

**NORTHERN ILLINOIS UNIVERSITY  
DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY**

**M.S. AND Ph.D. PROGRAM REQUIREMENTS AND DEPARTMENT POLICIES**

**MOST RECENT MODIFICATIONS:  
APPROVED BY THE DEPARTMENTAL FACULTY – MAY 1, 2014**

**Normal text represents verbatim 2013-2014 Graduate Catalog language.  
*Italicized text represents faculty approved program policies and document highlights.***

**GENERAL POLICIES APPLYING TO ALL PH.D. AND M.S. STUDENTS**

***Background Requirements.*** Students who wish to enter the graduate programs (Ph.D. or M.S.) in chemistry should have a baccalaureate degree in a life, physical, mathematical science, or engineering, including one year of physics; one year of general chemistry; one year of physical chemistry; and mathematics consisting of either three semesters of calculus or two semesters of calculus and one semester of differential equations. Also required are four courses in other areas of chemistry at the 300-400 level, except for doctoral students in the interdisciplinary nanotechnology area, for whom two other 300-400 level chemistry courses are required.

***Deficiency Courses.*** Students deficient in these requirements may satisfy them after admission, but the courses may not be taken for graduate credit and must be approved by the Graduate Program Committee after consultation with the chemistry faculty in the student's primary area of interest. These deficiencies must be satisfied with a grade of C or better during the first two semesters of enrollment in the program. *Students may not withdraw from courses considered to be deficiency courses without the concurrence of the advisor and the Director of Graduate Studies.*

***Transfer of Graduate Courses.*** Only graduate courses from accredited institutions in which the student has earned a grade of B or better may be accepted towards an advanced degree, subject to approval of the department and Graduate School.

***Background Examinations.*** Prior to registration the student is required to take background examinations in the fields of analytical, inorganic, organic, and physical chemistry. These examinations are usually given the week before registration to aid the advisor in the preparation of a course of study for the student. A passing level has been established so that these examinations can also serve as proficiency examinations for required undergraduate courses. (Students will be informed in advance that undergraduate deficiencies may be satisfied in this manner.)

***Research Advisor Selection.*** *To gain a wide exposure to research offerings of the department, entering fall semester graduate students will attend a program of faculty research project presentations in the first few weeks of the semester. Students will select at least three faculty members with whom they will learn more research details. With each faculty member, they will spend 6 to 10 hours involved in activities such as discussing research, attending group meetings, observing laboratory activities, etc. These activities must be completed by the end of the tenth week of the semester. Attendance by first year students is mandatory. First semester students will formally select a first and second choice for research advisor during the week preceding finals week and the completed Selection of Research Advisor form must be submitted to the Director of Graduate Studies that week. The Graduate Program Committee will provide recommendations regarding research advisor selection to the student with the best interests of the student and department in mind. Research advisor selection is a serious commitment. Normally a student will not be allowed to change research advisors. Exceptional circumstances will be evaluated by the Graduate Program Committee. If a*

*student has registered for CHEM 698, the Director of Graduate Studies will assign the grade for the first semester. Students, who do not have a research advisor, cannot be offered a TA contract, take a qualifier or candidacy exam, or defend a dissertation or thesis. They will receive an incomplete or failing grade on research, at the discretion of the DGS. These rules do not apply to students before the end of their first semester at NIU.*

***Advisory Committee Selection.*** *Each student, in consultation with the research advisor(s), will request the appointment of an advisory committee within the first eight weeks of the semester after selection of the research advisor(s). The Committee will consist of the research advisor(s) plus two additional regular faculty members, and must be approved by the Graduate Program Committee. One of these additional members will serve as the pre-thesis defense or pre-candidacy exam committee chairperson and will be designated by the GPC. Important roles of the advisory committee will be to monitor student academic and research progress, provide ongoing feedback to the student, apply the faculty approved M.S. and Ph.D. Chemistry Assessment Plans, and submit assessment results to the DGS.*

*The advisory committee shall meet at least once per semester until the student either defends an MS thesis or formally applies to take the candidacy examination. The advisory committee will later serve as the student's thesis defense or candidacy examination committee with provision to add or remove members in accordance with departmental graduate program and Graduate School policies. The student shall have the right to convene a meeting with the advisory committee chairperson and at least one other committee member. Any member of the advisory committee shall have the right to convene meetings of any combination that includes the advisory committee chairperson. The chairperson will submit all relevant assessment data to the DGS and will document and share with the DGS all concerns about academic/research progress and/or conduct.*

***Seminar.*** CHEM 615, chemistry seminar must be taken each semester unless a written waiver for a hardship cause is given by the Director of Graduate Studies. This requirement is in addition to the 24 hours (Ph.D.) or 15 hours (M.S.) of required course work.

***Ph.D. Dissertation and M.S. Thesis Defense Public Announcements.*** *An appropriate public announcement of the date, time, and place of a thesis or dissertation defense must be given two weeks prior to the presentation. A copy of the thesis/dissertation title and abstract must also be posted. The presentation part of any thesis or dissertation defense will be open; the question and answer period may be open or closed at the discretion of the student. The committee's deliberations will be closed.*

***Committee Approval of Ph.D. Dissertations and M.S. Theses.*** *For almost every thesis or dissertation, the dissertation or thesis committee will suggest corrections and modifications. Following examination of the modified and corrected post-defense version of the dissertation or thesis, and provided the committee member agrees that the document is of appropriate scientific, format, and grammatical quality, the committee member will sign the Graduate School's "Approval of Thesis, Dissertation, Documentation, or Recital" form. At least three voting members are required for M.S. Thesis Defense. Three to five are needed for the Ph.D. Dissertation Defense, with one member outside the department. Additionally, the dean or deans' designee will be present at the committee.*

## **MASTER OF SCIENCE**

*A student seeking to qualify for the Master of Science degree shall satisfy the following requirements.*

***M.S. Limitation of Time.*** The student must fulfill all requirements for the M.S. degree within a period of five consecutive years from entry into the program.

## Thesis Option

**General M.S. Thesis Option Lecture Course Requirements.** A minimum of 30 semester hours of graduate work is required. The student must successfully complete a minimum of five courses (15 semester hours, excluding CHEM 615, CHEM 690, CHEM 698, CHEM 699, and CHEM 799), of which at least nine semester hours are to be in chemistry, for graduate credit. At least one of these courses must be CHEM 644, CHEM 645, or CHEM 646 or an equivalent physical chemistry graduate course. A minimum of two courses must be outside the primary area of study.

**M.S. Thesis and Independent Study.** A thesis incorporating the results of an approved research problem and successfully defended as part of a comprehensive oral exam is required. *A copy of the thesis suitable for defense must be submitted to each member of the committee seven calendar days before the defense.* The thesis committee and the final comprehensive examination committee shall each consist of at least three voting members. CHEM 698, Independent Study, should be taken as soon as possible, with enrollment to continue each term until enrollment in CHEM 699, Master's Thesis, is begun.

## Essay Option

A minimum of 36 semester hours of graduate work is required. The student must successfully complete a minimum of six courses for graduate credit (18 semester hours, excluding CHEM 615, CHEM 690, CHEM 698, CHEM 699, and CHEM 799), of which at least 12 semester hours are to be in chemistry. At least one of these courses must be CHEM 644, CHEM 645, or CHEM 646, or an equivalent physical chemistry graduate course. A minimum of two courses must be outside the primary area of study. Only graduate courses from accredited institutions in which the student has earned a grade of B or better may be accepted towards an advanced degree, subject to approval of the department and the Graduate School. *The remaining 18 hours can be satisfied by other courses, including CHEM 698, but excluding CHEM 615, CHEM 699 and CHEM 799.* Students earning an M.S. degree through the Essay Option must have passed the qualifying examination and the research oral (candidacy) examination described under the Ph.D. program. In addition, students must submit a paper describing original research (a Master's Essay) to their examining committee. Approval of this research paper by at least three members of the examining committee and deposition of a copy of the research paper in the departmental office is required.

## Teacher Certification Option

**General M.S. Teacher Certification Option Lecture Course Requirements.** Students in this option must meet the requirements for teacher certification, in consultation with the Discipline Coordinator. In addition, the student must successfully complete a minimum of four courses (12 semester hours) for graduate credit, from courses numbered CHEM 505 to CHEM 700, excluding CHEM 590 to CHEM 599, CHEM 615, CHEM 690, CHEM 698, and CHEM 699. At least one of the four courses must be CHEM 644, CHEM 645, or CHEM 646, or an equivalent physical chemistry graduate course. A minimum of 30 semester hours of graduate work to be determined by the department is required. In most cases, the number of semester hours will exceed 30 hours.

**Comprehensive Examination.** The student must pass a comprehensive examination in chemistry and chemistry education.

*Eligible students must submit a written application for each examination component to the Director of Graduate Studies in advance of the planned date of graduation (specific scheduling below). Both components must be completed successfully by the deadline for submission of comprehensive exams to the Graduate School. Students who fail one or both components must retake the failed one(s) no sooner than one month after the date of failure, and no later than the end of the following semester. Failure on the second attempt will terminate further work toward the degree.*

**Component 1.** *The student must pass a written examination of chemistry knowledge administered by the Director of Graduate Studies or a representative selected by the DGS. The examination will be an American Chemical Society-approved diagnostic of comprehensive undergraduate chemistry knowledge or its equivalent. A normalized score equivalent to the 60th percentile or better (meaning that 60 % of students taking the exam performed as well or worse) will constitute a passing score. The examination may be attempted beginning with the student's third semester in the program, and will be administered concomitantly with scheduled written Ph.D. qualifying examinations. If necessary, owing to exceptional circumstances, and with approval from the Graduate Program Committee, other dates for administration of the examination may be scheduled.*

**Component 2.** *The student must make a public presentation describing the implementation and use of classroom strategies for teaching chemistry developed during the student's program of study. The student must also perform successfully during a post-presentation question-and-answer session with a committee. The student will select a committee of three faculty members from the Department of Chemistry and Biochemistry, naming one as Chair of the committee. The Graduate Program Committee must approve the selections prior to the presentation. The rules appropriate for M.S. defenses given above in the "Ph.D. Dissertation and M.S. Thesis Defense Public Announcements" and "Committee Approval of Ph.D. Dissertations and M.S. Theses" will apply to the presentation and the question-and-answer session. This component may only be undertaken during the final months before anticipated graduation, after the Application for Degree has been filed.*

## **DOCTOR OF PHILOSOPHY**

The prospective candidate for the Ph.D. in chemistry may do advanced study and research in the areas of analytical, biological, inorganic, organic, physical, or interdisciplinary chemistry, or nanotechnology.

**General Ph.D. Lecture Course Requirements.** A minimum of eight courses (24 semester hours, excluding CHEM 615, CHEM 690, CHEM 698, CHEM 699 and CHEM 799) must be taken for graduate credit. At least 15 semester hours are to be in chemistry, except for students in the nanotechnology area, for whom at least 12 hours must be in chemistry. At least one of these courses must be CHEM 644, CHEM 645, or CHEM 646 or an equivalent physical chemistry graduate course. A minimum of three courses must be outside the major area.

**Language/Research Skill.** There is no general language/research skill requirement. However, a student's research advisor may require that such skills appropriate for the student's research be obtained, and course work to achieve this may also be included in the student's Degree Progress Report in MyNIU.

**Ph.D. GPA Requirement.** The student must complete the degree requirements with a cumulative GPA of 3.20 or above in all NIU graduate course work included on the doctoral Degree Progress Report in MyNIU.

**Ph.D. Qualifying Exam.** A qualifying examination must be satisfactorily completed in the primary area. This examination will test comprehensive knowledge of the area at the graduate level. Faculty in each area will establish the graduate course(s) that will contribute towards the material upon which the examination is based. *The qualifying examination in each area is based upon undergraduate course material and the following core courses.*

<i>Analytical</i>	<i>Two from CHEM 622, 623, 624 and 626</i>
<i>Biochemistry</i>	<i>CHEM 572, 573, and 675</i>
<i>Inorganic</i>	<i>CHEM 663</i>
<i>Organic</i>	<i>CHEM 631, 632, and 635</i>
<i>Physical</i>	<i>Two from CHEM 644, 645, and 646</i>
<i>Interdisciplinary</i>	<i>At least three of the above core courses, of which at least two must be from a single area. In addition, special topics course(s) may be added. Students must</i>

*designate the courses upon which the exam will be based when requesting to take the qualifying exam. Students may attempt this exam only with the written consent of their research advisor. The exam will be administered by a committee chosen by the student with approval of the research advisor. The committee must include three to five Graduate Faculty from whom the student took the courses designated for the qualifying exam.*

*Nanotechnology CHEM 650 or CHEM 600 appropriate for the nanotechnology primary area, at least one other core course from chemistry, and courses designated by faculty in the nanotechnology area.*

*Graduate students must state their primary area in writing when requesting to take the qualifying exam. Students requesting Interdisciplinary or Nanotechnology qualifiers must designate the courses upon which the exam will be based when requesting to take the qualifying examination. Students may attempt an Interdisciplinary or Nanotechnology qualifier only with the written consent of their research advisor and the approval of the Graduate Program Committee. The exam will be administered by a committee including three to five graduate faculty, from whom the student took the courses designated for the qualifying exam. (Substitutions may be made by the committee if a faculty member has taught more than one of the courses covered by the exam.) The student's advisor will assume the responsibility for the tests to be collated and available on the day of the examination.*

The qualifying examination must be taken no later than the fourth semester of enrollment as a graduate student. Students must have a GPA of 3.20 in previous graduate work to attempt the examination. The student may request a postponement of the first attempt until the next scheduled qualifying examination, if the necessary graduate courses were not offered during the student's enrollment. This request should be submitted to DGS at the time the request for the original examination is due. A prospective doctoral candidate, who has received an M.S. degree in chemistry from NIU, must take the examination at the first offering following the awarding of the M.S. degree. Qualifying examinations will be given three times a year, in September, January, and May. A student who fails to pass this examination *on the first attempt* must retake it at the next offering. Failure on the second attempt will terminate further work toward the doctorate but not for the master's degree.

CHEM 799, Doctoral Research and Dissertation, should be taken as soon as possible after passing the qualifying examination, with enrollment to continue each semester until graduate work terminates.

***Ph.D. Candidacy Exam.*** Within one year of passing the qualifying exam in the primary field, the student must complete a research oral examination on his or her field of research encompassing the background literature in the area, the current state of the student's research, and the proposed direction of the research. The examination committee will be formed from faculty representing the primary area and a secondary area and will constitute the student's examining committee for all future examinations, with the addition of an extradepartmental representative for the final dissertation oral defense. The student's research advisor will chair the research oral committee. This examination will serve as the admission to *Ph.D.* candidacy examination. *A recommendation for admission to candidacy will be forwarded by the chair or graduate director upon successful completion of this examination.*

A student who fails to pass this examination must retake it no earlier than four nor later than six months after the first attempt. Failure on the second attempt will terminate further work toward the doctorate.

***Annual Review of Research (Research Update).*** Each doctoral candidate will give an oral presentation of her or his research once a year. *The first research update must be given before the second anniversary of passing the qualifying exam.* The student's examining committee will evaluate the presentation and inform the student of its opinion in writing.

***Additional Considerations Regarding Candidacy Examinations and Research Updates.*** In order to provide an appropriate review of the student's progress during the candidacy examination and the annual presentations of research by a student, a minimum of four committee members including one from the minor area must be in attendance. Students are responsible for the attendance of their appropriate committee members. Students will submit an extended abstract of the presentation including personal research results and relevant literature citations to the committee members and interested faculty at least one week prior to the examination.

*If a student so desires, the exam or review may be presented during the appropriate divisional seminars. The formal presentation and questions by students will be followed by an examination period attended by the student's committee and interested faculty members. However, if the committee requirements are not met, the student will still be responsible for presenting a seminar and the examination will be rescheduled within the appropriate candidacy exam anniversary date. The committee members will inform the student within one week in writing of their comments with the appropriate form.*

***Appeals of Negative Qualifying Exam and Candidacy Exam Decisions.*** Appeals against dismissal for failure to satisfy above examination requirements shall be directed to the Graduate Program Committee, whose recommendation shall be passed on to the faculty. The decision of the latter shall be final.

***Ph.D. Dissertation.*** The student must complete an approved research problem and incorporate the results in a dissertation. The dissertation will be a substantial contribution to knowledge in which original scholarship is demonstrated. A successful defense of the dissertation before the student's doctoral committee is required for its final approval.

***Ph.D. Limitation of Time.*** All requirements for the Ph.D. degree in chemistry must be completed within a period of seven consecutive years from entry into an NIU graduate program in chemistry.

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