

**GRADUATE STUDIES IN CHEMICAL ENGINEERING**  
**Brigham Young University**

**Graduate Student Handbook**

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August 2014  
(Supersedes all previous documents)

To the New Graduate Student,

On behalf of the faculty and staff of the Department of Chemical Engineering at Brigham Young University, I am pleased to welcome you to the department. We are anxious that you have a successful and beneficial experience while you are here, and this handbook is designed to help you do so. In addition, the faculty and staff of the department are also here to help you, and we hope you will feel free to approach any of us.

Your graduate education is intended to prepare you to be a leader in all areas of chemical engineering, rather than just in specific areas. In fact, most chemical engineers work on many applications throughout their careers that were never specifically addressed (in fact, may not have existed) during their formal schooling. For this reason, regardless of the topic of your graduate thesis or dissertation, you should not think of your graduate education as a means to become specialized in one area (e.g. combustion, thermodynamics, etc.), but instead, as a broad foundation upon which you will never stop building. Indeed, your graduate degree (especially a doctorate, but to a certain extent, also a master's degree) will indicate to your prospective employer that you can effectively apply fundamental principles to new problems.

To support the goal of a broad foundation, our program is designed to emphasize the fundamentals. Three cores courses, transport phenomena, thermodynamics, and chemical reaction engineering, are required of all students, and those courses become the basis of a comprehensive examination. Other "specialty" courses are also offered, but the student should approach those courses with a sense of continuity with the fundamental principles. Indeed, we encourage you to look for connections between what appear to be different areas. Do this in your course work, but also seek such connections through the graduate seminars that you will attend during each fall and winter semester. Also, seek opportunities for exchange with the faculty and with your fellow graduate students. Listen as your colleagues describe issues and challenges in their courses and in their research areas. In return, share your thoughts with them. As you contribute to the exchange of scholarship in our department, you will increase in ability to recognize the fundamental principles that tie together all areas within the broad chemical engineering discipline.

We eagerly anticipate your participation in the Chemical Engineering Department at BYU. We are particularly anxious that you find new understanding, new strengths, and new friendships to carry with you throughout your life. We pledge our best efforts to help you do so and ask for your best efforts as well. Welcome to our graduate program!

Sincerely,

Randy Lewis,  
Chair  
Department of Chemical Engineering

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## 1 - GRADUATE PROGRAM PHILOSOPHY

Welcome to the graduate education program in the Chemical Engineering Department of Brigham Young University. Your admission indicates our confidence in your abilities to succeed in advanced study and research. We expect you to put forth your best effort to learn new concepts and to develop research and learning skills beyond what you have acquired as an undergraduate. In turn, the faculty and staff will do its best to help you accomplish your educational goals. We anticipate that your time in graduate school will be some of the best of your life.

### 1.1 - Graduate Degrees

Because you have been admitted to our graduate program, you probably know something about what a graduate degree involves. However, the nature of a graduate program is so different from an undergraduate degree that you would be wise to read and reread the following paragraphs on the philosophy of graduate education. This will help you keep the ultimate objectives of your graduate education clearly in mind. Both the M.S. and Ph.D. degrees are research-oriented degrees. Course work is essential, but unlike undergraduate studies, is not the core of your studies. Your course work is designed both to broaden your understanding of chemical engineering and to deepen your insights into a specific area. This prepares you to make original contributions to a specific field. Working at the forefront of engineering science on a problem that is unique and specific to you will become the focus and highlight of your graduate studies.

As a graduate student, you will find yourself at a different level of interaction with faculty and peers than as an undergraduate, spending more time in discussions and problem solving with other graduate students and faculty and working with and discussing new problems with your faculty advisor. You will also find that more time must be devoted to learning on your own. Your academic independence will increase as you find that answers to some of the more profound questions confronting you are not in textbooks, but must be searched out in the scientific literature or through diligent personal study. As your graduate work progresses, a single thesis or dissertation problem will absorb your thoughts and excite your curiosity. You will become an expert in that particular field.

More important than the specific problem you work on are the problem solving techniques that you learn. Future employers rarely hire graduates to work on the same problem with which they wrestled in graduate school, though you will probably work in the same specialized area. Rather, they hire M.S. and Ph.D. students because of their acquired skills for concisely formulating, investigating, and solving complex technical problems, as well as their ability to present technical information to others. Keeping these ideas in mind, you may find interesting the definitions of the two degrees provided by the Council of Graduate Schools in the United States, (quoted in the National Research Council's book Engineering Graduate Education and Research):

*Broadly speaking, the master's degree indicates that the holder has mastered a program in a particular field sufficiently to pursue creative projects in that specialty... The degree should be awarded for completion of a coherent program designed to assure the mastery*

*of specified knowledge and skills, rather than for the random accumulation of a certain number of course credits after attaining the baccalaureate.*

*The master's degree is customarily awarded to an aspirant who achieves a level of academic accomplishment substantially beyond that required for the baccalaureate degree. The master's program should consist of a coherent pattern of courses frequently capped by comprehensive examinations and a thesis or its equivalent in a creative project. Ideally, all master's programs would include an opportunity for the student to learn to present information in written and oral form to a variety of audiences....*

The Ph.D. degree, on the other hand should be an original and significant contribution of knowledge to the field. In this respect, substantial portions of all Ph.D. dissertations should be publishable in peer-reviewed literature. Again quoting from the National Research Council's book Engineering Graduate Education and Research,

*The doctoral program is designed to prepare a student for a lifetime of intellectual inquiry that manifests itself in creative scholarship and research, often leading to careers in social, governmental, business, and industrial organizations as well as the more traditional careers in university and college teaching. The program emphasizes freedom of inquiry and expression and development of the student's capacity to make significant contributions to knowledge. An essential element is the development of the ability to understand and evaluate critically the literature of the field and to apply appropriate principles and procedures to the recognition, evaluation, interpretation, and understanding of issues and problems at the frontiers of knowledge.*

*A dissertation is universally required in U.S. universities for the doctor's degree. The purpose of the dissertation is twofold: (1) to develop in the candidate the independent ability to carry out a scholarly investigation of a challenging topic at a high level of professional ability, and (2) to provide for an original contribution to knowledge in the field. A nearly universal doctoral requirement is a comprehensive examination consisting of written and oral parts, generally imposed just before the candidate begins work on the dissertation. The purpose of the examination is to demonstrate an adequate knowledge of the field and an ability to use academic resources.*

Your research topic should be chosen carefully. The project should contribute to your education in three essential ways:

1. some theoretical understanding - a "why" component - of the problem
2. an understanding of the relationship of the problem to the general body of knowledge, and
3. creative and independent scientific problem solving skills

Your work must contain an element of your own creativity. This creativity may take the form of new engineering applications of existing principles rather than new scientific knowledge, but an original contribution is a distinguishing feature of all graduate research. Thus, a thesis is

not a descriptive essay, a narration of unimportant findings, or an application of a theory to another test case.

## 1.2 - Graduate Student Evaluation

As in any degree program, evaluation of your progress against program objectives is essential in assuring that you successfully obtain the desired education and degree. Evaluations will always have subjective components, but the department has tried to establish a complete set of evaluation criteria and performance indicators upon which to make fair evaluations. The following six categories are used by the faculty for evaluations:

1. Undergraduate performance
2. Knowledge of chemical engineering fundamentals
3. Ability to solve problems using an integration or synthesis of chemical engineering basics
4. Individual creativity
5. Continual progress toward solution of the research problem
6. Oral and written communication skills

Criterion 1 was used to evaluate your potential for success in our program before you were admitted for graduate studies in our department. Your undergraduate records and recommendations from faculty at your undergraduate institution were carefully evaluated, and your admission to the program is based on the faculty's confidence in you. The faculty wants you to be successful, and will help you achieve your goals.

Procedures and exams within the graduate program are specifically designed to help the faculty evaluate each of the remaining five criteria. These procedures are evaluation checkpoints. The specific items and procedures are:

- A. Comprehensive exams - called qualifying exams for Ph.D. candidates (2, 3)
- B. Graduate course grades (2)
- C. Prospectus (4, 5, 6)
- D. Advisory committee semi-annual evaluations (5)
- E. Thesis/dissertation defense (4, 5, 6)

The connection between these programs and the evaluation objectives are listed in parentheses above. For example, comprehensive exams covering the integration of material covered in the department's three core courses are used to evaluate criteria 2 and 3 above. The faculty's evaluation of your research prospectus is used to evaluate criteria 4, 5 and 6. Each of these programs is discussed in Sections 2 - 4.

By your performance in these five areas, you will have a good idea of how you are doing with respect to the evaluation areas or objectives. Besides semi-annual evaluations (item D above) there are specific formal evaluation times when important decisions concerning your status or progress are made by the faculty. This normally only occurs twice for M.S. students: at admission and at the oral thesis defense. In the case of Ph.D. students, four composite evaluations are made: at admission, at admission to candidacy, at the Ph.D. prospectus defense, and at the oral dissertation defense.

## **2 - PROGRAM PROCEDURES APPLICABLE TO ALL GRADUATE STUDENTS**

This handbook is not intended to reiterate the material in the Graduate Catalog, although there is some duplication. Rather, its intent is to inform you of particular requirements and procedures of this department. Please refer to the Graduate Catalog for other general university requirements. It is your responsibility to inform yourself of all procedures, fulfill all graduation requirements, and meet all deadlines. To assist you, you have been—or will be—assigned an initial faculty advisor to introduce you to the other faculty members, advise you with respect to initial registration, and help you select a faculty mentor and advisory committee. Upon arrival, please see the department secretary in 350 CB for information about your temporary advisor. The secretaries will also be able to provide you with your office and desk space assignment.

As a new graduate student, you should regularly check the bulletin boards and windows around the Chemical Engineering Office for postings of general information and procedures. Specific information pertinent to you will be communicated to you through a personal mail slot located just outside the main office. Incoming mail should be addressed to you, Department of Chemical Engineering, 350 CB, Brigham Young University, Provo, UT 84602. We request that you check this box at least daily for mail and other information.

The following subsections guide you through established procedures and policies in roughly the order you are likely to encounter them in your program.

### **2.1 - Admission Status**

Admittance to the graduate program in chemical engineering is extended to students most likely to derive the greatest benefit from attending BYU. All candidates must meet admission standards set by the Graduate School. Additionally, candidates for the Chemical Engineering graduate program must have an undergraduate degree in chemical engineering or a related field at the time of their admittance and must take the GRE exam. Additional factors considered in admitting students include

- Academic aptitude as indicated by previous grades, previous degrees, GRE or other national/international test scores, recommendations, etc.
- Research aptitude as indicated by letters of reference, prior research experience, demonstrated communication skills, and capacity for critical analysis and creative work.
- Demands on department resources as determined by outside fellowships, communication skills, intended research area, statement of research purpose, and tuition/stipend requirements.

No one of these factors either assures or precludes admittance to the program. Your admittance indicates our confidence in your abilities and your potential to succeed.

Your admission to the graduate program was assigned a status of either regular or provisional, based primarily on your previous grades and GRE scores. All students must submit an official GRE score. For U.S. students, a GPA of 3.0 in chemical engineering courses and an overall GPA of 3.3 is required for regular admittance into the graduate program. Regular admission permits you to pursue either the M.S. or Ph.D. degrees. If your status is provisional, then you may only enroll in the M.S. program and are not eligible for Ph.D. candidacy unless you complete a M.S. degree first. Additionally, provisional status carries some restrictions or provisions, itemized in a letter to you from the graduate coordinator that must be met to continue in the program. Generally this will require you to obtain a particular grade level in your first

semester or first year of course work, but it may include additional provisions. Once the provisions have all been satisfied, your status will automatically be changed to regular M.S. If for some reason, you do not satisfy the provisions of your admission, you will not be allowed to continue in the program.

## **2.2 - Degree Status**

Admitted M.S. students may immediately begin work on their M.S. degree. Students desiring the Ph.D. degree must be admitted to candidacy before undertaking course work and research beyond that required for the M.S. degree. Admission to Ph.D. candidacy is granted by the department only after successful completion of the core courses and qualifying exams as discussed later in Section 3. The status of a student who does not gain admission to Ph.D. candidacy is automatically changed to a M.S. program.

## **2.3 - Registration Requirements**

All graduate students must be registered for a minimum of 6 total hours per year (sum of Fall/Winter Semesters and Spring/Summer Terms) to avoid automatic cancellation of enrollment by the University. If your enrollment is canceled, you must apply for readmission. Additionally, a student must be registered for a minimum of 2 credit hours (or pay the equivalent fee) during the semester in which he defends the M.S. thesis or the Ph.D. dissertation.

Until you complete your approved study-list course work, you should generally enroll in more than 2 credit hours per semester. After your study-list courses have been completed, Department or advisor tuition support will only cover 2 credit hours per semester. These hours generally consist of research (699R/799R) and seminar (691R/791R) credits. Be aware that although the university considers 2 hrs full time for advanced graduate students with respect to university privileges, providers of student loans may require you to complete extra paperwork to prove you are still a full-time student in order to delay loan repayment.

It is a department requirement that all graduate students enroll for two credit hours during the Spring/Summer terms (one credit hour Spring, one credit hour Summer). It is also required that all graduate students enroll in 691R/791R every Fall and Winter Semester they are at the university working on their graduate degree.

All students who are in the United States on a student visa must be registered for 9 credit hours per semester unless they have completed their course work. When they have completed their course work, they may register for fewer hours provided that the graduate coordinator has granted written approval. This approval letter must be submitted to the University International Student Office.

## **2.4 - Core Courses**

All Ph.D. and M.S. graduate students are required to take the four core courses

ChEn 531 - Thermodynamics

ChEn 533 - Transport Phenomena

ChEn 535 - Kinetics and Catalysis

ChEn 601 - Directed Graduate Studies

as soon as possible, usually during their first year unless equivalent graduate-level courses have been taken as an undergraduate or transferred from another graduate program. These courses contain chemical engineering fundamentals of which every chemical engineer with an advanced degree should have mastery.

## **2.5 – Honor Code and Behavior Standards**

### **Honor Code Standards**

In keeping with the principles of the BYU Honor Code, students are expected to be honest in all of their academic work. Academic honesty means, most fundamentally, that any work you present as your own must in fact **be** your own work and not that of another. Violations of this principle may result in a failing grade in the course and additional disciplinary action by the university.

Students are also expected to adhere to the Dress and Grooming Standards. Adherence demonstrates respect for yourself and others and ensures an effective learning and working environment. It is the university's expectation, and my own expectation in class, that each student will abide by all Honor Code standards. Please call the Honor Code Office at 422-2847 if you have any questions about those standards.

### **Preventing Sexual Discrimination or Harassment**

Sexual discrimination or harassment (including student-to-student harassment) is prohibited both by the law and by Brigham Young University policy. If you feel you are being subjected to sexual discrimination or harassment, please bring your concerns to a professor. Alternatively, you may lodge a complaint with the Equal Employment Office (D-240C ASB) or with the Honor Code Office (4440).

### **Students with Disabilities**

If you have a disability that may affect your performance in any course, you should contact the office of Services for Students with Disabilities (1520 WSC). This office can evaluate your disability and assist the professor in arranging for reasonable accommodations.

### **Student Academic Grievances**

The university has an established procedure for handling graduate student academic grievances. If consulting with the faculty member or the graduate committee chair does not resolve a grievance, a graduate student should describe the problem to the department graduate coordinator and/or the department chair. If difficulties persist, the student may ask the college dean and finally the graduate dean for review. All grievances must be presented within a year of the semester in question.

The Graduate Student Academic Grievance Policy can be found under the resource section of the Graduate Studies Web site (<http://ww.byu.edu/gradstudies>).

### **Equal Opportunity Office**

Brigham Young University does not allow unlawful discrimination based on race, gender, color, national origin, religion, age, veteran status, or disability in the academic or employment setting. This includes unlawful sexual harassment, which is a violation of

university standards as well as state and federal laws, and may be considered grounds for discipline. Persons who believe they have been unlawfully discriminated against or unlawfully sexually harassed should contact the Equal Opportunity Office located in room D-282 of the ASB.

## **2.6 - Choosing a Research Advisor and Project**

The department has established a process designed to make the best possible match between each student and a faculty research advisor. No prior commitments between students and faculty are to be made outside of this process. The first step is for you to learn about faculty research interests and types of available projects as described on the department's website. You should contact and interview at least six faculty members whose research work seems interesting to you. Ask them about possible research projects and available funding. It may also be helpful to talk with current graduate students in the program to get additional perspectives. The department will provide you a form in which you indicate the six faculty members you interviewed and give a ranked list of your top three choices for advisor; the completed form must be returned to the department secretary by the indicated deadline (see below). The department will then make decisions regarding advisors. Once you have a permanent advisor your desk assignment can be relocated to an office within the area of the chosen research group and you can begin formulating a study list and advisory committee.

For the few students who are admitted for winter semester or spring term, full financial aid is not immediately available from the department and so the student must obtain initial support from a faculty advisor. Therefore these students should begin discussions with potential advisors and complete the advisor selection form as part of the application process. For students starting in the fall semester (the most common time) the selection form is due Oct. 31 after starting the program, with the following exception. Some students who have completed their B.S. degree and have been admitted for the fall may wish to perform paid research work during the preceding summer. Such work arrangements are negotiated directly between individual students and faculty members. However, because such employment often anticipates a more permanent advising relationship, we require that such students complete the advisor selection form, including interviewing six potential faculty advisors, prior to such employment. The department will review these forms and provide advice to students and faculty, while reserving the official advisor selection process for the fall semester.

## **2.7 - Advisory Committees**

The advisory committee assists you in choosing appropriate courses, provides guidance in your research, and helps evaluate your progress. The chairman of your advisory committee is your research mentor or thesis/dissertation advisor and must be from the Chemical Engineering Department. Once you and your advisor have decided on a research project, the other members of your advisory committee should be selected in consultation with your advisor. A Ph.D. candidate should select at least 2 committee members; then the department will assign 2 additional members from among the Ch En faculty. An M.S. candidate should select at least 1 committee member; then the department will assign at least 1 additional member from among the Ch En faculty. This should occur by the end of your first semester. The committee members you select should be faculty, not necessarily from Chemical Engineering, who have an interest in your project and are likely to contribute unique insights toward its successful completion.

Additionally, you should select faculty members with whom you will feel comfortable in periodically discussing problems and issues as they arise in your work. To organize your advisory committee, simply ask the chosen faculty member to serve as a member of that committee. His signature on the study list form indicates his consent to serve. Advisory committee members selected by the student may be changed in the same manner, but courtesy dictates that changes should only be made for compelling reasons, such as a faculty member on leave or a major change in research emphasis.

In order to be qualified to serve on your advisory committee, a person must have “graduate faculty status”, which is given by the BYU Graduate School to regular, part-time and adjunct faculty who meet the Graduate School requirements of experience and scholarship requisite with advising graduate students. Please check with your advisor or a member of the department graduate committee to confirm who has graduate faculty status. Also note that the current policy is that the graduate advisor and a majority of the graduate committee members must be regular chemical engineering department members.

All members of the advisory committee should be an important resource for you. Take advantage of the members' particular expertise and counsel as the project develops. Do not wait until your research is finished to find out that a member of your committee had a constructive idea that would have saved you time and effort. The advisory committee will also evaluate your progress in semi-annual reviews. For Ph.D. students the advisory committee, with the department graduate coordinator included as a voting member, has the important role of deciding Ph.D. candidacy.

## **2.8 - Study List**

A study list must be submitted and approved before the beginning of the student's second semester. Failure to submit your study list on time may cause your registration to be placed on hold for the next semester or term. The Graduate Study List is your officially approved course of study for the advanced degree. All courses listed on it must be successfully completed before the degree can be granted. With approval of your advisory committee it is possible to change courses on your study list. You may take classes unrelated to your graduate work while at BYU, but they should not appear on the study list and department/advisor tuition funds will not be used for them. Courses on your study list may be repeated to improve grades.

The steps in preparing the study list are as follows:

1. Obtain a study list form and instructions from the department secretaries.
2. Make a tentative selection of the classes which you think would be appropriate for your interests and meet all of the requirements for your particular degree.
3. Discuss these selections with your advisor and make modifications as necessary.
4. Have a study list signed by each member of your advisory committee.
5. Obtain the signature of the department graduate coordinator.
6. Submit the study list to the department secretary. The study list will be input into the computer for matching against degree requirements and pointing out deficiencies.
7. You will receive a copy of your study list in your mail box. If it is not approved, you must immediately work with the secretary and your advisor to resolve the problem.

8. Once the study list is approved, subsequent changes may be made by following the same procedures using a Study List Change form.

## **2.9 - Transfer Credit**

Students who wish to transfer credit from another university towards a graduate degree at BYU must follow the procedure outlined in the Graduate Catalog under "Credit Policies."

## **2.10 - Course Grades**

Although a "C" is an acceptable grade in the graduate program, you must maintain a grade point average of at least 3.0 for all courses on your study list. If your semester GPA drops below this level, you will automatically be placed on academic warning. The second time a semester GPA falls below 3.0, the student evaluation will receive a "marginal" classification on the annual evaluation. This will affect your financial assistance, evaluation status, and perhaps your continuation in the program. If the cumulative study list GPA falls below 3.0, the student is not permitted to graduate and may be dismissed from the program. No D credit may apply toward a graduate degree.

## **2.11 - English Course Work**

If English is **not** your native language and you did not do sufficiently well on the English proficiency exam required for admission, you may be required to take additional English coursework. Even if required by the department, these courses do not count toward degree credit requirements.

## **2.12 – Semi-Annual Progress Evaluations**

Each graduate student will receive progress evaluations twice each year, in winter and fall semesters. This is a chance for the student to demonstrate the exciting things he or she is learning and doing and concomitant progress toward graduation. Between January 1 and March 31 each winter semester, the graduate student will convene a progress review meeting with a majority of his or her thesis/dissertation advisory committee. The student will present results of coursework, qualifier examinations, prospectus status, publications, and research. The department will schedule this meeting. It typically lasts around 15 minutes, but may be as long as necessary to complete the review. The meeting may follow any format suitable to the committee and accordingly may be combined with research presentations, prospectus defenses, etc. Prior to the meeting, the student should note on the evaluation form which milestones have been completed on the included timeline (see below) and bring the form to the meeting. At the conclusion of the review, the advisory committee members present will indicate whether the student's progress is satisfactory, marginal, or unsatisfactory, and all advisory members present will sign the evaluation form.

At the beginning of fall semester each year, the department will review students' progress according to established milestones and deadlines. In consultation with the student's research advisor, the departmental graduate committee will determine if the student's progress is satisfactory, marginal, or unsatisfactory.

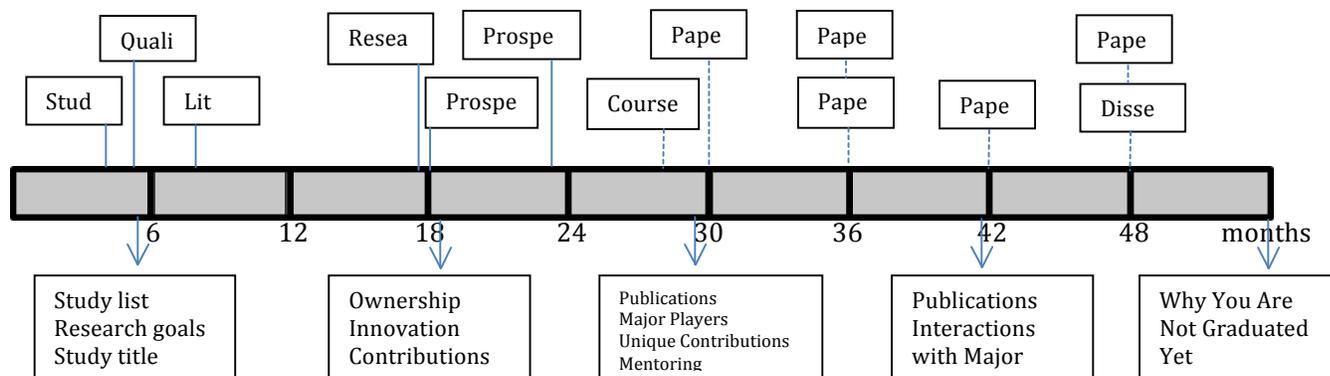
All semi-annual evaluation results are entered into departmental and Graduate School records. Each student will receive a letter indicating the evaluation outcome. If the evaluation of

any student is less than satisfactory, the graduate coordinator will outline in the letter the expectation that is not being met, the required changes in the student's performance, and a date by which the expectation must be met. This date can be the next regularly scheduled review (6 months) or sooner, consistent with the amount of work required. The advisor and the thesis/dissertation advisory committee will meet at the indicated date to consider student improvement. If this subsequent review is also less than satisfactory, the case is referred to the department graduate committee. The student's program will be terminated unless there is a compelling and exceptional justification for the graduate committee, with the concurrence of the student's advisory committee, to petition the university for an exception to policy, and the petition is granted.

Termination of a student's program will affect the visa status of foreign national students as they will no longer be associated with the university. Financial support for a student (tuition payments, etc.) can be withdrawn for failure to complete timely student-led reviews (winter semester) or to respond to reasonable requests associated with either semi-annual review.

The semi-annual evaluations are based on the following criteria. The timeline normally starts with the fall semester that the student takes the core classes: ChEn 531, 533, 535 (normally the first semester).

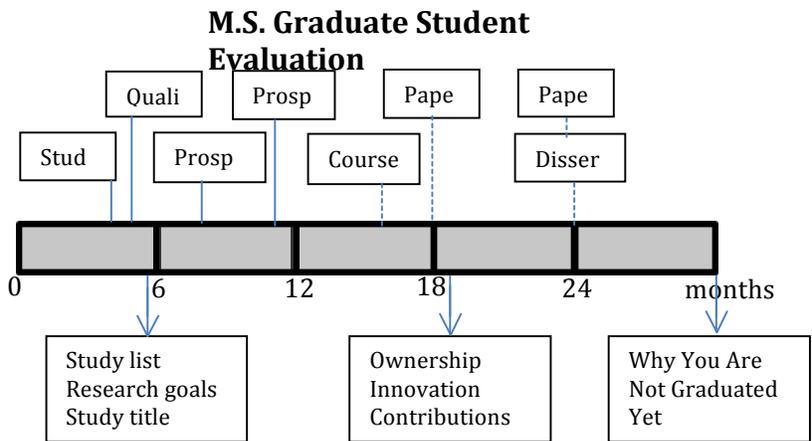
#### *Ph.D. Student Timeline and Evaluation Criteria*



1. Student completes objectives on timeline according to department expectations. Objectives with a solid line have “hard” deadlines: a satisfactory rating presumes on-time completion. Objectives with a dotted line are “soft” deadlines that are evaluated at the committee’s discretion.
2. Student completes study list courses with  $GPA \geq 3.0$ .
3. Student demonstrates innovative and independent research leading to high-quality publications and mentors other students.
4. Student behaves ethically.
5. The faculty will ask the student about these items:
  - First Year: The committee will inquire to determine:
    - The study list is completed, submitted and approved.
    - The student knows the study title and research goals.
  - Second Year: The committee will inquire to determine:
    - The student thorough understands and has “ownership” of the research project.
    - The student has made contributions and innovations towards the research project.

- Third Year: The committee will inquire to determine:
  - The status of publications and presentations.
  - Who are the major players and thought leaders in the field.
  - What unique contribution he/she has made in the research.
  - What mentoring (new grad or undergrad students) has been done.
- Fourth Year: The committee will inquire to determine:
  - The status of publications and presentations.
  - Interactions with major players and leaders in the field.
  - What new directions he/she has identified in the research.
  - Anticipated Ph.D. defense date.
- Fifth Year: The committee will inquire to determine:
  - Why the student has not graduated yet.
  - The status of publications and presentations.

*M.S. Student Timeline and Evaluation Criteria*



1. Student completes objectives on timeline according to department expectations. Objectives with a solid line have “hard” deadlines: a satisfactory rating presumes on-time completion. Objectives with a dotted line are “soft” deadlines that are evaluated at the committee’s discretion.
2. Student completes study list courses with GPA  $\geq 3.0$ .
3. Student demonstrates innovative and independent research leading to a high-quality publication and mentors other students.
4. Student behaves ethically.
5. The faculty will ask the student about these items:
  - First Year: The committee will inquire to determine:
    - The study list is completed, submitted and approved.
    - The student knows the study title and research goals.
  - Second Year: The committee will inquire to determine:
    - The student thorough understands and has “ownership” of the research project.
    - The student has made contributions and innovations towards the research project.
    - Anticipated date of M.S. defense.
  - Third Year: The committee will inquire to determine:

- Why the student has not graduated yet.
- The status of publications and presentations.

### **2.13 - Qualifying Exams**

Comprehensive examinations are required of all graduate students. Ph.D. students must pass these exams at a higher level than M.S. students, and so they are also called qualifying exams. Two open-book exams comparable in depth, extent and subject matter to that covered in the three core courses are given, but they are not necessarily typical of the course finals. They contain both quantitative calculational problems and qualitative questions (often in the form of multiple choice questions.) The exams include integration, synthesis, application, and extension of concepts learned in those courses. For example, a transport process or a kinetics problem may require utilization of your knowledge of thermodynamics to solve it. Or, you may have to use your thermodynamics and transport process knowledge to make a simple design calculation on a separation unit.

The comprehensive exams are offered each year during the first week in January. All beginning students must take the three exams immediately following completion of the core courses, normally in the first year. A composite result of either "high pass," "pass," or "fail" will be communicated to you by the department shortly after the exams are graded.

It is important to do well on these exams. There is a minimum expectation of "pass" at the M.S. level and "high pass" at the Ph.D. level. Failure to obtain this minimum will immediately jeopardize your degree as detailed in item 8 of section 3.1 and item 7 of section 4.1. Departmental evaluations are based on all of the criteria mentioned in section 1.2 and scores on these exams barely sufficient to achieve the desired passing level may still be insufficient if other evaluation areas are weak.

### **2.14 - Prospectus**

The prospectus is a written research proposal. Once you have formulated your thesis/dissertation problem and conducted a literature search, you should begin preparing your prospectus. Because it is a proposal, it should be completed and approved prior to significant and major work on the problem itself. The prospectus should:

1. Define and state the problem clearly
2. Include a comprehensive, critical literature review which puts the problem in perspective with the current body of knowledge and justifies its significance
3. Outline objectives and the significance of the work
4. Describe the methodology and approach that will be taken to solve the problem in sufficient detail to demonstrate that a successful conclusion can be obtained
5. Identify, in so far as possible, the student's unique and original ideas
6. Indicate work accomplished to date

Your prospectus is a valuable and essential part of your graduate program. This is a written document of no more than 30 pages for a PhD student (15 pages for MS), excluding front matter (title page, content, etc.), references and appendices. The format must be double spaced with margins no less than 2 cm and font no smaller than 11 pt. Appendices are not required for the students to write nor required for the committee to read. It defines the scope of your research

project so that both you and the faculty understand what must be accomplished to finish the degree. In this sense, it is an agreement that additional requirements will not be added later to the proposed project. It also requires you to plan, think creatively, and formulate your approach to the problem. It is not, however, binding with respect to proposed specifics, as research directions may appropriately change as the research unfolds. A copy of your prospectus with original signatures must be given to the department secretary to indicate completion of this requirement.

## **2.15 - Thesis/Dissertation**

The thesis/dissertation must conform in form and style with university, college and department regulations. The college has prepared a template and instruction, which if followed, will ensure that you have no formatting problems that will delay your graduation. After your thesis/dissertation is written you must submit it to the Chemical Engineering department secretary who will check it carefully for formatting errors. If 3 errors are found, the secretary will return the document to the student without further review and have the student go through the whole document again and fix all errors. If less than 3 errors are found, the secretary will point those out and the student must fix them (and any others) before the document is submitted to the college office. The college secretary will also review for formatting, and if more than two errors are found, the document will be returned to the student without further review. The student must allow each secretary at least two days to do this check, so do not put this off to the end. If the document is returned because of formatting errors, this will cost you at least 2 days. The formatting templates can be found at [http://www.et.byu.edu/thesis-dissertation\\_guidelines.htm](http://www.et.byu.edu/thesis-dissertation_guidelines.htm).

The length of the document should be sufficient to cover the work performed, but verbose presentations may be returned to the student for considerable reduction and editing before further review. Specific page limitations are found in section 3.6 and 4.4. The manuscript must be in clear, correct English, and it is the student's responsibility to produce such a document. Students are encouraged to use the Writing Laboratory in 1010 JKB as needed, and international students should enlist the aid of the Linguistics Department to ensure that the manuscript is grammatically correct.

Each new student has the responsibility to choose one (MS) or two (PhD) advisory committee members ("B" committee members) in addition to their primary research advisor (see Section 2.7). Then the department chooses one (MS) or two (PhD) additional committee members ("C" members). The student has the responsibility to enhance his/her own education and research skills by working closely with all members of their research advisory committee. He/she should keep them informed of progress and of upcoming important dates, such as annual evaluations, the prospective defense, and the thesis or dissertation defense. Such communication is particularly important when planning a defense to ensure that all committee members will be available on the day of the defense.

When planning to defend a prospectus, thesis or dissertation, please remember that the faculty are very busy and cannot drop all other responsibilities to read a document or attend a defense, even when employment is pending. Prior planning by the student and excellent communication with all committee members will help prevent unfortunate situations in which a student cannot defend before he/she must leave campus for employment. You must allow committee members at least 2 weeks to carefully review a prospectus, thesis or dissertation. In turn the faculty committee member will do his best to return a carefully criticized document to the student. If the faculty recognizes that there are major problems with the document early in his

reading, he may return it earlier and request that the student work on it before submitting it to him again.

The procedure for submitting a prospectus, thesis or dissertation is to first submit it to the primary research advisor. After multiple drafts back and forth, the advisor will indicate to the student when it is ready to go to the next level of the committee – the “B” committee member(s), whom the student chose. The student must allow him/them 2 weeks to read and give feedback on the document. When the student has satisfied his/their concerns (this may be more than one iteration), the student may submit a final draft to all committee members (A, B, and C members) for a final reading. After this final submission to the entire committee, the student may schedule a mutually agreeable time for a defense, not sooner than two weeks. There is a form required to apply for and schedule the defense.

Students, please do not shortcut this process. Attempting to skip or combine steps in the review process shortcuts your education and leads to frustration. Prior planning and good communication is the key to getting your documents approved and defended in a timely manner. We encourage you to communicate frequently with the committee and the department secretary during writing and review.

Writing a large scholarly document is not easy. Students often make the mistake of underestimating the time it takes to prepare such a document, placing undue pressure on themselves, faculty members and potential employers. While it may only take the better part of a semester to write the first draft, the subsequent review, revision and approval process will also require nearly a semester as shown in the schedule below:

	<u>Weeks Prior to Graduation</u>
1. Finish first draft	17
2. Advisor returns draft with corrections	15
3. Finish second draft	13
4. Advisor returns draft with corrections	11
5. Finish third draft, submit to "B" advisory committee members	10
6. "B" advisory committee members return draft with corrections	8
7. Submission to department secretary, and "C" advisory committee members	7
8. Oral defense	5
9. Submission of final manuscript	4
10. Commencement	0

As shown, you should plan to finish the first complete draft about 17 weeks ahead of the commencement in which you wish to graduate. Four weeks may be subtracted from that time if you do not care if the degree is not conferred until the following commencement. If so, you may leave campus after item 9 above. Students are strongly advised not to begin outside employment prior to submission of the final approved document. A student should not expect the above lead time to be shortened, as each document review by faculty can take up to two weeks and the document must be approved in sequential order by the research advisor and other members of the advisory committee.

## 2.16 - Application for Graduation

A signed Graduation Application Form (Form 8a) must be filed at the beginning of the semester in which graduation is expected. If graduation is delayed beyond the semester in which the application is submitted, it will be held over to the following semester. The cost, at the time of this printing, is \$20 for the M.S. and \$25 for the Ph.D.

While specific deadlines vary slightly from year to year, the deadlines listed **below for the 2007-2008 academic** year are representative of those which you need to be aware. These university deadlines are firm, so don't miss them. Be sure you look up the exact dates for the year you plan to graduate.

<u>December</u>	<u>April</u>	<u>August</u>	
Sep 29	Jan 25	May 23	Last day to pay the graduation fee at the Cashier's Office (D-155 ASB) and submit the Graduation Application (Form 8a) to your department
Nov 2	Feb 22	Jun 20	Last day to schedule a final oral examination (defense of dissertation, thesis, or selected project)
Nov 16	Mar 7	Jul 3	Last day to have a final oral examination (defense of a dissertation, thesis, or selected project)
Nov 30	Mar 14	Jul 11	Last day to submit form 8d and your completed work to the dean of your college for signature. Last day to submit ETD online.
Dec 7	Mar 21	Jul 18	Last day to submit final copies of dissertation, thesis, or selected project with form 8d to the HBLI Cashier's Office (Copy Center) for binding. Last day to complete any remaining requirements for a degree including payment of fees, submitting grade changes for I's and T's and examination results (oral or written) to the Office of Graduate Studies.
None	Apr 24	Aug 14	University Commencement
None	Apr 25	Aug 15	College Convocations

## 2.17 - Oral Defense

Please note that you must be registered for at least 2 credit hours in the semester that you defend your thesis/dissertation. Preferably, oral exams should not be scheduled or held during interim periods between semesters and terms. The procedure for submitting and defending your thesis or dissertation is:

1. When all members of your advisory committee agree that your thesis/dissertation is ready for defense and is in acceptable form, you must fill out the Departmental Scheduling of Final Oral Exam form and obtain signatures of your advisory committee members.
2. Submit this form to the department secretary and she will schedule your oral exam.
3. Submit a copy of your thesis/dissertation to the department secretary for her to review the document for format issues. She will review the document and give you a sheet indicating changes which need to be made to conform to department policy.

4. You must provide the department secretary with enough additional copies of the thesis for each member of the advisory committee. You must also deliver a 3-hole punched copy to the reserve library (3114 HBLL) at least two weeks prior to the date of the examination.
5. The first part of the oral defense is open to the public. You should prepare a 35 to 40 minute presentation of the work you have accomplished and its significance to your field. The public attendees are generally allowed to ask relevant questions during and after the presentation, but the exact format is set by the examining committee chairman, who is one of the advisory committee members assigned by the department. The department also allows a public or departmental seminar given in close proximity to the timing of the second part of the defense to count as the first part of the oral exam, provided the examining committee is present.
6. The second part of the oral defense is closed to the public. With the public dismissed, the examining committee will spend approximately one hour asking more probing questions about the problem, the methodology, the results and the document itself. This constitutes the defense of the thesis/dissertation, and you, not your advisor, are responsible for defending the quality of the work.
7. At the conclusion of the defense, you will be excused while the examining committee discusses the results of the exam and votes. The outcome of the committee vote may be any one of four grades:
  - A. Pass - You must, however, satisfactorily resolve minor corrections indicated by committee members. This will be monitored by your advisor.
  - B. Qualified Pass - The student must complete more extensive revisions. The chairman of the examining committee must send the graduate school written approval of the thesis when accepted to remove the qualified appellation.
  - C. Recess - the student must retake the defense from the same committee after major conditions have been met, but no sooner than one month later. Only one recess will be granted to a candidate.
  - D. Fail - the graduate degree program of the student is terminated.

### **2.18 - Submission of Thesis/Dissertation**

After appropriate revisions of the thesis/dissertation, signatures should be obtained on the acceptance and abstract pages. Only one original set of signatures is required, the others may be photocopied. Obtain from your advisor the Departmental Approval for Submission of Thesis for Binding (Form 8d) and obtain his signature and that of the examining committee chairman. This form contains specific instructions for submitting your thesis/dissertation. At least two copies must be submitted for binding. The distribution is: 1-department and 1-advisor. If you desire a personal bound copy, submit another copy at this time also. The ETD should also be submitted at this time.

In addition to the copy charges, the following charges must be paid:

- |  |              |
|--|--------------|
| 1. Binding Fees:   | \$10.00/copy |
| 2. Mail Costs (for your personal copies mailed outside the US) | \$6/copy     |

### **2.19 – Writing and Publishing of Theses and Dissertations**

The cost of publishing a thesis or dissertation documents is the responsibility of the student. Department and university computers may be used for data and word processing. The costs of printing drafts and copies of the documents should not be paid by the department. With permission of the department secretary and advisor, the student may use a department printer or copy machine if the costs are reimbursed to the department, including paper and machine costs (machine usage costs per page). Printing must be done at a time designated by the department secretary, and should be when the faculty and staff are not using the printers or copy machines. These rules also apply to prospectus documents.

### **3 - SPECIFIC INFORMATION FOR PH.D. STUDENTS**

#### **3.1 - Degree Requirements**

##### *1. Credit Hours*

A minimum of 54 credit hours beyond the B.S. degree is required. This includes 36 hours of graduate work and 18 dissertation hours. Students already possessing a M.S. degree may have up to 20 hours of their M.S. program apply toward satisfaction of these requirements as determined by the graduate committee (but still must have at least 36 hours total at BYU).

##### *2. Required Courses*

###### A. Core courses

ChEn 531	3 hrs.	Thermodynamics
ChEn 533	3 hrs.	Transport Properties
ChEn 535	3 hrs.	Kinetics and Catalysis
ChEn 601	2 hrs.	Directed Graduate Studies

###### B. Seminar

ChEn 791R	2 hrs.	Graduate Seminar
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###### C. Dissertation

ChEn 799R	18 hrs.	Dissertation
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###### D. Math requirement

6 hours of the above 36 hours of graduate coursework must be from graduate-level math, statistics or computer science courses. Engineering courses that cover equivalent content, such as ChEn 541, ChEn 641, and MeEn 505, may be used.

All Ph.D. students must complete a 3-hour course in each of the following areas, if this has not been done previously while a B.S. or M.S. student.

<i>Area:</i>	<i>Satisfactory courses:</i>
Partial Differential Equations	Math 303, Math 447, or MeEn 505
Numerical Analysis	Math 411, ChEn 541, or ChEn 641
Statistics	Stat 340, 431, 462, 511, or 512

Graduate-level classes (courses numbered 500+) taken to fulfill this requirement also count as part of the above 36-hour overall requirement and 6-hour math-related course requirements.

E. English-as-a-second language (only for students with a non-English native language)

Competency in writing, as determined by the Advisory and/or Graduate Committee is required. Normally TESL 404 is the minimum requirement, but ESL exams, taken upon arrival at the University, may suggest other requirements.

3. *Undergraduate Courses*

In general, no undergraduate courses (100-499 level) count toward the required 36 graduate course work hours. However, up to 6 credit hours of undergraduate interdisciplinary course work may be counted toward the 36 graduate course work hours as follows:

<u>Bioengineering Research Area</u>	<u>Statistical Thermodynamics Research Area</u>
Chem 481	Phscs 321
Chem 482	Stat 340
MMBio 430	
MMBio 461	
PDBio 362 & 363	

These undergraduate hours may only be counted if the student is performing his Ph.D. research in that particular area. For example, a student doing a dissertation in the combustion area may not count any of these undergraduate classes toward the minimum of 36 graduate course work hours.

4. *Advanced Classes*

At least 3 credits of 600-level or higher engineering or science courses, not including ChEn 601, must be included in the approved study list.

5. *Teaching Assistant*

Each student must serve the equivalent of 20 hrs/week for 1 semester as a teaching assistant. The word equivalent here allows other options such as 10 hrs/week for 2 semesters.

#### 6. *Minor*

If you desire, you may declare a minor based on 12 hours of coherently related courses. To do so, you must select a graduate faculty member to serve on your advisory committee who will write and/or administer an oral or written comprehensive examination in the minor area. A minor may even be from another department if approval is first obtained from the chemical engineering graduate coordinator and the other department's chair.

#### 7. *Residence*

All students must study on campus at least two consecutive 6-hour semesters (see University Graduate Studies Catalog).

#### 8. *Comprehensive Qualifying Examination*

All Ph.D. students must take comprehensive written qualifying exams, with the exception of case 3A, B below. Results of the qualifying exam will be combined with grades in the core graduate courses to determine Ph.D. candidacy, as explained in section 3A, B below. The department wants to see students succeed through preparation and hard work. A "high pass" will enable admission to Ph.D. candidacy, and generally corresponds to a minimum level of about 70% on the exams. A "pass" means that the student will be dropped from Ph.D. candidacy and admitted to the M.S. program, and generally corresponds to a level of about 50% on the exams. Students who receive a "fail" will be dismissed from the Ch En graduate program. It is our hope that the entrance requirements and class preparation will minimize the number of students receiving this latter evaluation.

The qualifying level of preparation is listed below for several of the most common cases:

1. A student with a B.S. degree from any university must pass the qualifying examinations at the "high pass" level to be admitted to Ph.D. candidacy.
2. A student with an M.S. degree from a university other than BYU must pass the qualifying examinations at the "high pass" level to be admitted to Ph.D. candidacy.
3. A student already completing a M.S. degree in Chemical Engineering from BYU may subsequently pursue a Ph.D. degree if the student received a "high pass" evaluation on the qualifying exam (either during the first try or during a subsequent try), and less than one year has lapsed since graduation with the M.S.

#### 9. *Research seminar*

At the beginning of the second academic year in the program, each Ph.D. student will prepare a 10-minute oral presentation of their research plans and progress. The presentation will be given to the faculty and other graduate students, typically scheduled in September as part of the graduate seminar (ChEn 791R).

#### 10. *Time Limit*

We anticipate that a regularly matriculated student can complete a Ph.D. degree in 4 calendar years. With diligent work and wise use of time, this goal is regularly achieved. The student and advisor should plan and work together to complete the Ph.D. degree in about 4 years from the time of enrollment. All students must complete the Ph.D. degree within 8 years of the first semester of enrollment. Department financial aid will not be given to students after 5 years from the time of enrollment.

### **3.2 - Advisory Committee**

The Ph.D. advisory committee consists of at least 4 members in addition to the chairman. Two of these are selected by the candidate, and 2 are selected by the graduate committee. (see Section 2.7)

### **3.3 - Prospectus**

The Ph.D. prospectus is an extensive written document. The literature survey and problem definition in the prospectus often may become the framework for the first few chapters of the dissertation. It should not be verbose, but must adequately address the issues stated in Section 2.11. This is a written document of no more than 30 pages, excluding front matter (title page, content, etc.), references and appendices. The format must be double spaced with margins no less than 2 cm and font no smaller than 11 pt. Appendices are not required for the students to write nor required for the committee to read. The prospectus and proposed research are defended in an oral exam open to all faculty and students. The student should prepare a 20- to 30-minute seminar summarizing the proposed work. Following the presentation by the student, a closed examination is held, during which the examining committee, consisting of the members of the advisory committee, one of which serves as chairman, ask questions about the prospectus, the research objectives, methodology, and significance. This part of the exam is generally 30 to 40 minutes long. Subsequently, the examining committee votes and informs the student of the decision. The conclusion of the committee may be "fail," or "pass." Any two "fail" votes will constitute failure. In the event of failure, only one repeat attempt to pass the prospectus exam is permitted. Regardless of the evaluation, the student must make any changes in the prospectus required by the examining committee before the results become official.

A draft of the bibliography section of the Ph.D. prospectus must be submitted to the advisor prior to completion of the Ch En 601 class. The student must submit and successfully defend a written prospectus on his/her proposed dissertation research topic within 15 months of completing the Ch En 601 class or 15 months after completing the M.S. degree, unless an exception is approved by the advisory committee.

To facilitate preparation of the prospectus, the candidate must obtain the appropriate signatures on the Ph.D. Prospectus Worksheet before the prospectus defense is scheduled; see Section 8.1 of this document. The prospectus defense will be chaired by one of the two committee members selected by the graduate committee.

### **3.4 - Admission to Candidacy**

The decision to admit a student to Ph.D. candidacy is made by a vote of the faculty after the qualifying exam. This decision is based on a composite evaluation of the student's performance on:

- |  |                  |
|--|------------------|
| 1. Study-list courses and grades therein | (~40%)           |
| 2. Qualifying exams                      | (~60%)           |
| 3. Annual evaluations                    | (if appropriate) |

Finally, at the prospectus defense, the advisory committee makes the decisions to continue candidacy based on grades, performance on the qualifying exams, annual evaluations, and performance on prospectus.

Except in unusual circumstances where permission is granted from the graduate coordinator, all of the above items must be completed within 15 months of completing the Ch En 601 class. Students who fail admission to candidacy, or do not continue candidacy, may complete a M.S. degree only—or they may be dismissed from the graduate program.

### **3.5 - Originality**

A significant amount of meaningful, creative, original work by the student must be included in the dissertation work. The dissertation must constitute a contribution to the current body of knowledge and large portions should therefore be publishable in the peer-reviewed literature. All work applying toward the degree must be completely open for University review and publication. Any exceptions to this policy must be supported by written approval by the department and college and obtained in advance of any work performed. Publication of the results of the dissertation in the open literature is an expectation of the Ph.D. degree.

### **3.6 - Length of Dissertation**

It is imperative that the dissertation be written in a logical and concise manner. A recommended length is 125 to 150 pages, in double-spaced format (excluding the appendix). Documents longer than 200 pages will be returned to the candidate. The appendix should be used to archive extensive tables, computer codes, derivations, etc.

### **3.7 - Graduation Evaluation**

Graduation evaluation is based on completion of the above requirements and the quality of the dissertation, including the oral exam and the written document.

### **3.8 – Publications**

An important aspect of the educational experience is to generate and then disseminate new knowledge. In addition to writing and defending a dissertation, the quality research and new knowledge must be transferred to the scientific community. A Ph.D. student is expected to produce at least 3 peer-reviewed articles in archival journals, based on the dissertation research. It is best for the student to write and submit these papers before leaving campus.

## **4 - SPECIFIC INFORMATION FOR M.S. STUDENTS**

Two types of M.S. degrees are available. The traditional M.S. degree requires a modest amount of significant original research by the student. Generally this will be sufficiently original

and meaningful that a peer-reviewed publication will result from the work. The requirements for this type of program are outlined below.

Occasionally, an M.S. student will work on a graduate project that requires a significant amount of engineering design or application of existing knowledge to solve a significant problem. This project is important to an industry or other organization, but may not be suitable for peer-reviewed publication. The preparation for this type of project is somewhat different, and requirements are listed below. An M.S. project is not a quick or easy path to an M.S. degree. An M.S. project degree requires a minimum of 34 credit hours whereas a M.S. thesis degree requires a minimum of 30 credit hours.

#### 4.1- Degree Requirements

##### 1. Credit Hours

A minimum of 30 credit hours of graduate work beyond the B.S. degree are required. This includes at least 24 credit hours of graduate course work and at least 6 thesis or project credit hours.

##### 2. Courses

###### A. Core courses (11 hrs) (for all M.S. students)

ChEn 531 (3 hrs)	Thermodynamics
ChEn 533 (3 hrs)	Transport Properties
ChEn 535 (3 hrs)	Kinetics
ChEn 601 (2 hrs)	Directed Graduate Studies

###### B. Other Required Courses

Research Emphasis	Design Emphasis
(None)	8 hrs. (any additional count towards electives) Stat 431 (3) (if not taken as undergrad) <i>At least one of the following:</i> ChEn 510 – Reservoir Engineering ChEn 528 – Industrial Catalysis ChEn 534 - Advanced Separations ChEn 641 – Combustion Modeling ChEn 674 – Advanced Thermodynamics

###### C. Elective Courses

12 hrs	8 hrs
	<i>List of optional classes:</i> ChEn 541 - Num. Methods for ChEn ChEn 693R - Special Projects

MeEn 531 - Design of Control Systems MeEn 575 - Optimization Mfg 480 - Process Planning Mfg 572 - Design for Manufacturing Other classes as approved
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D. Seminar

ChEn 691R (1 hr) Graduate Seminar	ChEn 691R (1 hr)
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E. Thesis

ChEn 699R (6 hrs) Thesis	ChEn 698R (6 hrs) Project
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F. English-as-a-second language

Competency in writing, as determined by the advisory board and or graduate committee is required. Normally TESL 404 is the minimum requirement, but ESL exams, taken upon arrival at the University, may suggest other requirements.

3. *Undergraduate Courses*

If process control, plant design, separations and kinetics were not taken as an undergraduate these courses must be taken. Up to 9 hrs of these courses may be applied toward the 30 total required credit hours. No more than 9 hrs of any course numbered 300-499 may apply toward the 30 required hours. No 100-299 level courses may be counted toward the 30 required hours.

4. *Teaching Assistant*

Each student must serve the equivalent of 10 hrs/week for 1 semester as a teaching assistant.

5. *Minor*

If you desire, you may declare a minor based on 9 hrs of coherently related courses. To do so, you must select a graduate faculty member to serve on your advisory committee who will write and/or administer an oral or written comprehensive examination in the minor area. A minor may even be from another department if approval is first obtained from the chemical engineering graduate coordinator and the other department's chair. No more than 3 hrs of 300-499 level course work may be used in this declared minor. A minor in Engineering Management has replaced the former MEM program. The minor requires 9 hours. MBA 502 - Managerial Accounting 1 (3 hrs) and 520 - Business Finance (3 hrs) are required courses. The other 3 hours are selected from:

MBA 550 - Marketing Management (3 hrs)

MBA 650 - Research Methods in Marketing (3 hrs, MBA 550 prereq)

MBA 673/674 - Creating and Managing New Ventures (3 hrs each)

PMGT 621 – Public and Nonprofit Budgeting (1.5 hrs)

PMGT 676 – Local Government 2 (3 hrs)

This minor requires an additional 6 hours of course work beyond the 30 hr minimum for an M.S. degree.

#### 6. *Residence*

Each student must study on campus at least two full-time semesters.

#### 7. *Comprehensive Examinations*

M.S. students (both Research Emphasis and Design Emphasis) must receive a minimum composite evaluation of "pass" on the comprehensive exams.

#### 8. *Time Limit*

We anticipate that a regularly matriculated student can complete an M.S. degree in 2 calendar years. With diligent work and wise use of time, this goal is regularly achieved. The student and advisor should plan and work together to complete the M.S. degree in less than 2 years. All students must complete the M.S. degree within 5 years of the first semester of enrollment. Department financial aid will not be given to students after 3 years from the time of enrollment.

### **4.2 - Advisory Committee**

The candidate, in consultation with the advisor, will invite at least one faculty to serve on the committee. The graduate committee will then assign an additional Ch En faculty member to serve on the committee. (See Section 2.7)

### **4.3 - Prospectus**

The M.S. prospectus is a short written document for both Research and Design Emphasis. It should not be verbose, but must adequately address the issues stated in Section 2.14. This is a written document of no more than 15 pages, excluding front matter (title page, content, etc.), references and appendices. The format must be double spaced with margins no less than 2 cm and font no smaller than 11 pt. Appendices are not required for the students to write nor required for the committee to read. The prospectus must be approved by the advisory committee. Signatures of all advisory committee members and the graduate coordinator constitutes acceptance of this document. A complete draft of the prospectus must be submitted to the advisor prior to completion of the Ch En 601 class. The prospectus must be completed and approved within 3 months of completing the Ch En 601 class.

#### **4.4 - M.S. Thesis Guidelines**

Guidelines for the M.S. thesis are 60 to 80 pages, excluding appendices. Theses of 100 pages or longer will be returned to the student. The appendix should be used to archive extensive data, tables, computer code, etc.

#### **4.5 - M.S. Design Emphasis**

A project report must be submitted and successfully defended before the examining committee. The same level of rigor and critique will be applied in a project defense as in a thesis defense. The length of the project report may be much shorter than an M.S. thesis (30 to 40 pages), but will still describe quality work in a professional manner.

#### **4.6 - Graduation Evaluation**

The decision to confer an M.S. degree is based on the overall performance of the student in the following areas:

1. Study-list courses
2. Comprehensive exams
3. Annual evaluation(s)
4. Prospectus
5. Thesis/project
6. Oral examination

Obviously the latter two categories are more heavily weighted, but performance in the other areas will be a factor in case of borderline decisions.

#### **4.7. – Publications**

An important aspect of the educational experience is to generate and then disseminate new knowledge. In addition to writing and defending in a thesis, the quality research and new knowledge must be transferred to the scientific community. An M.S. student doing a traditional degree is expected to produce at least one peer reviewed article in an archival journal, based on the thesis research. It is best for the student to write and submit the paper(s) before leaving campus.

### **5 - GRADUATE STUDENTS WITHOUT CH EN B.S. DEGREE**

#### **5.1 – Required Supplemental Courses**

Students with a B.S. degree in chemistry, mechanical engineering, or similar technical background may be accepted into our graduate program. They will have to take additional undergraduate coursework. This is based on two principles: (1) Each student should have sufficient preparation prior to taking the graduate core classes (ChEn 533, 535, and 531) that he or she has a reasonable chance to do well, and (2) each graduate student should be reasonably competent in a basic set of undergraduate chemical engineering skills, as the student may be called on to exercise those skills by a future employer.

What follows is a list of undergraduate classes that fulfill these two expectations, and which generally will be completed during the first year. It is expected that most students will have prior coursework that fulfills some of the required topics and, based on the department graduate committee's evaluation, those requirements will be waived.

*Year 1 Fall Semester*

Chem 351 – Organic chemistry

ChEn 374 – Fluid mechanics

ChEn 273 – Chemical process principles (taken online; may be taken in summer)

Math 302 – Engineering math (or equivalent)

*Year 1 Winter Semester*

ChEn 373 – Thermodynamics (or equivalent – must include multi-component phase equilibria)

ChEn 376 – Heat and mass transfer

ChEn 386 – Reaction engineering

Math 303 – Engineering math (or equivalent)

*Year 1 Spring Term*

ChEn 493R (2 credits) – Design lab\*

\*This course is still under development and details are pending. It will be an independent experience in which the student will complete unit operations lab experiments and will carry out a mini-plant design using process design software (ChemCad). The design must include a distillation-type separation.

Following completion of these courses while maintaining a GPA of 3.0 or better, the student may continue in the program and take the normal graduate core classes and the qualifying examination in the second year. Likewise, the clock for other graduate-student milestones such as the prospectus will begin with the second academic year. The student may take graduate elective classes at any appropriate time including the first year.

## **5.2 - Financial Support**

During the first year it is anticipated that graduate students in this category will devote most of their time to undergraduate-level coursework. Once a student has been matched with a faculty advisor, the student may receive hourly wages for time spent initiating and conducting research. Following the successful completion of the first year, the student will be given the normal graduate student financial aid package from the department for their degree program.

## **6 - INTEGRATED MASTER'S PROGRAM**

### **6.1 - Purpose**

Undergraduate students who have completed the first semester of the professional program (junior year) and have 32 or more credit hours remaining toward their B.S. degree may elect to pursue an M.S. degree concurrently with the B.S. degree in the integrated Master's program. The student begins working with a research advisor and completing graduate-level courses at the same time as completing undergraduate coursework, as long as no class is counted towards both degrees. The parallel nature provides greater flexibility in scheduling and therefore can shorten the time required to obtain the M.S. degree over the serial approach.

Any student can count up to 10 credit hours taken while an undergraduate toward a subsequent graduate degree, as long as those credits were not counted toward the B.S. degree. Thus if a student anticipates taking three or fewer graduate classes before being eligible to earn the B.S., it is probably preferable to not enter the integrated Master's program formally. Students formally part of the integrated Master's program may only receive their B.S. degree at the same time as their M.S. degree at the conclusion of the program.

There is no integrated Ph.D. program.

### **6.2 - Prerequisites**

A cumulative GPA of 3.2 in chemical engineering courses and a 3.3 GPA in all courses is required at the time of entry. The candidate must be in the top 25% of his/her class based upon grades in Ch En, Chemistry, Math and Physics. The student must be enrolled at BYU in junior-level chemical engineering courses. Admission must be by full review of the graduate committee. The candidate must have an advisor to sponsor him/her. Also, the admission process will require an evaluation from all Ch En professors who have taught the candidate in a class, and each of those professors will indicate a vote for or against admission of the candidate.

### **6.3 - Procedures**

1. Visit with at least three chemical engineering faculty members and identify an M.S. research program in which you would like to pursue your studies. Secure verbal agreement with the chosen faculty member to sponsor your M.S. research.
2. Fill out the Integrated Master's application form available from secretaries.
3. Fill out the outline of the study program which is part of the application mentioned in item 2. This outline indicates which courses will apply toward the B.S. degree and which will satisfy the M.S. requirements. It also specifies the semester in which you plan to take each of the courses. Your undergraduate advisor should help you fill out the undergraduate courses and your research mentor (graduate advisor) will help you choose and organize appropriate graduate courses. This mentor will later become your advisory committee chairman.
4. Prior to completing the last 30 hours of the combined program, apply to the Graduate School for formal admission into the regular M.S. program. The timing on this is crucial since the Advisement Center must certify that no more than 30 hours remain in the

combined program, yet you will not want to apply too early since it is important to have as much course work completed as possible. However, you must be admitted to graduate school at least two semesters prior to receiving the M.S. degree.

5. All M.S. rules covered in Section 4 apply to the student upon regular admission to the M.S. program. After regular admission to the graduate program, IM students must also have a yearly committee evaluation (see Section 2.12).
6. Comprehensive exams must be taken at the first available offering following completion of the graduate core courses whether or not the student has been officially admitted to the M.S. program. The student must plan his/her schedule such that the core courses are taken within the first year of admission to the regular M.S. program.

## **7 - FINANCIAL ASSISTANCE**

### **7.1 - Eligibility**

Generally, all graduate students receive stipend support from the department for 6 months during the first year of their program. At the conclusion of departmental support, graduate students are generally funded as research assistants from their advisor's external research contracts. Ph.D. students making satisfactory progress are also eligible for tuition assistance from the department during the early part of their programs. On occasion, students may receive supplemental stipend support through an extra departmental teaching assistantship.

The following are not eligible for financial assistance from the department:

1. Students with study-list GPA below 3.4
2. students on probation
3. students who receive 2 consecutive annual evaluations of marginal or unsatisfactory
4. Ph.D. candidates with 5 or more years residency; M.S. candidates with 3 or more years residency
5. Students who do not complete an annual evaluation by established deadlines.

### **7.2 - Available Funding**

#### *1. Department Tuition Scholarships*

Currently the department offers full-time tuition scholarships to Ph.D. students during the first two semesters of their program. Support during later semesters is dependent on department budgets, which fluctuate from year to year, and currently covers up to 4 credits during each of the Fall and Winter Semesters of the second year. This support may only cover classes that are part of the approved study list and necessary for graduation. Because department tuition support funds are limited, Ph.D. students should talk with their advisors about receiving tuition support from faculty research contracts. M.S. students do not receive departmental tuition support. If a student is unable to pay tuition costs in a given semester, short-term loans are available from the university.

#### *2. Teaching Assistantships*

In return for departmental support during the first year, and as a means for furthering their educations, supported graduate students must serve as teaching assistants to professors in an area of the student's expertise. All Ph.D. candidates must serve as a teaching assistant

for 20 equivalent hours (e.g., 10 hrs/wk for two semesters, 20 hrs/wk for one semester, etc.), and all M.S. students must serve for 10 equivalent hours as part of the degree requirements. Students who serve as a TA beyond these requirements may receive additional departmental stipend support to augment or replace that from their advisor. Applications are made by contacting the department secretary, who consults with the professor in charge of a particular course.

### 3. *Research Assistantships*

Funds for specific research projects are administered by each individual faculty member.

## **7.3 - Conditions for Acceptance of Financial Aid**

Students may receive support from any combination of the above sources, either on an hourly (time card) or contract basis at rates consistent with annual student salary guidelines determined by the department. A student receiving support from the department, his or her advisor, or both, is expected to devote themselves full-time toward their degree objectives and may not have any other forms of employment. Furthermore, students who intend to graduate “on time” generally must devote themselves beyond a 40-hour work week. Completion of your degree requires satisfactory solution of your thesis/dissertation problem, not a specified number of hours.

U.S. students who intend to apply for federal financial aid in addition to department support should note the following. Under federal requirements the total amount of loan, grant, and scholarship money received by a graduate student each year cannot exceed the estimated cost of education at BYU. If a student borrows money through a federal student loan program and the total amount of financial aid exceeds the established cost of education for that academic year, then the excess financial aid will not be given to the student but instead be used to pay down the incurred student loans.

## 8 - SPECIFIC FORMAT REQUIREMENTS FOR THESES AND DISSERTATIONS

### 8.1 - Ph.D. Prospectus Worksheet

A Ph.D. prospectus should be no longer than 30 pages (excluding front matter, references, appendices, etc.) and should address the issues discussed in the ChEn graduate handbook. This worksheet helps plan the prospectus defense.

1. The prospectus is ready for the Advisory Committee:

\_\_\_\_\_  
Advisor

2. The prospectus is ready for the oral examination:

\_\_\_\_\_  
Committee Member

\_\_\_\_\_  
Committee Member

3. Present this sheet, with appropriate signatures, to the department secretaries. They will arrange to schedule the time for the prospectus defense. Please allow 1-2 weeks to allow for faculty schedules.
4. The prospectus presentation should be approximately 20-30 minutes, and will be followed by approximately 30-40 minutes for questions. The following questions are on the evaluation sheet for the advisory committee.
  - A. Does the prospectus define and state the problem clearly?
  - B. Does the prospectus include a comprehensive, critical literature review which puts the problem in perspective with the current body of knowledge and justifies its significance?
  - C. Does the prospectus outline objectives and significance of the work?
  - D. Does the prospectus describe the methodology and approach that will be taken to solve the problem in sufficient detail to demonstrate that a successful conclusion can be obtained?
  - E. Does the prospectus identify, in so far as possible, the student's unique and original ideas?
  - F. Does the prospectus indicate work accomplished to date

### 8.2 – Electronic Submission of Theses and Dissertations

Electronic submission of theses and dissertations greatly increases their accessibility, expands the range of formats in which information can be presented, and decreases university resources required for archiving. The college requires students to submit one electronic copy of their thesis or dissertation. However, this does not change the requirement for two traditional, hard-bound submissions (one for the student's advisor and one for the department). Another hard-bound copy may be submitted if the student would like a personal copy. Information regarding ETD's and the submittal process can be found at <http://etd.byu.edu/>.

### 8.3 – Graduate Studies Minimum Standards for Submitting Dissertations and Theses

*College Standards can be found at:*

*[http://www.et.byu.edu/thesisdissertation\\_guidelines.htm](http://www.et.byu.edu/thesisdissertation_guidelines.htm)*

- NOTE:** Graduate students can submit their dissertation, thesis, or selected project electronically (in addition to submitting a paper version if required by the department). Some departments and colleges require electronic submission, so you should check with your individual department. The library does not require paper copies for a dissertation, thesis, or selected project submitted electronically. The ETD website, <http://etd.byu.edu>, has detailed information on the electronic submission requirements and formatting guidelines. It also has a comprehensive tutorial to help you prepare your electronic document.
- CAUTION:** To ensure the uniformity and continuity of style and format of all dissertations, these, and selected projects\* submitted to the university, please follow the university requirements listed here as well as the guidelines in the style manual required by your department. Please do not use as your guide a work submitted to the university in the past. To avoid the unnecessary expense of having to retype or reprint your work, please check your work carefully against the following standards before submitting it to your committee and college for final approval.

### **A. Format Requirements**

1. Paper: use 24-pound weight Xerox LX paper (which is acid-free and laser compatible) for all university copies. The required preliminary pages (see section B1) are to be single-sided. Your document should be double-sided if it is over 300 pages in length.
2. Printing: Use a laser or high-resolution inkjet printer with black, letter-quality in a standard size (10, 11, or 12 point only, including titles and headings). Use a standard, easily readable serif typeface such as Times Roman or Palatino. Ornamental typefaces, including script, may not be used. The body of the work should be double-spaced.
3. Margins: 1.5 inches on the bound side; 1 inch on the top, bottom and unbound side.
4. Page numbering: Preliminary pages are to be counted in the pagination and, where appropriate, numbered with lowercase Roman numerals (see section B5 below). The body of the work should be numbered consecutively with Arabic numerals, beginning with 1 and counting into any appendices (1a, 10c, B1, etc., are not acceptable).

### **B. Style Requirements**

1. The required university pages are to be single-sided and in the standard university style as illustrated on the attached sample pages. The preliminary pages consist of a title page, a copyright page (optional), a committee approval page, a final reading approval and acceptance page, an abstract, and an acknowledgements page (optional).
2. In the title of your work, use word substitutes for non-Roman-alphabet characters such as formulas, symbols, super- or subscripts, Greek letters, etc.
3. The abstract is to be no more than 350 words (approximately 1.5 pages double-spaced, single sided). Doctoral students: Because dissertation abstracts are published in *Dissertation Abstracts International* and in searchable databases you must include pertinent place names and full names of persons as well as descriptive keywords useful in automated retrieval. UMI editors will shorten your abstract if it is longer than 350 words.
4. The work's citations, references, and bibliographical style are to be consistent and follow the department's or the discipline's style guide.
5. Pages should be numbered according to the following sequence, with a page number included on the page as indicated:

Title page no number; begin with Roman numeral i, number consecutively  
Copyright page (if included)\*\* no number; but counted  
Graduate Committee Approval no number; but counted  
Final Reading Approval and Acceptance no number; but counted  
Abstract no number; but counted  
Acknowledgements (if included) no number; but counted  
Table of Contents number; continue with lowercase Roman numerals as appropriate  
List of Tables (if included) number  
List of Figures (if included) number

Body of work and appendices number; begin with Arabic numeral 1, continue consecutively

\*"Selected Project" in these instructions refers to the final project required by programs in the departments of Agronomy and Horticulture, Dance, Instructional Psychology and Technology, Nursing, Technology Education and Construction Management, Theatre and Media Arts, and Zoology. Projects in these departments are treated as theses, and the works must be submitted to the library for binding.

\*\*Copyright information is available from the Office of Graduate Studies.

### **C. Preparing the Work for Departmental Approval**

1. Print your entire manuscript, double-sided (except for the university pages), following the format and style requirements specified in sections A and B above. Do not use correction fluid or correction tape.
2. Check each page of the work and, if necessary, reprint and replace pages that are smudged, have correction fluid or tape, have poor print quality, or have misaligned printing. Also correct misordered or missing pages. All pages should be in the order described in section B5.
3. Obtain and complete, "Departmental Approval for Submission of Dissertation, Thesis, or Selected Project," Form 8d Part 1, and, for ETD submissions, Form 8d Part 2. These forms may be provided by your department and are available online at the Graduate Studies website at <http://www.byu.edu/gradstudies/forms>.
4. Present your work and the completed Form 8d to each member of your graduate committee and to your department chair for their approval and signatures. Signatures should be in black or blue ink so they copy properly.
5. After obtaining the signatures of your committee and your graduate coordinator or department chair, present your work to the dean or associate dean in your college who is assigned to review and sign the document. Allow enough time to meet the library submission deadline for your intended graduation. Refer to the graduate studies website at <http://byu.edu/gradstudies/resources> for the latest dates.

### **D. Preparing and Submitting Copies, Forms, and Fees to the Library**

All paper copies of dissertations, theses, and selected projects are to be submitted to the library for binding and retention by the library and/or department. Students who submit ETDs may still be required to submit a hard copy of the work for retention by the department; however, verify this policy with your department. (If your work is a project, do not pay for copying and binding until you have confirmed with your department that you are required to submit copies to the library.)

1. Submit the copies (required by the library and/or your department) of your work to the library. These copies do not have to be the original printed copy, and the signature pages may be photocopies of the originals. However, all required copies must be clean and clear, in black print, on 24-pound weight Xerox LX paper, with the required preliminary pages single-sided.
2. Do a final check of each page of all required university copies, replace poorly printed pages if necessary, and ensure all pages are present and in the order described in section B5.

3. Make additional copies of your work that you want for yourself. These copies need not be on bond paper.
4. Master's students: Make an additional copy, for the library, of both the title page and the abstract. Doctoral students: Make two additional copies each of both the title page and the abstract, one set for the library and the other for *Dissertation Abstracts International*.
5. Using a pencil, mark the upper right-hand corner of the title page of each copy with the appropriate abbreviation:
 

L1	Library copy
L2	Library copy
CC	Committee chair copy
DC	Department copy
P1, P2, P3, etc.	Personal copies

NOTE: For students who submit their dissertation, thesis or selected project electronically as ETDs, the library does not require any copies for binding. The library will print a single copy from the ETD submitted PDF file, bind it, and deposit that copy in Special Collections (Archives). There will not be a bound copy on the library shelves for check out.

6. Put each copy in a manila envelope and stack the envelopes so that the university copies are on top (ordered L1, L2, CC, and DC), with personal copies on the bottom.
  - a. Doctoral students: Complete and sign UMI's Doctoral Dissertation Agreement Form in the booklet "Publishing Your Dissertation." Attach a copy of your abstract and your title page to this form. If you wish UMI to register your copyright, read and sign the reverse side of the Agreement Form. Place the signed Form 8d, one title page, one abstract, and the Agreement Form (with the second title page and abstract attached) on top of your stack of envelopes, and then secure everything together with a large rubber band.
  - b. Master's students: Place the signed Form 8d, the extra title page, and the extra abstract on top of your stack of envelopes; then secure everything together with a large rubber band.
7. Deliver your packet to the Library Administration Office, 2060 HBLL (2-2905), and pay the required fees. Even if you are not having any copies bound (submitting ETD), you must still deliver Form 8d, the title page, and the abstract to the library.

Deadlines for Submitting Dissertations, Theses, and Selected Projects are available on the Graduate Studies web-page.

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All information should be centered horizontally between the margins as shown.

## SAMPLE TITLE PAGE

The title must be in all capital letters and located 2" from the top edge of the page. If the title is longer than five inches, it must be split and placed on two or more lines, with the first line the longest and subsequent lines shorter (inverted pyramid style).

# COMPUTER MODELING OF DIFFUSION FLAME STRUCTURE IN SOLID PROPELLANTS

The title must be the same font and size as the body of the work; i.e., no bold, large font, etc.

By

David A. Hill

Your name should be double-spaced below the word "by."

A dissertation submitted to the faculty of

Brigham Young University

Begin the statement with the formal introduction "A thesis submitted to" or "A dissertation submitted to."

In partial fulfillment of the requirements for the degree of

Write out the full name of Brigham Young University.

Doctor of Philosophy

Write out the full title of your degree.

Department of Chemical Engineering

Brigham Young University

At the bottom of the page, list the following, in order, double-spaced between each item: the name of the department, the university's name, and the month and year in which the degree will be granted (no comma between month and year).

August 2007

**SAMPLE COPYRIGHT PAGE**

Copyright © 2007 David A. Hill

All Rights Reserved

# SAMPLE GRADUATE COMMITTEE APPROVAL PAGE

The university's name must be printed 2" from the top edge of the paper.

BRIGHAM YOUNG UNIVERSITY

Three blank lines here. The title "Graduate Committee Approval" must be printed in the same font and size as the rest of the paper. It should be in all capital letters and may be in bold print if desired.

## GRADUATE COMMITTEE APPROVAL

Five spaces should precede this section. It should be double-spaced.

of a dissertation submitted by

David A. Hill

Two blank lines precede this text. Text should be typed as it appears here, single-spaced.

This dissertation has been read by each member of the following graduate committee and by a majority vote has been found satisfactory.

Leave three blank lines between the text and the signature line.

A line for a hand-written date and for the signature of each committee member must be provided. The chair of your committee should also be recognized by title.

\_\_\_\_\_

Date

\_\_\_\_\_

Josephine P. Brown, Chair

\_\_\_\_\_

Date

\_\_\_\_\_

James E. Barott

\_\_\_\_\_

Date

\_\_\_\_\_

Rex G. Lowe

\_\_\_\_\_

Date

\_\_\_\_\_

Mary L. Smith

\_\_\_\_\_

Date

\_\_\_\_\_

Robert Johnson

Leave two blank lines between each signature line.

## SAMPLE FINAL READING APPROVAL AND ACCEPTANCE PAGE

The university's name must be printed 2" from the top edge of the paper.

### BRIGHAM YOUNG UNIVERSITY

Three blank lines here.

This text is preceded by three blank lines. Text should be typed as it appears here, changing the type of work (dissertation, thesis, special project) and the name of the candidate as required.

As chair of the candidate's graduate committee, I have read the dissertation of David A. Hill is in its final form and have found that (1) its format, citations, and bibliographical style are consistent and acceptable and fulfill university requirements; (2) its illustrative materials including figures, tables, and charts are in place; and (3) the final manuscript is satisfactory to the graduate committee and is ready for submission to the university library.

Four blank lines precede the first signature line.

Format this section with vertical and horizontal spacing as shown. The chair of the candidate's graduate committee should sign.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Josephine P. Brown  
Chair, Graduate Committee

Either the graduate coordinator OR the department chair may sign here. Change the name and the title accordingly.

Accepted for the Department

\_\_\_\_\_  
Thomas H. Fletcher  
Graduate Coordinator

Accepted for the College

\_\_\_\_\_  
Douglas M. Chabries  
Dean, College of Engineering and Technology

## SAMPLE ABSTRACT PAGE

### ABSTRACT

#### COMPUTER MODELING OF DIFFUSION FLAME STRUCTURE IN SOLID ROCKET PROPELLANTS

David A. Hill

Department of Chemical Engineering

Doctor of Philosophy

The word "ABSTRACT" should begin 2" from the top edge of the paper. It must be printed in the same font and size as the rest of the paper and should be in all capital letters. Three blank lines should follow.

The title of your work should be typed exactly as it appears on the title page, double-spaced.

After three blank lines, type your name, the title of your department, and the full name of your desired degree, double-spaced.

After three blank lines, begin the body of the abstract, which should be double-spaced.

The abstract is a summary of the dissertation, thesis, or selected project with emphasis on the findings of the study. The abstract must not exceed 350 words in length (approximately 1 1/2 pages double-spaced). It should be printed in the same font and size as the rest of the work. The abstract precedes the acknowledgement page and the body of the work.

Doctoral students should ensure that the abstract contains significant wording to allow automated retrieval, as the abstract will be added to the database. In addition, the abstract will be printed, as it is submitted, in *Dissertation Abstracts International*.

## SAMPLE ACKNOWLEDGEMENT PAGE

The word "ACKNOWLEDGEMENTS" should begin 2" from the top edge of the paper. It must be printed in the same font and size as the rest of the work and should be in all capital letters.

### ACKNOWLEDGEMENTS

Following four blank lines, the text of the acknowledgement begins.

Students may use the acknowledgements page to express appreciation for the committee members, friends, or family who provided research assistance in writing, or technical aspects of the dissertation, thesis, or selected projects. Acknowledgements should be simple and in good taste.

The text should be in the same font and style as the rest of the work and double-spaced.

## 8.4 - Copyright Information

### Office of Graduate Studies

Brigham Young University  
B-356 ASB, PO Box 21339  
(801) 378-4091  
gradstudies@byu.edu

### Copyright Information Pertaining to Dissertations, Theses, and Projects

#### General Policy Information

**What is Copyrighted:** The Copyright Act of 1976 provides automatic copyright coverage as soon as a work (a book, article, poem, lecture, database, or drama) is created in tangible form, whether or not the work is ever published or the copyright registered. Copyright protection is given to all unpublished works regardless of the nationality or domicile of the author.

**What “Publication” Means:** Publication consists of the distribution of copies of a work for sale to the public. Dissertations submitted to UMI Dissertation Services are published; theses that are intended for inclusion in library holdings or for personal use are considered unpublished.

**Registration of the Copyright:** The copyright on unpublished works does not have to be registered. Mandatory deposit provisions apply to published works, in that two copies of the best edition must be deposited in the Copyright Office within 3 months of publication. If the proper form and application fee accompany the deposit, the copyright can be registered at the same time.

**Copyright Notice:** Copyrighted works are not required to carry a formal notice in order to have copyright protection, although most publishers continue to provide the notice to prevent infringement based on ignorance. The usual notice consists of the word “Copyright” or the symbol ©, the year the book is published, and the name of the copyright owner, in these cases, the author. The phrase “all rights reserved” is usually added because it gives some protection in countries that are not part of any world-wide copyright convention.

**Advantages of Copyright Registration:** Registration establishes a public record of the copyright claim, and a copyright that is registered allows the copyright holder certain advantages in the case of infringement suits. The registration establishes prima facie evidence in courts of the validity of the copyright, and statutory damages and attorney’s fees will be available to the copyright holder in court actions.

**Non-Literary Works:** Copyright is also given to musical, dramatic, and choreographic works, to pantomimes, and to pictorial, graphic, or sculptural works, including the individual images of a motion picture or other audiovisual work. For information on copyright law, including rights of reproduction, display, or performance of the work, refer to Circular 1 of the Copyright Office, “Copyright Basics,” and to Circular 40, “Copyright Registration for Works of the Visual Arts,” available in the Office of Graduate Studies.

**To Register a Copyright:** Doctoral students are required to have their dissertations published by UMI Dissertations International, a publishing service that will also arrange to have the copyright registered. For a fee of \$35, UMI will prepare the necessary forms and copies of the dissertation for submission to the Copyright Office. This process is explained in the booklet “Publishing Your Dissertation,” which is included in the oral defense packet.

If you wish, you may register your own copyright at any time following creation of the work. To register a work, send the following three elements **in the same envelope or package** to:

Library of Congress  
Copyright Office  
Register of Copyrights  
101 Independence Avenue, S.E.  
Washington, D.C. 20339-6000

1. A properly completed application form (available in the Office of Graduate Studies)
2. A nonrefundable filing fee of \$20\* for each application
3. A nonrefundable deposit of the work being registered:
  - If the work is unpublished, one complete copy (does not have to be bound, but should be firmly secured)
  - If the work is published, two complete copies of the best edition

\*Filing fees are effective through June 30, 1999. After that date, the fee is subject to change.

For more information or answers to questions concerning copyright policies and procedures, contact the General Counsel's Office, A-350 ASB, (801) 422-4722

### **8.5 - Opportunity for Graduate Students to Register for Religion Courses for No Cost and No Credit**

In the past, graduate students have not been allowed to enroll in religion courses without paying increased tuition. Graduate students are now eligible to audit religion courses on a space-available basis without incurring any additional tuition costs (Approved by the President's Council, 10/14/96). Details about such registrations are available from the Office of Graduate Studies, B-356 ASB, (801) 422-4091.

#### *1. Eligibility Requirements:*

To be eligible to register for no-cost, no-credit religion courses, students must:

- A. Be in a graduate degree seeking program
- B. Be enrolled for a minimum number of 2.0 credit hours during the semester of 1.0 credit hour during the term

#### *2. Conditions*

- A. Registration is for audit only--no credit is granted
- B. Registration is available on a space-available basis as approved by instructor

#### *3. Procedure*

- A. Students pick up Request for No-Cost/No-Credit Religion Course form from the Office of Graduate Studies (OGS), B-356 ASB. (OGS retains a copy of the form to track number of requests)
- B. Student requests approval from the Religion instructor (during the first ten class days of a semester; six days of a term)
- C. If the request is approved, either the student or the instructor mails or takes the card part of the form to the OGS