

Chemistry Graduate Program

Introduction

The Department of Chemistry offers the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees, with emphasis on the Ph.D.. Specialization is possible in inorganic, organic, or physical chemistry. In order to receive Ph.D. and M.S. degrees, students must fulfill a combination of requirements that consist of taking courses, presenting and attending seminars, passing cumulative and oral comprehensive examinations, submitting and defending a research proposal, submitting and defending a thesis based on original research. Students should consult the Graduate School Handbook to obtain detailed information concerning the rules that need to be followed to obtain the degree. Students are encouraged to approach Ms. Sara Sucklal (s.sucklal@miami.edu) for questions. The Director of Graduate program (Dr. Francisco M. Raymo) is also available for assistance.

Course Requirements for the Ph. D. Degree

The Ph.D. degree requires a minimum of 60 credits. The department will cover tuition costs up to 60 credits for students on assistantships and fellowships. At least 18 credits must be formal lecture courses. The remaining 42 credits could be broken down as follows:

<u>Courses</u>	<u>Credits</u>
Chemistry Seminar (CHM 679)	4
Chemistry Seminar (CHM 680)	2
Introduction to Research (CHM685)	2
Problems in Research Planning (CHM 688)	2
Pre-candidacy Doctoral Dissertation (CHM 730)	26
Post-candidacy Doctoral Dissertation (CHM 740)	6

Courses, Exams, and Thesis Requirements for the Ph.D. Degree

Students must take a minimum of 9 credits of formal lecture courses in the fall semester of their first year and a minimum 9 credits of formal lecture courses in the spring semester of their first year. Of the 18 credits, 3 core courses totaling 9 credits should be taken by all graduate students. Listing of courses is provided on a following page.

The required number of credits in *Chemistry Seminar* (CHM 679) must be taken in the first and second year.

The required number of credits in the *Chemistry Seminar* (CHM 680) must be taken in the second and fourth year.

The required number of credits in *Introduction to Research* (CHM 685) must be taken in the first year.

The required number of credits in *Pre-candidacy Doctoral Dissertation* (CHM 730) must be taken in the first, second, third and fourth year.

The required number of credits in *Post-candidacy Doctoral Dissertation* (CHM 740) must be taken in the fourth year.

Four *Cumulative Examinations* must be passed before the end of the second year.

An *Oral Comprehensive Examination* must be passed before the end of the second year.

An original research proposal in *Problems in Research Planning* (CHM 688) must be presented and defended before the end of the third year.

A dissertation based on research of a quality acceptable for publication in a recognized scientific journal must be completed before the end of the fifth year.

Course Requirements for the M.S. Degree

The M.S. degree requires a minimum of 30 credits. The department will cover tuition costs up to 30 credits for students on assistantships and fellowships. At least 18 credits must be formal lecture courses. The remaining 12 credits must be broken down as follows:

<u>Course</u>	<u>Credits</u>
Chemistry Seminar (CHM 679)	2
Chemistry Seminar (CHM 680)	1
Introduction to Research (CHM 685)	2
Master's Thesis (CHM 710)	7

Schedule of Courses and Exams for the M.S. Degree

Students must take a minimum of 9 credits of formal lecture courses in the fall semester of their first year and a minimum 9 credits of formal lecture courses in the spring semester of their first year. Of the 18 credits, 3 core courses totaling 9 credits should be taken by all graduate students. Listing of courses is provided in a following page.

The required number of credits in *Chemistry Seminar* (CHM 679), *Chemistry Seminar* CHM 680) and *Introduction to Research* (CHM685) must be taken in the first and second year.

The required number of credits in *Master's Thesis* (CHM 710) must be taken in the second year.

A dissertation based on research of a quality acceptable for publication in a recognized scientific journal must be completed before the end of the second year.

Listing of Lecture Courses

All entering students must take the three courses and the comprehensive examination at the end of the first year is based on these three courses. In addition to these three courses, students are expected to take courses that would benefit their research performance.

(a) **Core Courses**

- CHM 520 Physical Organic Chemistry (3 credits)
- CHM 541 Principles of Bonding and Reactivity in Inorganic Chemistry (3 credits)
- CHM 553 Modern Quantum Chemistry (3 credits)

(b) **Divisional Courses**

Organic

- CHM 510 Enzyme kinetics and Mechanism (3 credits)
- CHM 515 Makings of a Scientist (3 credits)
- CHM 521 Polymer Chemistry (3 credits)
- CHM 522 Synthetic Organic Chemistry (3 credits)
- CHM 523 Contemporary Total Synthesis (3 credits)
- CHM 525 Structural Organic Chemistry (3 credits)
- CHM 530 Fluorescence Spectroscopy and Microscopy (3 credits)
- CHM 535 Molecular and Supramolecular Photochemistry (3 credits)
- CHM 626 Advanced Organic Topics (3 credits)

Inorganic

- CHM 603 Structure and Reactivity of Inorganic Compounds (3 credits)
- CHM 604 Coordination Chemistry (3 credits)
- CHM 647 Advanced Inorganic Topics (3 credits)
- CHM 649 Advanced Inorganic Topics (3 credits)

Physical

- CHM 524 Supramolecular Chemistry (3 credits)
- CHM 555 Modern Statistical Mechanics (3 credits)
- CHM 556 Self-Assembly and Surface Chemistry (3 credits)
- CHM 565 Principles of Spectroscopic Techniques (3 credits)
- CHM 575 Principles of Nuclear Magnetic Resonance and Multidimensional (3 credits)
- CHM 655 Electrochemistry (3 credits)

CHM 660 Magnetic Resonance (3 credits)
CHM 665 Physical Supramolecular Chemistry (3 credits)
CHM 670 Advanced Physical Chemistry Topics (3 credits)

(c) **Courses Under Reorganization**

CHM 563 Electronic Structure Methods (1 credit)
CHM 564 Molecular Simulations (1 credit)
CHM 640 Introduction to Crystallography (1 credit)
CHM 646 Organometallics (1 credit)
CHM 650 Chemical Thermodynamics (1 credit)
CHM 651 Optical Spectroscopy (1 credit)
CHM 652 Chemical Kinetics (1 credit)
CHM 653 Modern Quantum Chemistry (1 credit)
CHM 654 Modern Statistical Mechanics (1 credit)

Credit Transfer

Any entering graduate student wishing to transfer credits from another institution must present a written proposal to the Director of Graduate Program identifying the appropriate courses and number of credits. In addition, copies of the course syllabi indicating the textbooks used must be provided. The Director of Graduate Program will then decide in consultation with the course instructors whether the credits can be transferred. It is important to note, however, that "credits that pertain to, and have been counted toward another degree, cannot be transferred" according to Graduate School. Additionally, any transferred credit is subject to the regency of credit rules listed in Graduate Studies Bulletin.

Academic Standing

All students must maintain a grade point average (GPA) of 3.0 throughout the program. Students with a grade point average lower than 3.0 at the end of the fall semester of their first year are placed on academic probation and can lose financial support if the grades are not improved in the spring semester. Students with a GPA lower than 3.0 at the end of the spring semester of their first year are terminated from the Graduate Program.

Choosing a Research Advisor

Students must attend the *Introduction to Research* (CHM 685) seminars in the fall semester of their first year. In these talks, faculty members able to accept additional students in their research groups present their research directions and discuss possible projects for the students. At the end of this seminar series students must submit their Preceptor Interview Form to the Director of Graduate Studies before December 15,

indicating their research advisor of first and second choice. Each student will be then notified of his/her advisor assignment no later than January 15 of the following semester.

Once the decision is made, students are strongly discouraged to change advisors and any such change is considered to be an exceptional situation. Students wishing to change research advisors any time during the course of study must submit a written request stating the reasons to the Director of Graduate Program. The Graduate Committee reviews the requests and authorizes the change only if the student and/or the advisor can offer convincing reasons to justify it.

Choosing an Advising Committee

The progress of each student is monitored by an advising committee of three faculty members, including the research advisor. Students must select the members of the committee in consultation with the research advisor before the end of the second year. The committee is expected to attend the student's oral exam, research proposal and dissertation and evaluate the student's performance. An additional faculty member from outside the Department of Chemistry must be selected for the dissertation defense.

Cumulative Examinations

Students must pass four cumulative examinations before the end of their second year. Cumulative examinations will be administered monthly, totaling four examinations per academic semester. Students will not be allowed to take cumulative examinations during their first semester, but are expected to start taking them as early as possible in their second semester in the program. Failure to meet this requirement will result in termination from the doctoral program.

Chemistry Seminars (CHM 679 and 680)

Students enrolled in CHM 679 must attend all departmental seminars. It is their responsibility to sign the attendance sheet. Students enrolled in the second-year CHM 680 must present a seminar on a literature topic not related to his/her research area. The choice of topic must be approved by the faculty member in charge of the seminar program. Students must prepare a one-page abstract of the talk, including literature references. The abstract must be distributed to faculty members and graduate students at least one week before the seminar date. Talks must be of 45 minutes at least and no more than 55 minutes and are followed by discussion and questions.

Oral Comprehensive Exam

All Ph.D. candidates must pass an oral comprehensive exam on their research project before the end of the second year. Students must submit a summary of their research project to each member of the advisory committee at least one week before the date of the exam. The document must have the following format:

1. Title Page
 - Title
 - Candidate name
 - Research advisor
 - Committee members
 - Place, date and time of the exam
 - Date submitted
 - Courses completed with dates and grades
 - Title of second year seminar
 - Authors, titles and citations of candidate publications (if any)

2. Text (no more than 15 double-spaced pages)
 - Title
 - Introduction
 - Results and Discussion
 - Conclusions and Future work
 - Experimental section (if any)
 - References

At the time of the examination, the student will give a brief (not to exceed 15 minutes) verbal presentation of his/her work to date and a description of his/her proposed research work. The committee may then question the student on his/her presentation and written summary. A majority vote of the committee is required to pass the student. Alternatively, the student may be dismissed from the Ph.D. program and switched to the M.S. program.

Problems in Research Planning (CHM 688)

Students must write an original proposal for research in chemistry before the end of the third year. The topic cannot be related to his/her research project. The document must be submitted to the members of the advisory committee at least one week before the test. The document must have the following format:

1. Title Page
 - Title
 - Candidate name
 - Research advisor
 - Committee members
 - Place, date and time of the exam
 - Date submitted
 - Courses completed with dates and grades)
 - Title of second year seminar

Authors, titles and citations of candidate publications (if any)

2. Text (no more than 15 double-spaced pages)

Title

Goal and Significance

Background

Plan

References

At the time of the examination, the student will give a brief (not to exceed 15 minutes) verbal presentation of his/her proposed research work. The committee may then question the student on his/her presentation and written proposal. A majority vote of the committee is required to pass the student. Alternatively, the student may be dismissed from the Ph.D. program and switched to the M.S. program.

Thesis and Defense

Each candidate for a M.S. or Ph.D. degree must produce a thesis describing his/her original research in chemistry and defend it before the advisory committee. The thesis must be prepared in accordance with the rules and regulations of the Graduate School and must be submitted to the members of the advisory committee at least one month before the exam date. Then, the student is expected to present the results of his/her research work in the form of a seminar. The committee members may question the student on his/her presentation and written document and vote, after considering the quality of the thesis and performance in the oral examination. The committee may decide by majority vote to pass, fail or re-examine the student. Failure with no possibility of re-examination must be by unanimous vote. In addition, the student may be asked to revise certain portions of the thesis. It is the responsibility of the research advisor to verify that the requested changes have been implemented. One or more copies of the final, approved thesis must be submitted to the Graduate School in accord with current Graduate School regulations.

Candidates for a Ph.D. degree can submit a thesis to the advisory committee only after the acceptance for publication of at least of one article in a refereed chemical journal. They must schedule their defense in concomitance with their fourth year CHM 680 seminar.

M.S. (Non-thesis Option)

A student may obtain the Master of Science degree by examination rather than by submitting a thesis. In such a case, thirty credits of coursework, which meet the minimum requirements, set forth for the MS with thesis must be presented. In some circumstances one credit of 679 may substitute for one credit of 680 but normally a seminar is required as part of the degree qualification. A student wishing to substitute 679 for 680 should write a letter to the Director of Graduate Studies justifying the request. A decision will be made by the Graduate Advisory Committee. After completing all requirements, the student must pass a comprehensive

examination administered by at least three faculty members in the Department of Chemistry. The committee will normally be appointed by the Director of Graduate Program. The examination will generally be oral, but may be written or combined written and oral portions at the discretion of the committee. A majority vote of the committee is required to pass, fail or reexamine the student. Rules for “Admission for Candidacy” are the same as those stated under M.S. (Thesis Option).

Financial Support

Students accepted into the graduate program can be awarded teaching or research assistantships. Both carry stipends sufficient for covering normal living expenses. University policy states that all teaching assistants must be able to communicate fluently in English. In order to receive the full financial value of the standard stipend as teaching assistants, students from non-English speaking countries must pass the SPEAK exam. Students failing the SPEAK exam upon entering the university have one academic year to pass the exam. If the exam is not passed by the end of the first year, the student's teaching assistantship would be terminated. Students no longer eligible to receive teaching assistantships may still receive stipends from research assistantships or fellowships, or they may continue in the program at their own expense.

Foreign Students

Foreign students arriving at Miami International Airport must have valid I-20 forms and F-1 visas. There, they will be given I-94 cards. These three items and the offer letter from the Department of Chemistry must be submitted to International Student Scholar Services in Building 21 on the Coral Gables Campus in order to obtain a work permit. A work permit (Certification of On-Campus Employment Eligibility) will be issued within three business days. All four of these items, and in addition, the passport and an official copy of the birth certificate must be taken to Ms. Gylla Lucky in the Office of the Dean of Arts and Sciences to partially complete an I-9 form. These documents should also be submitted to the Social Security Office at 11401 W. Flagler Street, Miami, FL 33174 (Monday–Friday, 8:30 to 3:30 PM, phone: 1 800 772 1213) to obtain a Social Security Card. A card will be issued in three or four weeks, at which time the I-9 form can be completed by inserting the newly issued Social Security Number. It is important to note that no student may begin work or be paid until the I-9 form is completed (except for the Social Security Number).