

Graduate Manual

Department of Chemistry

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IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

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GRADUATE MANUAL

Preface

This document is a compilation of the policies and practices of the Chemistry Department and the Graduate College. It has been prepared to guide graduate students through the program. Few of the policies stated are so inflexible, however, that an exception cannot be made if circumstances warrant.

The Graduate Affairs Committee (GAC) is charged by the faculty with administration of the graduate program. The committee, which consists of five professors appointed by the Departmental Executive Officer (DEO), monitors the progress of all chemistry graduate students throughout their graduate careers and periodically updates this manual. The Graduate Student Liaison Committee (GSLC) is a Subcommittee of the Graduate Affairs Committee. The GSLC, whose charge is to address graduate student concerns, is composed of the faculty members of the GAC, plus 4-6 graduate students. The graduate student members of the GSLC are elected by the Chemistry graduate students at large. The center of operations of the Graduate Committee is at the desk of the Graduate Secretary, located in the departmental office, 1605 Gilman Hall. *Students may obtain the required chemistry and graduate college forms from the Graduate Secretary. Samples of correctly completed forms, are available. Or, you may access the Graduate College Forms web site – www.grad-college.iastate.edu/forms/forms.html*

ALL forms should be submitted to the Chemistry Graduate Secretary for processing.

Immediately outside the office, next to the graduate student mailboxes, is the Graduate Bulletin Board, which displays notices of general interest.

The faculty has defined standards as to the length of time that students may receive full assistantship support (refer to Section 9). Diligent effort on the part of the student in the early stages of graduate work is the best way to avoid a prolonged stay in graduate school.

Graduate students are invited to consult any member of the Graduate Affairs Committee when that would be helpful. A list of the current members of the Graduate Affairs Committee can be obtained from the Chemistry Graduate Secretary.

Quite aside from the formal policies, the members of the faculty would like to wish each graduate student in the department the greatest possible measure of success. The years that you spend here will be, we hope, ones that you will look back on with fondness; may you inherit the joy of scientific inquiry which graduate study is intended to instill in every participant.

1. PROFICIENCY REQUIREMENTS

1.1. Proficiency in Chemistry

1.1.1. Diagnostic examinations. All entering graduate students take diagnostic exams in four areas: analytical, inorganic, organic, and physical. The exams are offered immediately prior to the first semester, and may not be delayed. The results are used to counsel students into suitable courses.

Each exam is scored as "P" or "NP". A "P" signifies that the student is familiar with the material at the undergraduate level (Chem 211, 316; 301, 402; 331, 332; 321, 322) corresponding to a grade of "B" or better.

An "NP" represents a deficiency that requires course work to establish proficiency. Ph.D. candidates must demonstrate proficiency in four areas, M.S. candidates in three, including the major.

1.1.2. Demonstrating proficiency. Students must demonstrate chemistry proficiency for each discipline in which a deficiency was found within a certain time to avoid reduced stipends (see Section 9)

Students with an "NP" may choose, in consultation with their advisers, either of two options.

Option (1): Students must pass, by the end of the third year, with a grade of $\geq C$ one of these courses in the deficient area, which will count toward graduate degree requirements:

Analytical: Chem 510, 511, 512, 513, 516
Inorganic: Chem 500, 506
Organic: Chem 530, 531, 537
Physical: Chem 560, 561, 562, 563, 580

The courses 500, 510, 530 and 560, for two credits each, are intermediate-level graduate courses with a subject emphasis for non-majors. They are not merely reviews of undergraduate chemistry, and are also open to students who have passed the diagnostic exam. However, these "5X0" courses do not count toward the 16 credit-hours required for a Ph.D. major described in section 4.2.1.2. Similarly, they do not count toward the 12 credit-hour requirement for a M.S. major described in section 4.2.2.2.

Option (2): Students who elect this option must complete this remedial work by the end of the Fall semester of their second year. The requirement is to pass with a grade of "B" or better the listed undergraduate courses:

Analytical: Lecture part of Chem 211 and 316
Inorganic: Chem 301 and 402
Organic: Chem 331 and 332
Physical: Chem 321 and 322

Option (2) is for students lacking a sufficient undergraduate preparation in the area. These courses do not count toward a student's graduate degree requirements. Experience has shown that relatively few students utilize this option.

1.2. Proficiency in English

1.2.1.Examination. All graduate students are to take a qualifying exam in English before 12 credit hours have been completed. Students who fail the required tests are to take the specified remedial actions.

Those students whose native language is English take the ISU Graduate College English Qualifying Examination. The English Department will provide the student with a date and time to take this exam. Review sessions are available prior to the administration of the exam.

Students whose native language is not English must take the ISU English Placement Test for International Students. Furthermore, TA's must take the SPEAK/TEACH Test.

1.2.2. Remedial courses. Courses required to satisfy the English requirement are to be taken within the first year; students must enroll for credit and not pass/fail. Fulfillment of the required remedial courses in English is a prerequisite for advancement to RA-II status and to take the oral prelim exam.

The stipend of students who have not demonstrated proficiency in English, and of TA's not fully certified by the SPEAK/TEACH test, will be reduced according to the schedule shown in Section 9.

2. ADVISING AND REGISTRATION

2.1. At the Start

An explicit time schedule of events for new graduate students will be distributed.

2.1.1. Entrance interview. New graduate students are interviewed individually by a member of the Graduate Committee. Among other things, students are asked to state their area(s) of interest, such as:

- (a) A preference for a particular discipline [chemistry, analytical chemistry, inorganic chemistry, organic chemistry, physical chemistry, chemical education], whose professors then appoint a temporary adviser.
- (b) An interest in two disciplines. These students will be counseled by (usually two) professors designated by the Graduate Committee, who will jointly advise the student.

2.1.2. Temporary adviser. A list of temporary advisers will be posted on the Graduate Bulletin Board. These advisers will counsel students on academic matters until they have a Major Professor.

2.1.3. Initial counseling and registration. Students meet with their temporary advisers for the results of the diagnostic exams and to discuss their first semester's course work. *The completed registration form is first taken by the student to the General Chemistry Office to facilitate the arrangement of teaching schedules, and then to the Graduate Secretary for approval by the department.*

Thereafter, the students take their schedules to the University Registrar. Some of the class times may be changed by the University Registrar (due to filled sections, etc.); *if so, the student must report such changes immediately to the General Chemistry office.*

2.2. Subsequent Semesters

2.2.1. Registration. Students should use the ISU TouchTone Registration Worksheet or the web. Watch for the announced dates. In order to register on the web, go to AccessPlus through the ISU homepage or use this link: www.adp.iastate.edu/accessplus.html. If you do not have a PIN, follow the directions on the website to obtain one. After you have logged onto AccessPlus, click on "register for classes" under "students".

2.2.2. Changes in Schedule. The "Request for Schedule Change" form, available from the Graduate Secretary, is used for drops, adds, credit changes. Limitations apply regarding the timing of such changes.

3. SELECTING A MAJOR AND A MAJOR PROFESSOR

3.1. Areas of Study

3.1.1. Major. Options for graduate degree majors are:

- a. Chemistry
- b. Chemical Education
- c. Analytical Chemistry
- d. Inorganic Chemistry
- e. Organic Chemistry
- f. Physical Chemistry

The last four, c-f, are the “traditional” disciplines. The availability of the first major, “Chemistry,” provides considerable flexibility in designing a program of study.

3.1.2. Minor. A student may elect an optional minor in another discipline or in another department.

3.2. The Major Professor

Any professor may serve as Major Professor to any graduate student regardless of the student’s major. The choice of a Major Professor represents an agreement between the graduate student and the professor to work together in planning academic studies and research for an advanced degree. Students should give this matter careful consideration, exploring conscientiously the available options as to major, research specialty and research group. The following policies are intended to promote a thorough exploration and a free decision on the part of all students.

3.2.1. Learning about research programs

Chem 579. All new graduate students must register for this course in their first semester. This course will acquaint students with the research underway in the department.

In the Fall Semester, Chem 579 consists of research presentations and one-on-one discussions with the faculty. As a part of the process, students are to engage in personal discussions with several professors.

In the Spring Semester, for January entrants, only one-on-one discussions with the faculty are offered.

3.2.2. Choosing a major professor

Expressing the choice. During Chem 579, students will be asked to return the Major Professor Preference Form to the Graduate Secretary. On this form students state their preference or preferences for a Major

Professor. Students may elect to postpone the choice of Major Professor, but for no longer than late Spring.

The faculty will honor a student's preference for a given research group insofar as allowed by considerations of faculty workload, space, research support, and so on.

Early selection of a major professor can be arranged by petition to the Graduate Committee, with an adequate justification for the immediate initiation of research. If the petition is approved, the student may submit the Major Professor Preference Form after interviewing six professors. The student is still required to attend Chem 579.

Recording the choice of major and major professor. Once the choice of the Major Professor has been ratified by the faculty, the student should submit to the Graduate Secretary the form entitled "Selection of Major Discipline and Major Professor."

Change of major professor. A graduate student should make a careful selection of discipline and Major Professor. Nonetheless, in the rare event a change might be desired, a student should act promptly, preferably by the end of the first year to avoid prolonging the time to an advanced degree. (See the longevity schedule, Section 9). This is particularly so if the change also entails a change in the major.

Any such change must first be adequately explored with the potential new Major Professor. If the new Major Professor concurs, then the student should give the reasons in a memorandum to the Graduate Committee. The new Major Professor should sign it to indicate concurrence; the current Major Professor should sign it to indicate cognizance of the pending change. The change requires the approval of the department. If the POS Committee has already been constituted, the Graduate College must also be informed.

4. PROGRAM OF STUDY

4.1. The Program of Study Committee (POSC)

The student's personal POSC approves the Program of Study, and conducts the oral prelim and final exams. In addition, oversight of the student's progress is ensured by annual meetings of the POSC, which is assembled no later than the end of the student's second semester. The student (with help from the advisor) initiates the annual meetings. The purpose of the meetings, which start no later than the student's third semester in residence, is to provide informal discussion of planning and progress of the student's program and *not* to entail formal presentations on the part of the student. These meetings are not examinations. No more than one member of the committee may be absent at these informal meetings. These discussions are not held in years in which the oral exams are scheduled.

4.1.1. The Ph.D. committee consists of at least five professors, and is chaired by the Major Professor. At least three members must represent the major (including the major professor), and at least one member must be from another discipline or department.

A minor discipline, if any, must be represented.

4.1.2. The M.S. committee consists of three professors, and is chaired by the Major Professor. One member must be from another discipline or department.

Students who are aiming solely for the M.S. degree should so inform the department as soon as possible, to avoid an excessive time to the degree.

4.1.3. Appointment of the POSC. The student and Major Professor select the members, and submit the "Recommendation for Committee Appointment" form to the Graduate Secretary. The approved form will be returned to the Major Professor and the student. Preregistration for your fourth semester will not be approved until this has been completed. The Recommendation for Committee form is available from the Graduate Secretary in 1605 Gilman, or you may access the Graduate College Forms web site; but remember to return the completed form to the Chemistry Graduate Secretary.

4.1.4. Changes. A member of the POSC may be replaced permanently by another professor by submission of the appropriate form.

4.2. Degree Requirements

Graduate study centers on research; expectations are set forth in Section 8.1. Certain other requirements must be satisfied, as specified here.

4.2.1. The Ph.D. Degree

4.2.1.1. Graduate College requirements for all majors:

- (a) Complete ≥ 72 semester hours of graduate credit. Courses included within each major are defined in Section 4.2.1.4.
- (b) Pass courses on the POS.
- (c) Pass the written cumulative exam requirement.
- (d) Pass an oral prelim exam conducted by the student's POSC.
- (e) Pass a final exam in defense of the thesis.

4.2.1.2. Chemistry Department requirements for all majors:

- (a) **Coursework.** Students take at least 16 credit hours of 500-level chemistry courses (excluding 5X0s, 550, 555, and 579—or any such courses of an orientational nature) or substitutions approved by the POSC and the Major Professor. Most individual majors have more specific requirements, as given in Section 4.2.1.3.

Additionally, the student must take at least one 600-level special-topics course in or out of the Chemistry Department. This course must be for at least one credit-hour. Alternately, with the approval of the POSC, the student may take a course that is at least 500-level outside of the Chemistry Department or a 500-level Chemistry course given in alternate years or less frequently. This course cannot be one of the seminar courses and does not count among the 16 credit hours noted above.

All students must take:

- "Safety in the Chemical Laboratory", Chem 550X, and
- "Introduction to Research in Chemistry", Chem 579.

- (b) **Seminars.** Students must present at least one public seminar (on their research or on the scientific literature) before the end of their third year. An oral presentation at a national or international meeting before the end of the third year may satisfy this requirement.

4.2.1.3. Chemistry Department requirements for specific majors:

The following courses must be included in the POS for each individual major.

Chemistry: No requirement.

Chemical Education: Documentation of these requirements can be obtained from the Graduate Secretary. This is officially a co-major between Chemistry and the Department of Curriculum and Instruction.

Analytical: 511 (3), 512 (3), 513 (3), 516 (3), plus 611 (1 each semester offered)

Inorganic: 505 (3), 506 (3), 600 (3x1), ≥ 4 Cr. of other inorganic courses, including at least 2 credits in 601.

Organic: 531 (2), 532 (2), 537 (3), 538 (3), 572 (3), 631 (1 each semester offered), 632 (2 for credit, 2 for audit). Students may choose to audit other courses that meet the Special Topics requirement (described in Section 4.2.1.2(a)) for the audited sections of 632, but must audit two courses regardless of the number of credits. Students who opt to fulfill the departmental seminar requirement with a 631 seminar should enroll for a grade for that semester.

Physical: 561 (4), 563 (2), 583 (1) and 562 (3), or 564 (3); plus 660 (1 every semester offered). Each course requirement may also be met by the following substitutions: Phys 591 for 561; Phys 592 for 562; Phys 531 for 563 (they may be particularly attractive to students interested in Chemical Physics).

4.2.1.4. Minor requirements: About 12 hours in a discipline, chosen from:

Analytical: 510 (2), 511 (3), 512 (3), 513 (3), 516 (3).

Inorganic: 500 (2), 505 (3), 506 (3), 601 (1-2).

Organic: 530 (2), 531 (2), 532 (2), 537 (3), 538 (2).

Physical: 560 (2), 561 (4), 562 (3), 563 (2), 564 (3).

General: 570 (2), 571 (3), 572 (3), 573 (2), 574 (2), 575 (3), 576 (3), 578 (2).

4.2.1.5. Additional Specialties: A Ph.D. student in chemistry may choose one of four specialties, in addition to the major discipline. A minimum of 10 credits is required for each specialty. Any course which could be used to fulfill the requirements of the student's major may not be used for a specialty. Any special topics course offered by Chemistry (Chem 601, 619, 632, 667, or 668) which is not eligible for the student's major may count toward the specialty, with approval from the POSC. A course which satisfies the preceding requirements, and which is not listed below, may be used with approval from the curriculum committee and from the POSC. A student must choose at

least one course from outside of chemistry. In addition to special topics courses, suitable courses for the four specialties are:

Materials Chemistry: Chem 571, Chem 573, Chem 575, MatE331, MSE 534, MSE 516, MSE 539, MSE 635, ChE 443, Phy 511, Phy 512.

Industrial Chemistry: Chem 574, Chem 576, , Chem 578, ChE 410, ChE 688, Stat 401, Stat 402, Stat 407, Stat 495, Stat 496.

Biomolecular Science: Chem 503, Chem 578, BB 404 or 501, BB 405 or 502, BB 411, BB 451 or 551, BB 642, BB 675, Biol 302, Biol 302L, Gen 520, Gen 411, Tox 501.

Chemical Instrumentation: Chem 513, Chem 516, Chem 576, Chem 577, Chem 581, Chem 582x, BB 411, Phys 310, MSE 534, MSE 635.

Students who do not have the prerequisite coursework (or equivalent) in their background for any of the above should contact the course instructor about waiving the requirement.

4.2.2. The M.S. Degree

4.2.2.1. Graduate College requirements

- (a) Complete ≥ 30 hours of graduate credit.
- (b) Pass courses on the POS.
- (c) Pass a final exam in defense of the thesis.

4.2.2.2. Chemistry Department requirements for all majors:

- (a) Complete Chem 550X, "Safety in the Chemical Laboratory."
- (b) Complete ≥ 12 hours, but not more than 16, of graduate course work exclusive of seminars, orientational courses (such as 5X0s, 550, 555, and 579), special topics courses and research. Of these, at least 6 must be within the major discipline, and 4 outside of the major discipline, as defined in Section 4.2.2.3. Chem 500, 510, 530, 560 are acceptable as 'outside' courses, as are courses numbered 570-578.
- (c) Present at least one public seminar (on current research or on the scientific literature), prior to their final defense. An oral presentation at a national or international meeting may satisfy this requirement.

4.2.2.3. Chemistry Department requirements for specific majors.

Students must complete ≥ 6 hours in the major. Coursework *acceptable* for each major is defined below. (Chem 500, 510, 530, 560 are not acceptable.) Coursework *required* for the M.S. in each major is indicated by an asterisk.

Chemistry: No additional requirement.

Chemical Education: See Graduate Secretary.

Analytical: 510 (2), 511 (3), 512 (3), 513 (3), 516 (3), 611 (1, each semester)

Inorganic: 500 (2), 501 (2), 505* (3), 506* (3), 600* (1)

Organic: 531* (2), 537* (3), 572* (3), and either 532* (2) or 538* (2)

Physical: 560 (2), 561 (4), 562 (3), 563 (2), 564 (3), 660 (1, each semester)

4.2.3. Preparing the POS

The student and Major Professor prepare the proposed program. The form is then approved (or modified) by all members of the POSC, and

submitted to the Graduate Secretary. The Program of Study form is available from the Graduate Secretary in 1605 Gilman, or you may access the Graduate College Forms web site; but remember to return the completed form to the Chemistry Graduate Secretary.

All students are expected to submit the POS no later than early in their third semester. Preregistration for the fourth semester will not be approved without the POS.

Further Instructions appear on the reverse of the POS form. Note:

Part I, Item 4: All M.S. degrees require a thesis.

Part I, Item 6. List Chemistry

Part I, Item 7. List the major (e.g. Analytical Chemistry)

Part I, Items 8 to 11: Specify NONE unless a minor is desired.

Part I, Items 12 and 13: These dates are tentative guides that should agree with the schedule in section III of the form.

Transfer Credits from another university to be applied for graduate credit are designated T in the * column. The request must be approved by all members of the POSC on a signed form accompanying the POS. Transfer credit is not normally given for a course in an area in which a student received an "NP" on the Diagnostic Examination, for a course in which the student received an grade below B, or in courses that are not comparable to the 500-level courses in this university. Transfer credit will not be awarded for courses applied to a student's undergraduate degree. Transfer requests must be accompanied by photocopies of the relevant transcripts; the course contents are to be reviewed by a professor who teaches the comparable course here.

Graduate courses: List the courses in the major first, indicating them as "X" in the ** column. Outside or minor credits are designated "Y". Courses in foreign languages, elementary computer science, remedial English, and other courses not receiving graduate credit should be designated "Z".

Audits are listed on a student's transcript only if the student obtains the instructor's approval on the appropriate form.

Changes in the POS are made on a designated form.

4.2.4. Teaching Experience

One semester of half-time teaching experience is required for a graduate degree. Normally such experience is gained as a TA in this Department, but equivalent, substantive prior science teaching as a high school teacher or as a TA at a university in which English is the language of instruction can be substituted. However, teaching done

during a student's undergraduate career or as a teacher's aide does not qualify.

These possible reductions in the required TA service will not allow a student to be released from a teaching assistantship agreement, unless the change is acceptable to the department.

4.2.5. A chemistry minor

A minor in chemistry, or in any of its disciplines, for students from other departments requires 10 credit hours of lecture courses carrying graduate credit, six of which must be at the 500 or 600 level, and exclusive of credit for seminars and research. The specific courses chosen require approval by the chemistry member of the student's POSC.

5. PRELIM EXAMINATIONS AND Ph.D. CANDIDACY

The Preliminary Examination is designed to promote an integration of the student's knowledge, to require the student to stand up to oral questioning by experts in the field, and to screen students being considered for the Ph.D. degree.

5.1. Written Prelims (Cumulative Examinations)

Dates for cumulative examinations for the academic year are announced for all disciplines at the beginning of the fall semester. The professor preparing the exam and the topic of the exam are announced one week before the exam. The examinations last two hours. Professors indicate for which discipline(s) they are willing to write examinations.

Each discipline gives its examination on the same day, 9 times each academic year (none being given in December, July, and August). Four series of examinations now exist, but this number may change as our doctoral program evolves. The student is required to pass 5 out of 12 exams. No more than 2 low passes may substitute for 2 passes. For traditional disciplines, two passes (pass or low pass) outside the area are permitted.

Students begin writing examinations no later than the first February following August enrollment or the first September following January enrollment. The POSC may make allowance for exceptional cases: in these instances, a student may begin taking cumulative examinations at a later date. Once a student has begun to write examinations, he or she must continue to write them; examinations missed without a waiver are failures.

Exams are graded as pass, no-pass, or low-pass. No more than two grades of low pass are accepted among the required five passing exam grades. Faculty are not obliged to employ the low-pass grading option.

5.2. Oral Prelims

After passing written prelims, the student submits Form 3A to the Graduate Secretary at least two weeks before the oral exam. The specific format of the oral prelims for the four traditional areas is as follows:

Analytical. The oral preliminary examination should be scheduled to occur within three months of passing the written examination. The student, in consultation with the Major Professor, may elect one of two options for conducting the oral examination.

Option A: In this option, the topics for discussion are chosen at the discretion of the members of the POSC, to include topics from course work, applications of those topics to analytical problems, and research which the student has already completed.

Option B: In this option, the oral examination will be directed to a defense by the student of an original research proposal. Although the student may select a topic based on consultation with others including the Major Professor, the POSC will be looking for evidence of originality on the part of the student. The topic may not be that research to be pursued by the student, and may not duplicate planned or on-going projects in this or other departments. The research proposal should be of a scope which would lead to a significant publication in the analytical literature. Students selecting Option B will give each member of the POSC, at least two weeks in advance of the oral exam, a written summary of the proposal (3-5 pages). This summary shall include a specific statement of the problem, a critical evaluation of prior work on the problem, and an explanation of the student's approach to solving the problem. The quality of the written proposal, including spelling and grammar, may be viewed as positive or negative evidence of the qualifications of the student. Although the major portion of the oral examination in Option B will be devoted to the research proposal, the members of the POSC shall not be restricted in their choice of questions.

Chemistry, Chemical Education. The oral preliminary examination should be scheduled to occur within six months of passing the written examination.

Inorganic. The primary component of the preliminary oral examination for an inorganic chemistry major is a defense of the student's own research. This should be presented with sections on background and significance, objectives, research results, conclusions, and future work. The research will be judged on quality, volume, relevance of the results, and the student's understanding. The student will also prepare and defend an original research proposal as part of the preliminary oral exam. The work described in the proposal should not be related to the student's past or present research or to projects in the student's research group. The date of the oral exam is set by the timeline described below.

Three weeks after being notified that cumulative exams have been cleared, the student shall submit an original research preproposal to his/her POS committee, or to a subset of the POS committee as designated by the major professor. If the student has passed five cumulative exams by the end of the third semester, the preproposal is due the first week of the fourth semester (summer sessions are not counted as semesters). The preproposal must be no longer than 600 words (excluding references). It will include a title, and concise

statements of (a) what questions will be answered, (b) why the problem is important, (c) what will be done, (d) what new and significant knowledge can be anticipated, and (e) key references.

The preproposal will be evaluated for significance, creativity, and feasibility by the POS committee or the designated subcommittee, usually within a week. The major professor will convey to the student a decision of "approved" or "not approved". In the latter case, suggestions for revision may be made, or the idea may be rejected. The student will have two weeks from the date of notification to submit a revised version or a new preproposal for approval.

A student will schedule the oral preliminary examination to be held within four weeks of the preproposal approval. The student then prepares a full proposal (1700 words maximum, excluding references), and gives copies to the full POS committee one week before the oral examination. This final proposal will contain sections on Objectives (What questions will be answered?), Background and Significance (What has been done before and why is the proposed work important?), Research Plan (What will be done, what difficulties and results are expected, and how will they be interpreted?), and References (in ACS journal format). The Research Plan should constitute the major part of the proposal.

During the examination, the student will present and expand on the idea and defend it against questions and criticisms. The oral exam will conclude with general questions. Students who fail the first attempt at the oral examination may, at the discretion of the POS Committee, be allowed one repetition within 90 days.

Organic. The oral preliminary exam will consist primarily of two parts: (1) discussion of the student's thesis research and (2) defense of an original research proposal. In the defense of an original research proposal, the following guidelines should be observed.

Within nine months after notification that a student has fulfilled the prerequisites to justify an oral examination, the student should submit a "short abstract" of a research proposal to the organic professors of his/her POSC. The abstract cannot be longer than two pages; it should include the student's name, date of submission, title of the proposed research, a concisely stated objective, a brief background of the proposed research, a brief chemical justification (clearly labeled as such) which presents the expected contribution to the field of organic chemistry, a summary of key points including one or two key intermediates or key experiments. Key references should also be included.

The area of the proposal must not be directly linked with the student's research or other research underway in the Major Professor's group.

The three organic professors will then evaluate the proposal, usually within three - four days. The student will be notified of the result by his/her Major Professor. The criteria for evaluation will include originality, creativity, and feasibility. If the organic professors' evaluation of the proposal is "Approved", the student may then schedule the oral examination, a portion of which will be devoted to a defense of the proposal. If the proposal receives a "Not Approved" from the organic professors, the student must submit a new or revised proposal within one month. The student will be told, as clearly as possible, why the original proposition received a "Not Approved". The evaluation procedure will be the same for each new or revised proposal. A student may not have an oral examination before submitting a proposal which receives an "Approved" from the organic faculty on the POSC.

If possible, the student should arrange to have an oral preliminary exam within four weeks of the acceptance of the proposal. The student must distribute copies of the complete proposal to the members of the POSC at least one week before the oral exam. The complete proposal should consist of five separate sections entitled "Background", "Objective", "Justification", "Planned Work", and "References" and should not exceed five pages, not counting the references. The student should plan to devote no more than 30 minutes to the presentation of the proposal at the oral examination. The student should take the oral exam within one year after having been notified that he/she has passed the written preliminary exams.

Physical. Students must take the oral prelim before the end of their second year. Exceptions from this rule require a written request by the Major Professor for postponement, and must specify a definite period of time.

The oral preliminary examination is to ascertain that minimum academic standards have been achieved and to evaluate the proposed plans for research leading to a dissertation. Normally, a successful performance in the written cumulative examinations and in the core courses is perceived by the physical chemistry faculty as an indication of satisfactory academic progress in the major area.

5.3. Advancement to Candidacy

The Preliminary Examination can have one of the following conclusions:

- (a) **Pass.** The student is admitted to candidacy and advanced to RA II standing;
- (b) **Conditional Pass** (subject to specified remedial action, such as submission of a research report, further academic course work,

etc.). Promotion to RA II is delayed until the conditions are met;

- (c) **Fail.** A careful screening is made by the POSC whether or not to allow the student to repeat the exam or a part of it. The POSC might require the student to terminate with an M.S. degree. The POSC might require other conditions (e.g., preparation of a proposition, a research report, further academic course work) or the presentation of an M.S. thesis if the student is to be given a second chance at the oral prelim. Any repeat should be re-taken within one year.

5.4. Time Limitations. The prelim exam should be passed by a certain time to avoid a reduction of the assistantship stipend (See Section 9).

6. RESEARCH, THESIS, AND GRADUATION

6.1. Research

The conduct of research resulting in a thesis is the basis for awarding the M.S. and the Ph.D. degrees at ISU. Usually a student will begin to participate in research work before having been admitted to Ph.D. candidacy. After attaining candidacy, the advancement and completion of the thesis research should become the central objective of the student's study and work.

6.2. Other requirements

Continuous Registration. All graduate students, including off-campus and part-time students, are required by the Iowa Board of Regents to register for at least 1 Cr. or "R" Cr. each semester after passing the prelim exam. This policy involves fee payment for Fall and Spring semesters each year. Off-campus M.S. students need register only for the semester they plan to graduate.

Diploma Slip. By the start of the semester in which graduation is expected, the student should submit a diploma slip to the Graduate Secretary. If the student does not graduate in that semester, a new diploma slip is needed. The deadline for submission is posted on the Graduate Bulletin Board.

Fees for the Final Semester. When registering for their final semester, students planning to finish should be aware of Graduate College deadlines on the termination of Graduate Assistantships. Please refer to the Graduate Student Handbook and/or consult the Graduate Secretary. Missing certain deadlines can result in severe fee penalties.

The Final Examination is conducted by the POSC. The candidate submits a copy of the thesis to each member of the POSC two weeks in advance. The final defense consists of a publicly announced oral

presentation, which is open to the public, followed by a closed examination. This applies both to Ph.D. and M.S. candidates.

The convening of the final exam rests with the student and Major Professor. The student submits Form 4 to the Graduate Secretary two weeks prior to the Examination.

The Major Professor completes Form 5 and returns it to the Graduate Secretary immediately after the exam.

Graduation Approval. The full thesis must be approved by the DEO, who will sign the title pages and the Graduation Approval Slip. The latter can be obtained from the Graduate College on a one-day notice. Timely graduation requires the proper handling of this document.

7. SCHOLASTIC STANDARDS AND THE EVALUATION OF STUDENTS

7.1. Remaining in good standing

Graduate College policies stipulating requirements for academic grades, probation, appointments, etc., are given in the Graduate Student Handbook.

The Graduate Committee evaluates each student's progress in graduate studies. The faculty as a whole, not just the Graduate Committee or the Major Professor, will determine whether the student is making satisfactory progress toward the degree being sought, based on the academic and research performance of the student.

These areas are pertinent:

- Active involvement in research as soon as is feasible within the limitations of the time necessary to choose a Major Professor and a research problem. The student should have exhibited sufficient proficiency in the chosen research area by the end of the first year that the Major Professor may have a basis for judging whether or not it would be to the student's benefit to remain in the chosen area, or indeed, to remain in the graduate program. The extent to which a student can become deeply involved in research during the first year will, of course, depend upon the major area and the student's preparation and program.
- Performance in research as determined by the Major Professor and POSC. The criteria are the motivation, aptitude and capacity of the student for research. A student is expected to be productive and competent as a research scientist, and to be able to communicate with members of the research group, discipline, and profession. Familiarity with current literature in the student's major discipline is mandatory.

- The written and oral prelim exams, which are to be taken within a reasonable time, as defined elsewhere.
- Maintenance of a grade point average ≥ 3.0 in academic courses (exclusive of research). Experience has shown that a student with only B grades in the major discipline may find prelims difficult.
- Proficiency in English.
- Proficiency in Chemistry.
- The student and the Major Professor are expected to be in communication regarding research performance. Major Professors should keep students apprised of their progress.

7.2. Review of first-year students.

At the end of the first semester, students are provided with timely information on their scholastic standing. Because of the limited amount of information available at that time, this first review is preliminary in nature, and is based upon their grades and additional evaluations solicited from the faculty. The Graduate Committee then places each student in one of the following groups:

Group I. Satisfactory progress.

Group II. Some indication of possible scholastic weakness as evidenced by a GPA slightly below 3.0, or a grade of C or C+ in one course, or the completion of only one substantive course during the first semester. Such student's are sent a letter expressing mild concern about their progress.

Group III. Serious scholastic difficulties. These students are encouraged to show substantial improvement in order to be permitted to continue. Students should consult their Major Professor and/or a member of the Graduate Committee in writing or in person, to avoid further academic difficulty.

7.3. Annual review of students

Review data. During the Spring semester all professors are asked to evaluate students on research, teaching performance, and overall intellectual and research potential. The evaluating professor may be familiar with the student from an academic course or as a teaching supervisor.

As part of the evaluation process, the faculty recommends that each professor meet with each of his/her students to discuss research progress and progress toward the degree at least twice per year.

The faculty within each major then recommends to the entire faculty

the tentative placement of students in one of the eight scholastic groups described below, and the students are so informed in writing.

Scholastic groupings:

Group A: Admitted to Ph.D. candidacy. The student must have passed the prelim oral and demonstrated proficiency in chemistry and English.

Group B: Satisfactory progress toward the Ph.D., prior to admission to candidacy. A student in **B** may obtain an M.S. degree while progressing toward a Ph.D. degree.

Group MSC: A student plans to terminate with an M.S. degree. The POSC will consist of 3 members only. A student who may go on to the Ph.D. degree should not be in this group, and an **MSC** student who later decides to work for the Ph.D. degree will still be held to the time requirements, which include the time in **MSC**.

Group MSP: These students are required to complete an M.S. thesis before they can be considered for **Group B**, and should endeavor to do so by the end of the second year.

Group MST: A student in this group will terminate graduate studies with an M.S. degree.

Group D: Uncertain Degree Status. This is a temporary assignment, and students will not normally remain in **Group D** beyond the third academic semester.

Students in **Group D** must carefully plan their courses, research and exams to ensure two objectives in the second year: (i) to determine whether they will be able to continue towards the Ph.D.; (ii) to be able to complete the M.S. degree promptly if called upon to do so.

The faculty of the major will recommend to the faculty as to whether a student in **Group D** should be moved to **Group B**, **MSP** or **MST**. The performance during the first semester of the second year is therefore crucial.

Group F: No graduate degree

Group S: Special cases

8. ASSISTANTSHIPS

8.1. Promotions.

RA-II appointments may carry a higher stipend than RA-I. Appointment as a TA is contingent upon proper certification as a result of the SPEAK/TEACH test; if a Fully Certified level is not attained, the stipend will be lower than that for TA-I.

Promotion to TA-II occurs after the student has satisfactorily completed two semesters of half-time teaching, provided all the required remedial work in English has been completed.

Promotion to RA-II occurs in the month after the student has passed the oral prelim exam, including proficiency in English and in chemistry. So that the promotion to RA-II is not overlooked, eligible students should submit Form 8 to the Graduate Records Secretary.

8.2. Fellowships

Students making excellent progress are encouraged to apply for outside fellowships (NSF, NIH, etc.). Departmental fellowships are awarded by a faculty committee.

8.3. Students without Departmental Support

Such students become eligible for graduate assistantships only by action of the Graduate Committee and the chair of the department. *Admission without support carries with it no assurance that an assistantship will ever be awarded.* To be eligible for departmental support, students must have completed at least 7 credits of graduate courses other than research and seminars at ISU; maintained a GPA of >3.0 (excluding research and seminars) at ISU; demonstrated proficiency in English, and obtained the concurrence of their POSC. Of course, funding must also be available.

9. PROGRESS TOWARD THE GRADUATE DEGREE

9.1. Normal Academic Progress

A student in good standing must maintain a 3.0 grade point average, make timely progress in written and oral prelim exams, and demonstrate accomplishments, diligence, competence and progress in research. These expectations are given in more detail elsewhere in this manual.

The department has set standards as to timely progress. It is not to a student's advantage to prolong the time toward a graduate degree. To avoid an unduly long time to attain a graduate degree, students should exert due effort in the early stages of their graduate work, paying careful attention to program deadlines.

9.2. Conditions of appointment; stipend reductions

The Department will reduce the assistantship stipends of students not making timely progress; in extreme cases, it will not renew a graduate assistantship.

Attainment	Stipend reduction if not attained by the start of the year shown		
English proficiency	Year 3: 5%	Year 4: 10%	Year 5: 100%
Chemistry proficiency	Year 4: 10%	Year 5: 100%	
SPEAK/TEACH	Year -All: To < TA-I, as specified by the department.		
M.S. Degree, if required or desired	At Year 3.5, no support unless the major professor provides an RA (unless the department needs a TA).		
	Year 4: 5%	Year 5: 100%	
Ph.D. Candidacy	Year 4: 5%	Year 5: 100%	
	Includes time to prior M.S. degree at ISU		
Ph. D. Degree	Year 6: 10%	Year 8: 100%	
	In Year 7, no support unless the major professor provides an RA (unless the department needs a TA) the 10% reduction applies		

10. VACATION AND LEAVE POLICIES

10.1. Vacations

- a. Arrangements for vacation and leaves of absence are made between the graduate assistant and that assistant's supervisor. When a graduate student employee needs to be absent either for personal reasons or illness, the supervisor should be understanding and accommodating to that need. At the same time, the graduate assistant should attempt to plan personal leave so that it does not interfere with or cause neglect of the duties associated with his or her appointment. Supervisors of graduate assistants are responsible for ensuring that their assistants do not exceed reasonable limits for leave.
- b. Although we do not tabulate any record of accruals, usage or balances, there will still be a requirement to submit absence requests to the department. These will be filed in the main office for each major professor.
- c. Assistants whose appointments are in the Ames Laboratory submit Ames Laboratory absence requests. Students on chemistry department appointments obtain and submit their forms in the department office.
- d. Research Assistants should take their vacation so that it can be conveniently worked into the research plans of their major professor.

10.2. Leaves of absence

10.2.1. Maternity leave. A six month extension on stipend reductions (Section 9) is automatic.

10.2.2. Military leave. These are honored upon petition.

10.2.3. Other leaves. These are handled as special cases.

11. GRADUATE STUDY BY FULL-TIME EMPLOYEES

Full-time employees of ISU or another employer who pursue a graduate degree must have the background expected of regular students, including the required technical courses a chemistry major takes and an appropriate grade record. Application should be made to the Graduate College. Applicants are invited to correspond with the department concerning their suitability for admission. Applicants who do not qualify may be admitted as Special Students in an effort to fulfill admission requirements.

Because of the special circumstances involved, it is recommended that the student, the employer, the Major Professor and the department agree in writing on the plans and time schedule of the candidate.

Immediately prior to the semester in which graduate study will begin, the student is to take the diagnostic exams in all four areas. Proficiency requirements in Chemistry and English must be met promptly.

The student should complete the forms "Recommendation for Committee Appointment" and "Program of Study" at an early date. A maximum of 6 hours per semester may be earned by an employee of ISU.

Full-time employees, like other students, are required to undertake an original research project and defend their thesis before the POSC. Results of a routine or repetitive nature which lack a creative, original component are not acceptable. If a student plans to include in the thesis research done in fulfillment of job requirements, not only must the employer agree, but such students should delineate in advance to their POSC their intentions in a written statement, so that the suitability of such plans may be judged at an early stage.

The time requirements stated elsewhere in this document will be appropriately extended for full-time employees.

12. GRADUATE STUDENT ACADEMIC MISCONDUCT

Academic misconduct by graduate students is taken very seriously. The more serious cases involve cheating or plagiarism on a preliminary examination, thesis or dissertation. Plagiarism involves taking or passing off as one's own the ideas or writings of others. Others ideas or writings should always be openly acknowledged and thoroughly referenced. Such matters of misconduct are very serious violations of academic ethics and usually result in dismissal from the university without a degree.

Cheating on a course examination or plagiarism on a paper related to a course more often results in lesser penalties than permanent dismissal. If a graduate student is believed to have plagiarized a term paper or to have cheated on an exam, most often that situation is handled informally between the professor and the student or by a representative of the department. The student or the faculty member may ask for more formal review by the Dean of Students' office using policies developed for ensuring that due process is followed. A formal investigation of the situation may be conducted by the Dean of Students office, a hearing held by a committee of the all-university judiciary, and a recommendation made to the Vice President for Student Affairs. The student may appeal to the vice president for student affairs if he/she is not satisfied with the decision of the hearing committee.