INFORMATION FOR CANDIDATES

FOR GRADUATE DEGREES

IN THE

DEPARTMENT OF CHEMISTRY

UNIVERSITY OF WISCONSIN-MADISON

Fall 2014

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INFORMATION FOR CANDIDATES FOR GRADUATE DEGREES IN THE DEPARTMENT OF CHEMISTRY, UNIVERSITY OF WISCONSIN-MADISON

Entering graduate students should have undergraduate training in chemistry, which includes as a minimum the equivalent in class and laboratory of the basic undergraduate courses in analytical, inorganic, organic, and physical chemistry specified in the requirements for the undergraduate major at the University of Wisconsin-Madison. If the advisory examinations indicate deficiencies in these areas, additional work in courses at the undergraduate level may be required.

Candidates for graduate degrees in the Department of Chemistry should consult the Graduate School Bulletin (www.grad.wisc.edu/) for the requirements for the Graduate School, which must be met by all those working for an advanced degree at the University. In addition to these requirements, some of which are described below in Section III, graduate students majoring in Chemistry must meet the requirements of the Chemistry Department.

I. ADVISORY EXAMINATIONS

The advisory exams, required of all new graduate students, consist of separate examinations (2-3 hours) in each of four areas of chemistry: analytical, inorganic, organic, and physical. These examinations are designed to test the student's knowledge of the chemical principles and significant facts in these fields. Each entering graduate student is required to take all four examinations. These examinations, which are given prior to the first semester of graduate study, are graded on a pass-fail basis.

Examination results will be made available to the student's temporary adviser and will be used to guide first semester course selection. The temporary adviser will evaluate the results of the advisory examinations together with the student's prior coursework and research interests and will decide on appropriate coursework for the first semester. The results will also be available to all students prior to advising so that each student has a chance to consider the scores and to be prepared to participate in choosing coursework during the advising period. The results of these exams will be added to the student's record and may be used by professors when evaluating students for their research groups.

The following books are representative of texts that have been used in undergraduate courses at the University of Wisconsin, and may be helpful as study guides.

Analytical: D. C. Harris, *Quantitative Chemical Analysis*, 4th edition (W. H. Freeman and Co.); D. A. Skoog and J. J. Leary, *Principles of Instrumental Analysis*, 4th edition (Harcourt Brace College Publishers); H. A. Strobel and W. R. Heineman, *Chemical Instrumentation: A Systematic Approach*, 3rd edition (John Wiley & Sons).

Inorganic: Recent Editions of Shriver, et al., *Inorganic Chemistry*; J. E. Huheey, *Inorganic Chemistry. Principles of Structure and Reactivity*; F. A. Cotton and G. Wilkinson, *Advanced Inorganic Chemistry*; or Greenwood and Earnshaw, *Chemistry of the Elements*.

Organic: Streitweiser, Heathcock and Kosower *Introduction to Organic Chemistry*, 4th Edition (MacMillan); McMurry, *Organic Chemistry*, 3rd Edition (Brooks-Cole); Carey, *Organic Chemistry*, 2nd Edition (McGraw-Hill) or similar texts.

Physical: I. N. Levine, *Physical Chemistry*, 4th Edition (McGraw-Hill); M. Karplus and R. N. Porter, *Atoms and Molecules*, (Benjamin/Cummings); P. W. Atkins, *Physical Chemistry*, 5th Edition (Freeman).

II. SELECTION OF ADVISERS FOR GRADUATE STUDIES

The entering graduate student may request any professor in the Chemistry Department to act as his or her adviser, however students will normally be assigned to a temporary adviser in the area (program or path) of the student's principal interest. The student is free to change advisers at any time. Before November 15 (or as soon as possible in the first year of study) the graduate student must select a major professor, who then becomes the permanent adviser. The choice of major professor and thesis problem is an important decision that should not be made hastily. A series of seminars or similar programs is scheduled during the fall semester to acquaint new students with the research interests of the faculty. The student should refer also to the Departmental brochure or website describing the research interests of the chemistry faculty and then arrange interviews with those professors whose research work lies in the field of interest. On the basis of these discussions, the student should make the decision and when a mutually agreeable program is arranged, the Chemistry Graduate Office should be notified. Occasionally a student will transfer to another major professor before completion of graduate work.

A student who expects to meet the requirements for a Doctoral degree must declare a minor in their field of choice. This may be one of the areas of chemistry outside of the student's major area, or may be a related field outside the Department, such as Biochemistry, Chemical Engineering, Mathematics, or Physics. If the student chooses Minor Option A (see below), a minor adviser will also be needed. The minor professor should be selected not later than the third semester. It is important to file a "Minor Agreement Form" not later than halfway through the minor course sequence with the Chemistry Graduate Office (see Section III.B.1 "Minor Requirement").

III. REQUIREMENTS FOR THE DOCTORAL DEGREE

"The doctor of philosophy…[is among] the highest degrees conferred at UW-Madison. [It is not] conferred solely as a result of any prescribed period of study, no matter how faithfully pursued. The Ph.D. degree is a research degree and is granted on evidence of general proficiency, distinctive attainment in a special field, and particularly on ability for independent investigation as demonstrated in a dissertation presenting original research or creative scholarship with a high degree of literary skill." (From http://www.grad.wisc.edu/catalog/degrees.htm.)

A. Requirements for Admission to Candidacy (Advancing to Dissertator)

Although to qualify for admission to candidacy for the Ph.D. degree a student must satisfy a number of requirements in excess of those for the Master's degree, it is not necessary for the student to take a Master's degree.

The Graduate School Academic Guidelines (located on the web at: http://www.grad.wisc.edu/education/acadpolicy/guidelines.html) identifies requirements for admission to candidacy: passing the comprehensive preliminary examination in the major field; obtaining approval of the proposal for meeting the minor requirement; and completing all requirements of the major area except for the dissertation. One other requirement is that of residence status. A Ph.D. degree requires a minimum of 32 credits for residence status. This includes courses numbered over 300. Full time study is between 8 and 12 credits per semester, so you will complete 32 credits for residence in two years or less. In the Department of Chemistry the candidate must also have taken the advisory examinations as described above.

1. Preliminary Examinations. A candidate for the Ph.D. degree is required to complete the preliminary examination in his or her field of specialization at least two semesters before taking the final oral examination. It is the responsibility of the major professor to give the preliminary examination with the assistance of such other professors as he or she may select. Ordinarily this responsibility is shared with the staff of the program corresponding to the candidate's specialized field, and each program establishes the form of the preliminary examination.

The "examination" consists in practice of a series of written examinations and one or more oral presentations. Program requirements determine the form of the examination and the times at which the series is to be begun and completed. One of the requirements in each Program is a research proposal,

which is a suggested original research problem and the approach recommended for its solution. The individual Programs issue the detailed rules for preparing and presenting research proposals. Some programs require an intermediate research report or a research progress seminar as part of the preliminary examination.

Satisfactory completion of the Program preliminary examination requirements, including usually the cumulative examinations and the research proposal, and approval of the scope of the minor program (see below) satisfies the requirements of the Graduate School preliminary examination.

2. Preliminary Warrant and Formal Admission to Candidacy. In addition to the above formal requirements, the candidate must demonstrate to the major professor competence in the field of specialization and capacity for independent work. Each semester the professor will judge whether the candidate has made satisfactory progress in research. The "Request for Preliminary Warrant", available in the Chemistry Graduate Office, Room 2108, must be completed and sent to the Graduate School at least three weeks prior to the preliminary examination. After the preliminary examination has been completed and the professor is satisfied with the candidate's competence and capacity for independent work, the signed "Preliminary Warrant" must be returned to the Chemistry Graduate Office and will be filed with the Graduate School. This form requires the signatures of the major professor, the minor professor (or, in the case of an Option B -- Internal Minor, the appropriate Departmental administrator), and the Chairman of the Chemistry Department.

B. Requirements for Completion of Candidacy

1. Minor Requirement. Each Ph.D. candidate must meet the minor requirement under either Option A or Option B -- Internal Minor, as described below.

Option A. Under this option, a candidate for the Ph.D. degree in one of the fields of chemistry must complete the requirements for a minor within a single division of the Chemistry Department, or within a single department other than Chemistry. A minor within the Chemistry Department consists of a minimum of 9 credits passed with a grade of B or better in any graduate courses which are satisfactory to the candidate and to the minor professor. A candidate whose minor field is outside the Chemistry Department must satisfy the requirements of the department concerned and should consult the minor professor in this regard.

Option B / Internal Minor. Under this option, a minimum of 9 graduate credits is taken in two or more areas outside the candidate's specialized field. These courses can be in different departments or all within Chemistry. The minor may correspond to one of the programs, or to an alternative major as approved by the Department and the Graduate School. A set of related courses is to be chosen with the approval of the student's major professor and the faculty member designated by the Chemistry Department (often the Associate Chair) to administer such programs. They must be passed with a grade of B or better.

Under either option, Chemistry 603, 604, 605, and 606 may be taken for minor credit by any student, regardless of field of specialization, subject to approval by the minor professor. However, Option B / Internal minor must include courses from at least two programs in addition to courses selected from the above list. No more than one of the courses Chem. 511 (Inorganic), Chem. 524 (Analytical), and Chem. 547 (Organic) may be used in fulfilling the minor requirement. No 500-level physical chemistry course may be used as a minor course. A list of graduate courses by area within Chemistry is available from the Department.

The Graduate School requires that the minor program be outlined on a Minor Agreement Form approved by the Department of Chemistry and filed through the Chemistry Graduate Office, Room 2108, not later than halfway through completion of the sequence of minor courses.

The minor requirement must be completed by the end of the third year of graduate work. The signature of the minor professor (if Option A) or the Departmental administrator (if Option B / Internal Minor) should then be obtained on the Preliminary Warrant.

2. Thesis. When the major professor decides that the candidate has satisfactorily completed the thesis research work, the candidate is required to prepare a thesis in accordance with the regulations of the Graduate School and the University Library. This thesis must be approved by the major professor and by the other members of the committee; then approved by the Graduate School. The thesis must be submitted to the committee at least seven days before the final oral examination.

3. Final Oral Examination. Following the completion of the thesis, the candidate is required to take an oral examination given by five members of the staff approved by the Graduate School. If the Option B minor included course work outside of the Department, at least one member of the committee must be from outside the Department. The scope of this final oral examination will usually be confined to matters pertaining to the thesis. This examination will not ordinarily be scheduled during periods when regular classes are not in session. If a candidate fails to take the final oral examination within 5 years after passing the preliminary examination, he or she is required to take another preliminary examination and be admitted to candidacy a second time. The "Ph.D. Final Oral Committee Approval Form" must be filed through the Chemistry Graduate Office at least three weeks prior to the student's final defense.

C. Criteria for Satisfactory Progress

To be considered to be making satisfactory progress as a graduate student, a Ph.D. candidate must:

1. Complete a minimum of 8 credits per semester and 2 credits per summer session. These courses are to be approved by the adviser or major professor. The normal course load is at least 8 credits per semester. After admission to candidacy, registration for the minimum number of credits specified by the Graduate School is allowed, while continuing full time effort on research.

2. Maintain a cumulative B average for all courses taken. In computing this average, grades of P or S in non-research courses are counted as B, but all research course grades are excluded from the average. Note that even though courses for which a grade of C are given do not count towards fulfillment of the course requirements, they still factor into the GPA.

3. Choose a major professor and begin research within 2 semesters of beginning graduate study. Continue to make satisfactory progress in research as judged by the major professor and confirmed by the Program in which the student is specializing.

4. Satisfy the preliminary examination requirements set by the Program of specialization, including meeting these requirements within the time limits (if any) specified by the Program. This varies with the Program, but usually includes items such as a research proposal, a seminar on some topic of interest outside the research specialization, and progress on cumulative examinations to demonstrate mastery of areas outside of those covered by course work.

5. Complete the Ph.D. minor requirements not later than the end of the third year of graduate work.

A student who fails to meet specified requirements after one semester will be placed on academic probation and will receive notification from the Department. Any requirements not satisfied after two semesters will result in termination unless the major professor requests, and the Department approves, continued academic probationary status. Academic probation will be granted one semester at a time. All requests for academic probation must be initiated through and approved by the major professor prior to the first department meeting of the affected semester. An exception may be made to any of the requirements by action of the Department.

In addition to these requirements, the student is advised to be aware of the general rules of the Graduate School. The Graduate School urges that special attention be paid to the rules governing residence credit. The requirements for the degree and the criteria defining satisfactory progress toward it are subject to change, with the approval of the Departmental Committee. When any substantive change is made, students actively in the Ph.D. program will have the option of continuing under the new requirements or under those in effect when their program was started. Students who have not registered for a full semester or longer will become subject to requirements in effect when they re-enter the program.

IV. REQUIREMENTS FOR THE DOCTORAL DEGREE IN SPECIAL FIELDS

A. Theoretical Chemistry

The degree of Ph.D. with specialization in Theoretical Chemistry has been established for students concentrating in the theoretical aspects of chemistry, which places considerable emphasis on mathematics and physics. For the requirements for this degree, a professor in this area should be consulted.

B. Biophysical Chemistry

The degree of Ph.D. with specialization in Biophysical Chemistry has also been established for those students who desire to combine Physical Chemistry and Biochemistry in a joint major, and also a joint minor. For the requirements for this degree, a professor in this area should be consulted.

V. REQUIREMENTS FOR THE MASTER'S DEGREE

Note that these requriements are changing, and not all detials have been finalized at this point.

A. Adviser

Each student who enters the Master's program will be assigned an adviser. Any member of the departmental faculty may serve as an adviser, and the adviser can be changed by mutual consent of the student and the faculty members involved.

B. Course Work and Residence

Candidates must spend at least one academic year in approved graduate study. A minimum of 30 credits must be earned in graduate courses; credits in excess of 12 in any semester or 5 in any summer session will not be counted toward this minimum. At least 27 of the 30 credits must be in courses beyond the fundamental treatment found in courses 346, 511, 524, 564 and their prerequisites. However, either 511 or 524 may be counted in the 27. The adviser must approve the choice of courses, and graduate credit is given only for a grade of B or better.

C. Advisory Examinations

The advisory examinations must be taken at the first opportunity and deficiencies must be dealt with as required by the adviser. The requirements are described in Section I.

D. Additional Requirements

A candidate must satisfy the additional requirements in Group A or Group B:

Group A:

1. The candidate must select a major professor not later than the second semester of graduate study. This selection requires mutual agreement of the candidate and the prospective major professor.

2. The selection of graduate courses must be approved by the major professor, and at least 14 credits must be in graduate research or advanced laboratory work.

3. The candidate must present either a formal thesis or a comprehensive written research report to the major professor, and the major professor must accept it.

Group B:

1. The candidate must have a faculty adviser in the Department. The adviser may be changed only with the approval of the Department.

2. At least 24 of the credits must be for courses in Chemistry with course numbers greater than 600. The selection of courses must be approved by the adviser and must represent a coherent program of study. Graduate level courses in other departments may be included subject to these restrictions.

3. A maximum of 3 credits of graduate research can be counted as part of the 30 required credits.

E. Criteria for Satisfactory Progress

To be considered to be making satisfactory progress as a graduate student, a M.S. candidate must maintain a cumulative B average for all courses taken. In computing this average, grades of P or S in non-research courses are counted as B, but all research course grades are excluded from the average. In addition

1. M.S. candidates seeking to meet the requirements of Group A must:

a. Be affiliated with a major professor and begin work on a research topic within 2 semesters.

b. Complete a minimum of 6 credits per semester and 2 credits per summer session. These courses to be approved by the adviser or major professor. The normal course load is at least 8 credits per semester.

c. Complete the degree within 6 semesters plus 2 summers of graduate study.

2. M.S. candidates seeking to meet the requirements of Group B must accumulate graduate credits at a rate approved by the adviser.

A student admitted to the Department in the Ph.D. program who transfers to the M.S. program must complete the degree within 4 semesters plus 1 summer of graduate study.

A student who fails to meet specified requirements after one semester will be placed on academic probation and will receive notification from the Department. Any requirements not satisfied after two semesters will result in termination unless the major professor requests, and the department approves, continued academic probationary status. Academic probation will be granted one semester at a time. All requests for academic probation must be initiated through and approved by the major professor prior to the first department meeting of the affected semester.

An exception may be made to any of the requirements by action of the Department.

VI. ADDITIONAL INFORMATION

A. General

For information concerning the dates of examinations and other similar matters, the candidate should confer with the major professor and consult the departmental Newsletter, which is published weekly during the academic year.

B. Records

Candidates are expected to have entered on their permanent record (maintained in the Chemistry Graduate Office) all graduate courses and examinations taken at Wisconsin and elsewhere, with grades received. It is the responsibility of each candidate to see that this record is updated as new courses are taken and examinations are passed. The record will be examined before the Preliminary Warrant is filed and at the time of the final oral examination.

C. Check Out

Before receiving any degree or leaving the Department for any reason, a student must return to the proper place all University equipment and building keys. The Chemistry Check Out form, available from the Chemistry Graduate Office, must be signed by the appropriate departmental personnel listed on the sheet, and by the major professor to certify that this obligation has been fulfilled. The sheet should then be returned to Room 2108, indicating an address for mail forwarding.