Department of Chemistry
Howard University
Requirements for the Ph.D. Degree

(Effective June, 2007)

Part A: Details of the Chemistry Graduate Program

General Overview

All entering graduate students in the department are strongly encouraged to pursue the Ph.D. degree. Thus, the aim of the program is to provide a challenging curriculum for all students, in addition to offering significant opportunities to those with less accomplished academic backgrounds. Further, the program has several components that are collectively designed to promote disciplinary competency, professional development, interdisciplinary training and research, group mentoring, collegiality among faculty and students, and dynamic student tracking. Emphasis of the doctoral program is placed on the integration of professional development into the curriculum and the opportunity for interdisciplinary training and research.

A total of 72 semester hours of graduate credit must be earned. Students are required to complete a minimum of six (6) graduate courses (18 credit hours, total) before candidacy and up to 54 credits of additional specialty/research hours for completion of the Ph.D. Additionally, specialty divisions (Analytical, Inorganic, Organic/Biochemistry, or Physical) or an Advisory committee (in the student's specialty area) may require more than the minimum 18 credit hours of coursework prior to candidacy. The total of 72 hours will include at least one (1) hour of the Chemistry Graduate course numbered 205-600.

Master’s degree holders may transfer up to 24 Credit hours of coursework from the Master’s degree, and entering Bachelor’s degree holders may transfer up to 18 Credit hours of coursework toward the Ph.D. program. In any event, proposed transfers: a) must be requested before the student is admitted to candidacy and b) approved by the Department of Chemistry’s Committee on Graduate Studies and the Executive Committee of the Department.

All students must take a graduate-level Professional Development Course and (at least) two graduate courses outside of their chemistry division which could be Chemistry courses or those from other departments such as pharmacy, engineering, biochemistry (Medical College), biology, or related disciplines.
Reading and Conference (205-293), and Special Laboratory Projects (205-294) may not be counted towards the minimal 18 Credit hours of required coursework prior to candidacy. Seminar courses (with changing topics) may be taken for credit for multiple times.

No course taken more than seven years prior to the semester in which the student presents himself/herself for candidacy will be credited toward the degree. Courses may be recertified by recommendation of the Departmental Chair, based upon the results of special written examination(s) taken by the candidate. PLEASE NOTE: A Graduate School regulation states that any course more than ten years old can only be recertified by retaking the course(s) in question.

**Residency Requirement**

A minimum of six (6) semesters of full-time study (at least 9 Credit hours per semester) are required for the Ph.D. degree. At least four (4) semesters of residence and full-time study shall be pursued in the Graduate School of Arts and Sciences at Howard University. At least two of these four semesters of residence and full-time study shall be consecutive.

Students are expected to complete the Ph.D. degree within seven (7) years from the date of initial registration in the program. They will be dropped from the program if they do not complete the degree within the specified time.

**Selection of a Research Project**

Students should begin interviewing individual faculty members near the end of the first semester of full-time residency in order to identify common areas of interest and to select a research advisor and/or project. Each student is required to consult at least five faculty members, but is encouraged to interview even more. After a research advisor is selected and a research project agreed upon, the student, in consultation with the chosen advisor and Director of Chemistry Graduate Studies, will pick an advisory committee (see section under advisory committee below).

**Teaching Requirement**

Each student who is supported through Teaching Assistantship must give at least one supervised laboratory lecture in each semester of such financial support. Students who are supported by external grant fund may give at least one supervised laboratory lectures at the request of their research advisor(s).

**Scholastic Requirements**
A cumulative grade point average of 3.00 (B) is required for graduation. A student will be permitted only two grades below “B”. In the event a student receives a third grade below “B” in the Ph.D. program, he/she will be dropped from the Ph.D. Program. A student whose grade point average (GPA) falls below the 3.00 average will be warned and informed that he/she must raise his/her GPA to at least 3.0 by the end of his/her next two semesters in residence. If the student fails to do this, he/she will be dropped from the Graduate Ph.D. program.

**CAUTION:** A student who receives a Master’s degree from this department may reapply to enter the Ph.D. program as a new student. Such a student would still have to meet the placement exam requirements, and should also request to transfer the applicable Master’s coursework to the Ph.D. program.

**Curriculum Practical Training (CPT)**

Graduate students are strongly encouraged to use the Special Lab Project Course (Chem 294) to engage in an industrial and/or national laboratory internship with the consent of the research advisor. Participation in such industrial or national laboratories rotation will further expose our students to practical training in cutting-edge research. The course will carry 1-3 semester credit hours, and there must be joint advisorship between the chemistry department advisor and the external advisor. A project outline must be clearly defined to enable an objective assessment of the quality of research work for the purpose of assigning letter grades. If the student does not have a chemistry department research advisor, the Department Chair or Director of Graduate Chemistry Studies would assume that role.
Part B: Summary of the Sequence of Requirements for the Ph.D. Degree.

1. ACS Placement Examinations
   - Must pass exams in 3 Chemistry divisions in the first Semester of residency.

2. Coursework (minimum 18 credit hours required before candidacy)
   - 3 Courses from discipline (division)
   - 2 Courses (1 each from two other divisions)
   - 1 Graduate-level Professional Development Course

3. English Competency and Expository Writing

4. Responsible Conduct of Research Workshop

5. Cumulative Examinations (must earn 32 points within first 2 years; effective August 2006)

6. Selection of Research Advisor/Project and Advisory Committee
   a) Oral Presentation on original idea (3rd Semester)
   b) Oral Presentation on dissertation proposal (4th Semester)

7. Dissertation Proposal and Dissertation Research

8. Application, and Admission to Candidacy

The Above Items (1-8) Must be Completed Within Two (2) Years of Initial Residency.

9. Departmental Seminar Presentation (prior to Dissertation Defense)

10. Completion of at least 72 (coursework + research) credit hours

11. Dissertation Completion

12. Final Oral Examination
Part C. Details of the Requirements for the Ph.D. Degree.

1. ACS Placement Examinations
   a. All incoming graduate students must take the American Chemical Society (ACS) placement exams in all four areas (analytical, inorganic, organic, and physical).
   b. Students who fail the ACS placement test in an area would audit an appropriate undergraduate chemistry course, and this would be in addition to the required coursework.
   c. Students who pass at least 3 out of the 4 ACS placement exams (analytical, inorganic, organic, and physical), in the first semester of residency are eligible to continue in the Ph.D. program.
   d. Students who do not pass 3 out of the 4 ACS placement exams, by the end of the first semester of residency, will be placed in the Master's program, and may reapply for the Ph.D. program upon completion of the Master’s program.

2. Summer Preparatory Workshop for New Graduate Students
   In order to increase the probability that new students will pass the placement exams, a summer preparatory workshop will be offered in July/August for incoming graduate students, during which an overview of the undergraduate courses: Analytical, Inorganic, Organic, and Physical Chemistry, will be provided. Those students with low GRE scores are strongly advised to take advantage of the summer workshop program. For such students, participation in the summer program will enhance the likelihood for graduate student stipend.

3. Cumulative Examinations
   In an effort to expose students to current literature and topics, cumulative exams will be given in analytical, inorganic, organic, and physical chemistry starting from the first semester of initial enrollment. These cumulative exams will be based on suggested literature topics and/or topics from departmental seminars. Four cumulative exams will be given by each division each semester. For incoming graduate students, effective fall, 2005, each cumulative exam would be scored from 0-4 points, and each student must score a total of 32 points in order to proceed with the Ph.D. program. The 32 points could come from a single area or any combination of specialty areas. Once a student has identified their specialty area, it
is expected that he/she takes all the cumulative exams in that area in order to accrue the required 32 points.

4. Advisory Committee, Dissertation Proposal, and Oral Presentations

a) At the end of the second semester, each student will choose a research advisor. Also at the end of the second semester, the student and the advisor, in consultation with the Director of graduate studies, will choose an advisory committee (advisor + 2 other faculty members). The advisory committee will play the primary mentoring role for the student, in addition to constituting part of the Dissertation Committee.

b) Each student is expected to start the Dissertation Research at the end of the second semester.

c) Students are also required to give two seminars to the Advisory Committee. One shall be on a topic other than the students’ research (3rd semester), the other shall be a defense of student’s dissertation proposal (4th semester). The dissertation proposal shall be written in form of a grant application, which could be used as a basis for the application for candidacy. The dissertation proposal will be jointly reviewed by the Advisory Committee.

d) In the fourth semester, the Advisory Committee will inform the student whether to proceed to the Ph.D. or M.S. program based on compliance with the placement exams requirement, completion of required coursework, completion of cumulative exams, and competency in the oral presentations.

5. Foreign Language/Computer Requirements

i. There is no language requirement for the Ph.D. program.

ii. There is no computer requirement for the Ph.D. program.

6. English Competency and Expository Writing Requirement

All incoming graduate students are given an English Proficiency Examination. Students who fail are required to take and pass a no-credit expository writing workshop administered by the Graduate School. This is a graduate school requirement.

7. Responsible Conduct of Research Workshop

All students are required to participate in a Workshop on “Responsible Conduct of Research”. This workshop, administered by the Graduate School will cover issues of interest to the Institutional Review Board (IRB), Intellectual Property, Scientific Ethics, Data Acquisition, Management, Sharing & Ownership, Scientific Misconduct, Conflict of
Interest, Policies and Procedures Governing Research Involving Human Participants and Animal Subjects. This Workshop must be taken in the student’s first year of residence. This is a graduate school requirement.

8. Application for Candidacy

Before the end of the fifth semester, the student will apply for candidacy. The complete requirements for candidacy include: proficiency in expository writing, completion of the workshop on Ethics and Responsible Conduct of Research, compliance with placement exams requirement, completion of required coursework, completion of cumulative exams, and competency in the oral presentations, and a written research proposal. A copy of the proposal must be submitted to the Graduate School with the application for candidacy. The proposal must be endorsed by the research advisor, and the candidacy forms must be signed by the advisor, director of graduate studies, and departmental chair prior to submission to the Graduate School.

9. Seminar Presentation to the Department

In a continuation of the efforts at providing opportunities for professional development, after admission to candidacy and prior to dissertation defense, the student will give a departmental seminar highlighting his/her research findings.

10. Dissertation Defense

This is the last of the major transitions by the student. The date for the dissertation defense is set by the Graduate School subsequent to the student’s submission of four copies of the dissertation. Prior to the submission, the final dissertation copy must have been critically reviewed by the dissertation committee which consists of the Advisory Committee, another faculty member, an External Examiner, and the Chair of the Department of Chemistry. The committee members shall be formally appointed by the graduate school upon recommendation of the department. The dissertation format shall follow the requirements as prescribed by the graduate school.

11. Final Oral Examination

The final oral examination shall be based primarily upon the student’s research, the field of his/her research and related areas of study. The examination committee shall consist of a minimum of five examiners and one of whom must be from outside the University. The examiners shall be appointed by the Dean of the Graduate School upon recommendation of the Department of Chemistry. The unanimous passing of this oral and the unanimous acceptance of the dissertation by the Graduate School fulfills all the requirements for the Ph.D. degree in Chemistry.