

MARQUETTE UNIVERSITY

**Graduate Student Handbook
Department of Chemistry
2008-09**

INTRODUCTORY STATEMENT

This handbook has been prepared by the Graduate Committee (GC) with the intent of providing each graduate student with the necessary information in the pursuance of his/her graduate degree. The handbook is divided into two sections. The first section gives the general and specific requirements leading to the Ph.D. and M.S. degrees. Here you will find the various courses, exams and annual reviews required to complete your graduate degree. The latter section, the Appendix, lists the forms and procedures which each student must follow for both the Ph.D. and M.S. degrees.

Additional regulations, requirements, and procedures may be found in the Graduate Bulletin.

Should you have any questions regarding any of the items given herein, please consult with the Chairperson of the Chemistry Department or the **Director of Graduate Studies (DGS)**.

DGS
05/08

STATEMENT OF HONESTY AND TRUST IN RESEARCH

Research achievement is the heart of the Ph.D. and M.S. programs. Progress in research is entirely dependent upon the honesty of the worker. Any form of falsification of data is counterproductive to progress, and victimizes all who depend upon that data.

The crucial nature of the role played by honesty in the research enterprise cannot be overstated. For that reason, any evidence of dishonesty in any aspect of our program must be regarded as a grave violation of our tenets. One should expect, therefore, that any incident of cheating in a course, cumulative examination, or any other part of our program will be grounds for dismissal.

The trust that will develop between you and your research advisor is a great treasure. Many such relationships grow into lifelong friendships, and are mutually rewarding to both parties. The establishment and maintenance of this trust is an honorable goal for both the faculty advisor and the graduate student.

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General Requirements for All Chemistry Graduate Students

All Ph.D. students must complete the general requirements in the time allotted. These requirements are as follows.

I. Proficiency Exams

Proficiency exams are given at the time the student enters the program. Exams will normally be the ACS exam in each subject area (analytical, inorganic, organic, physical) with a minimum passing grade to be in the 65th percentile rank. The student must pass three out of the four proficiency exams. To prepare for the proficiency examinations in a given subject, the student should study from the following texts:

Inorganic Chemistry: Shriver, Atkins, "Inorganic Chemistry" 3rd edition (W. H. Freeman, San Francisco).

Physical Chemistry: Engel and Reid, "Physical Chemistry" 1st ed. (Benjamin Cummings, 2005). This examination emphasizes chemical thermodynamics and chemical dynamics.

Analytical Chemistry: Daniel C. Harris, "Quantitative Chemical Analysis," 6th ed. (W. H. Freeman, San Francisco). This examination emphasizes gravimetry, titrimetry, and chemical equilibrium.

Organic Chemistry: Carey, "Organic Chemistry," 6th ed. (McGraw-Hill).

Each deficiency can be made up by either:

1. Retaking the exam. Exams will normally be given in August, January and May. A maximum of three total chances (i.e., opportunities) are allowed for a given exam.
2. Passing one or more of the following courses:
 - a. Inorganic - CHEM 105 (Offered fall term)
 - b. Physical - CHEM 132 (Offered fall term)
 - c. Analytical - CHEM 114 (Offered spring term)
 - d. Organic - CHEM 024/124 (Spring term, Chem124 preferred)

If option 2 is chosen, the student must take and pass the course at the "BC" or better grade level. NOTE: All deficiencies must be removed by the end of the student's second semester in the program, and the student's major area of research must be in one of the three areas in which proficiency has been established by either exam or course grade.

II. Core Area Courses

All students must take and pass three of the following core area courses:

1. Inorganic - CHEM 201
2. Analytical - CHEM 246
3. Physical - CHEM 262
4. Organic - CHEM 223

Core area course requirements must be completed by the end of the fourth semester with at least two core area courses completed by the end of the second semester.

III. Seminar

The student will present one seminar in the major area of research but not directly related to the student's research, which must be completed during the third or fourth semester of graduate study. A pass or fail grade for the seminar will be assigned by the Departmental Seminar Committee. NOTE: All graduate students must register for Chem

296 (Seminar) for each semester in which they are in residence.

IV. **Foreign Language**

Normally, no reading knowledge of a foreign language is required in the master's and doctoral programs in Chemistry. However, at the discretion of the student's Advisory Committee, proficiency in a foreign language may be required if it is necessary in a student's research.

V. **Teaching Experience**

All graduate students are required to earn the equivalent of one year of teaching experience during their graduate program.

VI. **End-of-Semester Review**

The GC reviews the progress of each student at the end of each semester, and gives each student a written evaluation of his/her progress. The GC will consider course work, cumulative examination record, advisor's comments, teaching evaluation, seminar, and all other requirements of the program in its review. **Continuation in the program is contingent upon a satisfactory evaluation by GC.** Particular attention will be paid to third semester students.

VII. **Other**

It is the responsibility of the student and his/her advisor to make sure that all graduate school requirements are satisfied for the M.S. and Ph.D. degrees. *Additional regulations, requirements, and procedures are found in the Graduate Bulletin.*



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General Requirements for Students in the Chemical Physics Program

Unless noted otherwise below, the requirements for students in the chemical physics program are identical to those for the chemistry program.

I. Proficiency Exam

The chemical physics proficiency is given along with the other (chemistry) proficiency examinations. Students in the chemical physics program must pass a total of three proficiency exams: the chemical physics proficiency examination, the physical chemistry proficiency exam, and one other chemistry proficiency examination.

A deficiency in the chemical physics proficiency examination can be satisfied by either:

1. Retaking the chemical physics proficiency examination, or
2. Passing undergraduate courses in electricity and magnetism (PHYS 111 or EECE 121) and mechanics (PHYS 131) with a grade of BC or better.

II. Core Area Courses

Chemical physics students must pass three core courses, as follows:

1. Electrodynamics (EECE 201)
2. Physical Chemistry (CHEM 262)
3. One other chemistry core course (CHEM 201, 223, or 246)

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Specific Requirements for the Ph.D. in Chemistry and Chemical Physics

In addition to the general requirements listed above, the following **Specific Requirements** must be met for Ph.D. students:

I. **Course Work**

At least twenty four (24) hours of formal coursework are required, which may include up to six hours of Chem 295 (Independent Study). Not more than 3 hours of Chem 297 (Special Topics) may be taken, and these are substituted for Chem 295 credit hours. These twenty four hours do not include Chem 296 (Seminar) or Chem 399 (Dissertation). NOTE: Twelve hours of Chem 399 are a Graduate School requirement.

II. **Cumulative Exams**

The student must pass two cumulative exams by the end of the fourth semester of graduate study, and pass a total of three cumulative exams by the end of the fourth semester of graduate study, or five cumulative exams by the end of the fifth semester. A matriculating student who initially does not pass any of the proficiency exams will be granted a one semester delay in beginning the cumulative exams; other students should begin the cumulative exams right away. Cumulative exams are given on a monthly basis throughout the academic year; a total of eight (8) exams are given per year.

III. **Dissertation Committee**

The dissertation committee will normally consist of three faculty members from the Chemistry Department, including the student's research advisor as chairperson. The chairperson will select the other committee members. *At the discretion of the committee chairperson, a fourth person from outside the department may be elected.*

IV. **Research Meeting**

In the fifth semester, a public research meeting will be conducted by the Dissertation Committee, usually held in TWC 121. A notice giving the student's name, date, and members of the Dissertation Committee shall be posted in the Chemistry Building one week prior to the meeting; notice must also be given in the Weekly Bulletin of the department. A report stating the research problem, experimental work performed to date, a survey of pertinent literature, and work to be done will be given to each committee member at least one week prior to the Research Meeting. The quality (format and style of the report should parallel), and the quantity should approach that of full papers in ACS publications.

The student should be directed to give a 40-45 minute oral discussion, followed by time for questions; questions from the public may proceed those by the committee members. The examination by the committee will follow the oral presentation and may be carried out in a closed meeting. A report of the meeting, using the form provided (Appendix A-5) should be filed, along with the student's written report, in his/her file.

The Dissertation Committee will inform the student of its recommendation in writing within one week of the Research Meeting. A copy of the recommendation will be forwarded to the GC chairperson. The GC will inform the student of his/her status within one month following the research meeting.

V. **Ph.D. Planning Report and Advancement to Candidacy**

The Ph.D. Planning Report should be prepared by the student in the fifth semester of graduate studies, following successful completion of the Research Meeting. A student is

considered to be "advanced to candidacy" upon completion of the following requirements:

1. Satisfying the cumulative examination requirement,
2. Satisfying the residency requirement,
3. Completing all required courses, and
4. Satisfactorily completing the Research Meeting.

When these requirements are satisfied, the department will file the appropriate form ("Doctoral Qualifying Examination Committee Chairperson's Summary") with the graduate school. The student will then become a Ph.D. candidate.

V. Annual Reviews

Annual reviews of research progress with the Dissertation Committee must begin before the beginning of finals week of the eighth semester (see p. A7). The format of the student's report to the committee will be at the discretion of the Dissertation Committee Chairperson. The Dissertation Committee shall evaluate the student's progress using the Annual Review Report form, which shall be forwarded to the Chairperson of the GC. A copy of each review report should be placed in the student's file.

VI. Dissertation Defense

Upon completion of research, the student shall present the results to the Dissertation Committee in a public defense, followed by a nonpublic oral examination. (See A-12)

VII. Other

- A. Beyond the tenth semester, the student is not normally eligible for university financial aid.
- B. The student should consult the Graduate School Bulletin for special requirements for the Ph.D. such as filing of Dissertation Outline, submission of Ph.D. dissertation for graduation, deadlines and procedures for filing for graduation, etc.
- C. All copies of letters, reports, etc. must be placed in the student's file.

Specific Requirements for the M.S. (Plan A or B) in Chemistry

All M.S. students must complete the General Requirements in the time frame allotted. In addition, the following specific requirements must be met:

I. Course Work and Thesis

A. Plan A - (Thesis)

A total of twenty four (24) hours of course work are required, of which at least 6, but not more than 9 credit hours may be Chem 295 (Independent Study). Not more than 3 hours of Chem 297 (Special Topics) may be taken, and these are substituted for Chem 295 credit hours. In addition, six (6) hours of Chem 299 are required.

B. Plan B - (Essay)

A total of twenty four (24) hours of course work are required, of which six (6) are Chem 295 (Independent Study). In addition, six (6) hours of Chem 299 are required.

Departmental Policy on the Plan B Option:

Research is at the heart of graduate education in chemistry. Therefore, the Plan B option is not normally permitted, except for secondary school teachers seeking to advance their standing in their school districts. Those wishing to pursue this program should apply for permission to the GC.

II. Thesis or Essay Committee and Thesis Outline

The Chair of the GC may choose one of the three members of the Thesis or Essay Committee, in consultation with the student's advisor. The committee will be selected by the end of the second semester. The Committee will consist of three members of the scientific faculty of Marquette University, two of whom must be members of the Chemistry Department. The committee may also consist of one more member outside of the Marquette Faculty, at the discretion of the advisor and GC. NOTE: The Thesis Outline should be filed with the Graduate School by the end of the third semester of graduate study.

III. Research Meeting (Plan A only)

Some evidence of research progress must be demonstrated to his/her thesis committee by the end of the third semester. A concise written report should be prepared and a copy given to each committee member, and placed in the student's file. The research director will also place a copy of the committee's report in the student's file.

IV. Essay (Plan B)

An Essay Committee (usually the chair of the committee) will ask the student for a literature review of some area in chemistry. The essay must include not only a review of the literature but also a section on how the student will propose an extension of some problem or initiation of some research pertinent to the essay's content.

V. Thesis or Essay Defense

The student will defend his/her thesis or essay in public. A successful defense is equivalent to passing the comprehensive examination discussed in the graduate bulletin.

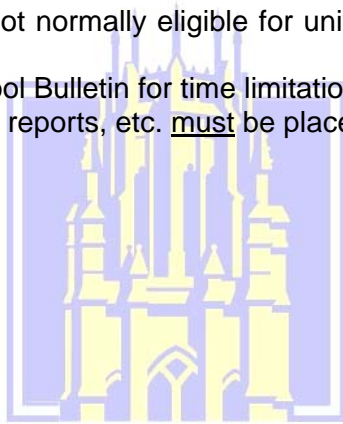
Copies of the thesis must be filed in the Graduate School office.

VI. **Right of the M.S. Student to Petition for Admission to the Ph.D. Program**

All M.S. degree students who wish to be considered for admission to the Ph.D. degree program must: (1) have completed the General Requirements (2) write the cumulative exams no later than the beginning of the fourth semester of graduate study (3) petition, in writing, the GC by the end of the student's fourth semester of graduate study, the reasons why admission into the Ph.D. program should be attained. The GC will consider the student's overall progress and he/she must show the potential for independent research which is characteristic of the Ph.D. student.

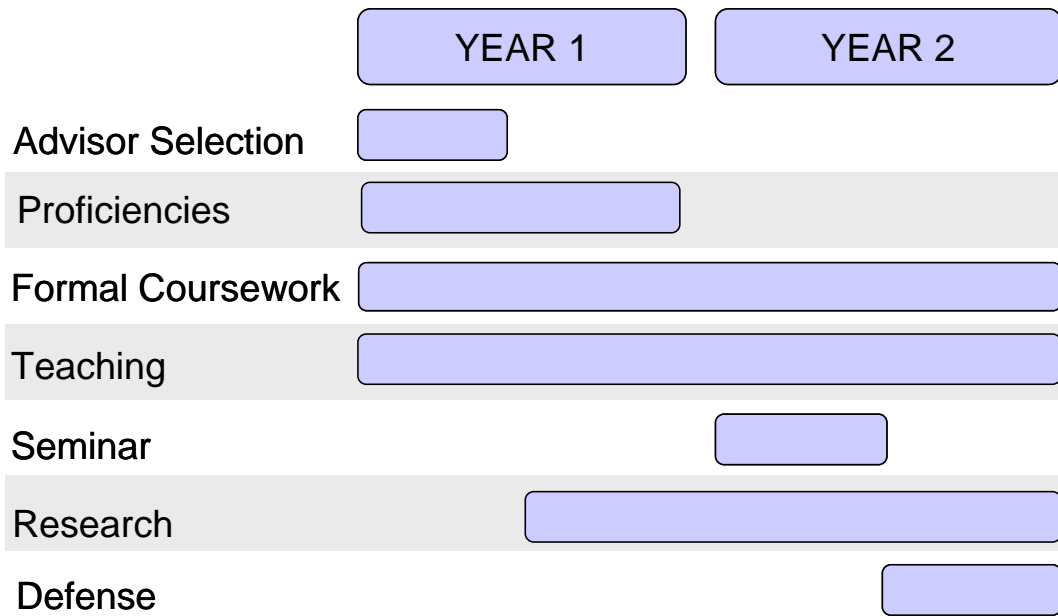
VII. **Other**

- A. A M.S. student is not normally eligible for university financial aid after the fourth semester.
- B. See Graduate School Bulletin for time limitation and any special requirements.
- C. All copies of letters, reports, etc. must be placed in the student's file.

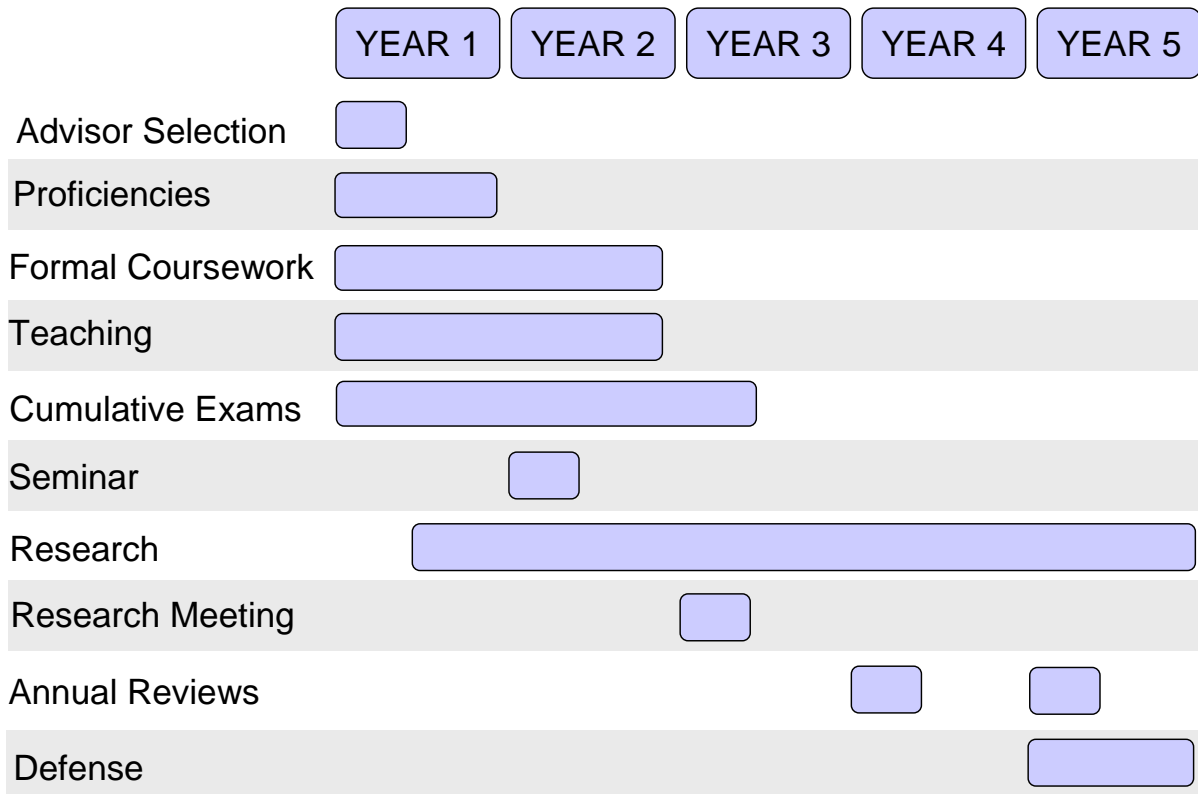


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TYPICAL TIME LINE FOR COMPLETION OF THE M.S. DEGREE



TYPICAL TIME LINE FOR COMPLETION OF THE Ph.D. DEGREE



Choosing a Research Director

To aid in choosing a research director, faculty research seminars will be given early in the Fall semester; ***first-year students must attend all faculty seminars***. Each student is required to discuss research opportunities with all faculty listed on the Research Conference Form, a list of all faculty members who are accepting new graduate students into their group, which will be distributed early in the Fall semester. Further private discussion with the faculty is strongly encouraged. Part-time students are required to interview only three faculty members. For an overview of faculty research interests, please consult the department website.

The Research Conference Form must be returned by the date specified to the Director of Graduate Studies before the student begins his/her research activities. *Please have at least two faculty with whom you have had extensive discussion sign the form.* Indicate on this form your first and second choices for the research director. The first and second choices will be forwarded to the faculty listed who will make their choices of students. Problems will be resolved by convening the DGS, RAC, chair and department chair. NOTE: It is the right of each faculty member not to accept any given student into her/his research group.

Under certain very specific circumstances, it may be possible to bypass the normal selection procedure. Please consult with the Director of Graduate Studies for details.

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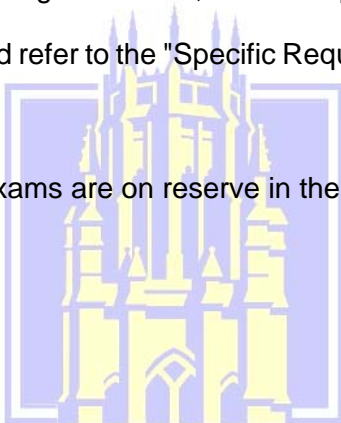


CUMULATIVE EXAM GRADE FORM

Dear _____:

Your grade in the _____ cumulative exam given on _____ is an(a) _____. Please consult the faculty in the division in which you wrote the exam if you have any questions regarding the exam. For the number of passes required and the corresponding time frame, see the "Specific Requirements for the Ph.D." - Item No. II. All M.S. students should refer to the "Specific Requirements for the M.S." - Item No. VI.

NOTE: Copies of old cumulative exams are on reserve in the Science Library.



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NOTE: This completed form is given to the graduate student after each cumulative exam score has been given to the department secretary.

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Transfer of Credits

Students wishing to transfer credits from another institution should submit a course description to the **DGS**. This might be lecture notes, a page from the course catalog of the other institution, a letter from the instructor at the institution, or other reasonable evidence.

The GC will examine the evidence submitted by the student and will, after consulting with other faculty members as appropriate, make a decision. If the decision is favorable, then the GC will take care of the following action:

M.S. students: A memo describing the course and its Marquette equivalent will be attached to the planning form.

Ph.D. students: The equivalent MU course will be entered on the planning form, and a course description of the course taken at the other institution will be attached to the planning form.

The Graduate Bulletin must be consulted for more information.



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THESIS OR DISSERTATION COMMITTEE APPROVAL FORM

To: _____ Date _____
(Student's name)

The following thesis/dissertation committee is hereby approved by the Graduate Committee:

_____ Chair

The logo of Marquette University, featuring a stylized yellow and blue building facade within a blue square frame.

cc: Committee chair and members and student file

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RESEARCH MEETING REPORT
and
RECOMMENDATION TO THE GRADUATE CURRICULUM COMMITTEE

To: (Student's Name): _____ No. of Semesters at MU: _____

Copy to: GCC _____ Date: _____

TITLE: _____

Evaluation of the written research report:

The written report is satisfactory.

The written report requires revision.

Comments by the committee on the written report:

Evaluation of the overall progress and quality of the research:

Excellent

Very Good

Good

Fair

Poor

Comments by the committee:

Recommendation to the GC: Progress is satisfactory, continue in program

Other: _____

Signatures of committee members:

(Chairperson)

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**Program Transfer
(Ph.D. to M.S., M.S. to Ph.D.)**

M.S. students must file an application for admission to the Ph.D. degree program with the Graduate School.



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Graduate Student Second Year Seminar

Below are summarized the requirements for preparation and presentation of the seminar. The basis for grading the seminars is also set forth. Please read these carefully.

1. The seminar should be a professional level presentation. It should be well-organized and clearly presented with specific chemical details and arguments. The scientific level should parallel that of specialized journal articles; e.g., J. Am. Chem. Soc., Inorg. Chem., or J. Org. Chem., J. Phys. Chem., etc. Topics taken from recent (last 5 years) review type journals, such as Acc. Chem. Res., Chem. Rev., etc., will not be allowed.
2. The talk should make primary use of Powerpoint (or an overhead projector).
3. A one to two page abstract (typed) with a complete bibliography following current J. Am. Chem. Soc. style should be provided. This will be typed by the chemistry office only if it is submitted at least five days before the seminar is to be given. At the top of the first page and in the upper right hand corner, put your name and date of the seminar. Three spaces below this, put the TITLE of your seminar in capital letters. Leave three spaces, type the word ABSTRACT in capital letters and underscored. Leave a double space and start the body of the abstract. Place the references immediately after the abstract. Leave a triple space at the end of the abstract, type the word REFERENCES in capital letters and underscored, followed by two spaces, then list your references. The complete program (abstract, references and overhead slides) must be approved by the student's research director and seminar director one week before the seminar.
4. Students are required to give a practice seminar at least one week before their seminar presentation. The presence of their research advisor is appropriate. It is the student's responsibility to request help from other faculty, if necessary, to present a professional level seminar. It is recommended that the student prepare an outline of the talk prior to the practice of the seminar.
5. A graduate student will choose a topic from a list of general topics no earlier than 4 weeks prior to the seminar date. The list of general topics will be available by consultation with the seminar director. The topic will need to be narrowed down to a more specific subject which must be approved by the seminar director, three weeks before the seminar. The seminar topic must not be related to the student's research. A copy of all references used in the seminar will be presented to the seminar director at that time. A seminar schedule will be posted in TWC #105.
6. The seminar should start promptly at 12:00 noon and last about 45 minutes, leaving about 10 minutes for questions.
7. The seminar will be evaluated by the seminar director and two faculty designated by him/her; the discussion and the decision of this committee will be open to any faculty attending the seminar who wishes to comment. Evaluation of the talk will be based on items 1-6 above and the ability to answer questions for the audience. **The grade will be pass or fail.**

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Dissertation Submission and Oral Defense (Ph.D.)

1. At the beginning of the semester prior to planned graduation the student shall complete the on-line Graduation Application available at the Graduate School website.
2. Insure that the Doctoral Planning Form and Outline for Dissertation, Thesis, or Professional Project have been filed with the graduate school. Forms are available at the Graduate School website.
3. Consult the Dissertation Directives available at the Graduate School website for procedures for preparing the dissertation, scheduling an oral defense, and submitting the dissertation.
4. At least one month prior to the scheduled oral defense, the student shall submit five copies of the dissertation to the members of the Dissertation Committee and inform the department secretary of the impending defense. The dissertation must have been read and approved by the research advisor before distribution to the committee.
5. At least one month prior to the scheduled oral defense, the student shall present copies of the "Request for Announcement of Final Public Examination for Doctoral Degree" and the "Dissertation Defense Program" to the Departmental Chair's secretary. These two items are due in the Graduate School one month prior to the scheduled defense. The "Dissertation Defense Program" can be typed by the Chair's secretary if submitted to the office one week before it is due at the Graduate School. The Chair's secretary shall be notified to reserve a room for the defense.
6. The forms required for the defense, namely the "Confidential Report on Dissertation for the Degree of Doctor of Philosophy" and the "Report of the Final Examination for the Doctor of Philosophy Degree" will be prepared by the Chair's secretary and placed with the copy of the dissertation to be given to the research advisor.
7. The forms mentioned in item 3 above should be signed and returned to the Chair's secretary after the oral defense. These forms will then be sent to the Graduate School.
8. The original copy of the dissertation complete with the signed dissertation approval page should be submitted to the departmental office by the student. The dissertation will then be delivered by a member of the office staff to the Graduate School. If the dissertation needs revision, it will be the student's responsibility to submit it to the Graduate School when it has been revised and approved.

Thesis Submission and Oral Defense (M.S.)

1. At the beginning of the semester prior to planned graduation the student shall complete the on-line Graduation Application available at the Graduate School website.
2. Insure that the Outline for Dissertation, Thesis, or Professional Project has been filed with the graduate school. Forms are available at the Graduate School website.
3. Consult the Thesis and Professional Project Directives available at the Graduate School website for procedures for preparing the thesis, scheduling an oral defense, and submitting the thesis.
4. At least two weeks prior to the scheduled oral defense, the student shall submit one copy of the thesis to each of the three thesis committee members. The thesis must have been read and approved by the research advisor for distribution.
5. The time and date for the defense must be agreed upon by the Thesis Committee before the thesis may be submitted to the committee.
6. The Departmental Chair's secretary shall be notified two weeks prior to the defense to (1) reserve a room for the defense, (2) notify the Graduate School of the date of the defense, and (3) prepare and distribute the public announcement of the defense.
7. The forms required for the defense, namely, the "Confidential Report on Thesis for the Master's Degree" and the "Departmental Report on Comprehensive Examination for Master's Degree" will be prepared by the Chair's secretary and forwarded to the student's research advisor.
8. The forms mentioned in item 4 should be signed and returned to the Chair's secretary after the oral defense. The forms will then be sent to the Graduate School.
9. The three copies of the thesis complete with the signed thesis approval page should be submitted to the departmental office by the student. The thesis will then be delivered by a member of the office staff to the Graduate School. If the thesis needs revision, it will be the student's responsibility to submit it to the Graduate School when it has been revised and approved by the entire Thesis Committee.

Responsibilities of Teaching Assistants

This appendix outlines the responsibilities of graduate students who are paid by the University to be teaching assistants. Most teaching assistants work in teaching laboratories and in lecture sections when examinations are being given and graded. In General Chemistry your immediate supervisor for your laboratory duties is the General Chemistry Coordinator. Your supervisor for assisting with examinations (proctoring and grading) is the lecturer.

Laboratory Duties for Teaching Assistants

- TA's are responsible for up to three laboratory sections.
- Normally, TA's will hold one or two office hours each week, as directed by your supervisor. Office hours will be held in room TW 2nd floor, not in research laboratories. The primary goal is to help students develop problem solving skills and to learn to use course materials such as the syllabus or the text book to find answers to their questions. Help any student who asks for help, being kind and courteous.
- TA's are expected to attend all meetings called by your supervisor and to be on time. You will be directed to practice the next experiment and/or given directions on what to say about it to your students.
- Take attendance at every meeting of every laboratory section. Good attendance records are required.
- Be available, and be helpful. Move around the room during the laboratory period, watching for and correcting improper procedures.
- Students are responsible for cleaning up their work areas and returning any equipment to the proper place. Using student helpers to restore the room set-up is encouraged, but when messes are left behind by students, the cleanup becomes your responsibility. At the end of the laboratory period, refill bottles, close all water and gas valves, clean all balances, return all pieces of equipment to their proper locations (e.g., the stockroom and communal lockers). Return keys to the stockroom. Turn off the lights. Close windows and doors.
- Grade student laboratory reports promptly and carefully, following established grading guidelines. Be fair but have high expectations. Put helpful suggestions on reports. A class average which is lower or higher than normal suggests that either you have an exceptional section, or you are not following the guidelines, and your section average will be adjusted.
- If asked, make solutions to be used in your laboratory sections.
- Record and report your grades promptly, as directed by your supervisor.

REMEMBER: You are there to establish a safe environment and to teach chemistry. You are not there to use harsh discipline or entertain. Do not hesitate to seek help from your supervisor if something unexpected happens which you don't know how to deal with during a laboratory period.

Lecture Duties for Teaching Assistants

- Unless excused by the lecturer, attend all lectures given. When asked by the lecturer, distribute or collect materials, erase the chalk board, assist with demonstrations, etc.
- Assist the lecturer in giving examinations. Attend all exam session, arriving at least 15 minutes before the exam starts. Be aware that the students may have a legitimate question about the examination, or a legitimate problem might arise (e.g., illness, dead calculator batteries, no eraser, etc.). While proctoring, also be aware that cheating occurs, is not to be tolerated, and is subject to penalty. Report suspected cases of cheating to the instructor who will make the final judgment. Do not take action yourself. Remember: Your main job as a proctor is to help provide a good atmosphere for the students to take the examination.
- Assist the lecturer in grading examinations. This includes grading the assigned problem(s) and entering grades accurately onto a recording sheet and computerized record keeping program.