

Ohio University

GRADUATE REQUIREMENTS IN CHEMISTRY AND BIOCHEMISTRY

Effective August 2017

Candidates for a graduate degree from the Department of Chemistry and Biochemistry at Ohio University must demonstrate the ability to plan, execute, evaluate, and communicate original chemical research. Candidates are expected to develop specialized research skills in order to carry out this work effectively.

I. Coursework Requirements

- a. Demonstration of Breadth of Knowledge Competency
 - i. Competency is demonstrated by passing at a level of B or better one 5000-level course in three of these five areas of chemistry: Analytical, Inorganic, Organic, Physical and Biochemistry. One of the three courses must be in the student's major area, and the other two must be in the other areas. Courses will be offered each fall at the 5000-level in each area. Students enrolled in the Ohio-Leipzig Double Master's program (see Section VI.d) can petition the Department Graduate Committee (referred as "Graduate Committee" thereafter) to have equivalent courses taken at Leipzig count towards this requirement.
 - ii. Competency must be met during the first year of graduate studies. Students failing to meet the competency requirement during their first year will typically lose their financial support (stipend and tuition waiver), and may be dismissed from the program, at the discretion of the Graduate Committee.
 - iii. Students must take two classes at the 5000 or 7000-level each semester until they have passed all required classes (for additional coursework requirements, see section I. b. i.). The Graduate Chair may grant an exception to this requirement if (1) students only have one class left to pass, or (2) the required classes are not being offered.
 - iv. Students who do not pass any chemistry classes (i.e. who do not obtain a grade of B or higher per class) in their first semester may be dismissed from the program at the end of the first semester, at the discretion of the Graduate Committee.
 - v. All graduate students new to the Department of Chemistry and Biochemistry will be required to take entrance examinations in all five areas of chemistry. The exams will be taken from the current American Chemical Society exam sequence, unless a division decides to generate and grade its own exam. The Graduate Chair will use exam scores to guide the students towards the most appropriate courses in their first semester.
- b. Depth of Knowledge, Major Course Requirement
 - i. In addition to the courses/exams taken to demonstrate breadth of knowledge competency, each student will be required to take eight (8) credit hours within their major area of research for depth of knowledge.
 1. For students pursuing an M.S. degree, the courses in the major area can be at the 5000-level.
 2. For students pursuing a Ph.D., the courses in the major area must be at the 7000-level.
 - ii. A grade of B or better must be obtained in each course attempted; courses with lower grades will not count towards the major course requirement.

- iii. Students may petition the Graduate Committee to count one 7000-level course outside of the department in place of one of the courses within their major area of research.
 - iv. Research advisors can ask their graduate students to take more classes, at their discretion.
 - v. It is the prerogative of the Graduate Committee to deem some classes ineligible for the fulfillment of breadth of knowledge competency or depth of knowledge major course requirements. The list of ineligible classes will be updated on a yearly basis, and will be shared with all graduate students at the beginning of each Fall semester.
- c. Seminar & Colloquium
- i. All graduate students are required to attend the weekly departmental colloquium series.
 - ii. Students are required to enroll in and attend the graduate seminar course each semester.
- d. Coursework Expectations
- i. The student will select all coursework beyond the first semester in consultation with their advisor and, on occasion, the Graduate Committee.
 - ii. Students are not permitted to audit courses unless they pay the associated tuition fees out of pocket, or the audit has been approved by both the advisor and the Graduate Chair. The use of the tuition scholarship provided by the department to cover the costs of any non-approved audit course is not allowed. Students must be formally registered in any class they are attending.
- e. Elective Courses Outside Chemistry and Biochemistry
- i. Any student who wants to enroll in a course offered outside the Department of Chemistry and Biochemistry must have prior written approval for the course from the research advisor/director.
 - 1. The approval form must be obtained from the graduate secretary and must be completed by the student, signed by the advisor, and turned into the Graduate Chair before any course(s) can be taken from outside the department.
 - 2. For first-year students who have not selected a research advisor, the Graduate Chair serves as the advisor.
 - ii. Failure to follow this process may result in an immediate cancellation of any tuition scholarship and stipend.

II. Grade Standards

- a. At any time during their degree program, a student who receives more than two grades of C+ or poorer and/or progress reports less than satisfactory may lose financial support and may be removed from the program, at the discretion of the Graduate Committee. (See appendix for progress expectations)
- b. Continuing graduate students are required to maintain at least an overall 3.00 gradepoint average. A 3.00 grade point average (exclusive of research, seminar and CHEM 5100) must be maintained in order to be eligible for or to continue to receive financial support (scholarship, fellowship, associateship).
- c. A student that falls below a 3.00 grade-point average will be put on probation. Failure to achieve a 3.00 grade-point average after one semester of probation may result in immediate loss of financial support.

- d. The University requires a 3.00 grade point average in course work and also in research before a graduate degree can be awarded.

III. Graduate Research Expectations

- a. The normal grade for a graduate student in research is PR (progress toward degree); exceptional work will rate a grade (A, A-, B+) for completion of a paper, poster, or other research accomplishment as an example. However, faculty members are strongly encouraged not to give a letter grade until the student has completed all required coursework, unless research progress is deemed unacceptable by the faculty; in that case, a grade of B- or lower will be given. In addition, overall progress towards degree will be evaluated annually as initiated by the Graduate Chair. See appendix for research progress expectations.
- b. Students must be registered for CHEM 6950/8950 during any semester in which they are using research facilities and/or resources

IV. Requirements for Students Supported on Teaching Assistantships

- a. Students must maintain teaching standards as determined by the Department of Chemistry and Biochemistry (See appendix for teaching expectations).
- b. Reprimands or poor evaluations from faculty can result in loss of student's financial support (including tuition waiver).
- c. Poor evaluations or reprimands will trigger a meeting of the Graduate Committee to determine if disciplinary action is warranted.

V. Selection of the Research Advisor and Thesis/Dissertation Committee

- a. Ph.D. graduate students carry out rotations in three research groups during their first semester.
- b. The selection of a research advisor should be accomplished no later than the beginning of the second semester of study.
 - i. The preferred choice of advisor and indication of all interviews is reported to the Graduate Committee as directed by the Graduate Chair.
 - ii. The Graduate Committee, in conjunction with the departmental faculty will consider the student's preferences when assigning research advisors.
 - iii. The grade point average based on chemistry classes taken during the student's first semester must be 3.0 or higher for him/her to join a research group. Exceptions may be granted by the Graduate Committee if the student's GPA is lower than 3.0.
 - iv. In the event that a student is without a research advisor, the Graduate Chair will work with the student to identify a suitable advisor or an alternate career path.
- c. The student and research advisor will select the members of the thesis/dissertation committee within two semesters after the student has selected a research advisor.
 - i. The research advisor will be the chairperson of the committee.
 - ii. For Ph.D. candidates the dissertation committee shall consist of at least 4 members: the research advisor; two other departmental faculty (regular, not adjunct), one must be from the student's major area and the other from outside the major area. The fourth member of the committee must be the graduate faculty representative from outside the department.

- iii. For M.S. candidates the thesis committee will consist of at least 3 members: the research advisor and two other Chemistry or Biochemistry faculty members, one of whom is from outside the student's major area.

VI. M.S.-Specific Requirements:

- a. Thesis and non-thesis options
 - i. Thesis Option: A written thesis must be prepared and accepted by the advisor, the student's Thesis Committee, the Department, the College and the University.
 - ii. Research Publication in Lieu of Thesis Option: Alternatively, candidates for the M.S. degree may prepare a manuscript, a major portion of which is based on his/her research, and submit it to a peer-reviewed journal. If the paper is accepted for publication and accepted by the Department, College and the University in lieu of a thesis, no other written thesis is required.
 - iii. Non-Thesis Option: Alternatively, a student must complete a total of 26 credit hours of graded coursework at the 5000-level or above. Coursework will be chosen in consultation with their M.S. advisor, to expose the student to a diverse range of cutting-edge topics and techniques in chemistry research. Coursework chosen must be approved by the Graduate Committee. In addition to the coursework, the student must complete the capstone requirement by completing at least 4 credit hours of M.S. research (Chem 6950) and writing a research paper (10 pages or more, double spaced, 1" margins), which must include a critical evaluation of the current literature and a new research hypothesis. This research paper will be presented in an hour-long presentation as part of the oral defense (see section VI.b.i.).
- b. Oral Defense
 - i. An oral examination is required of all M.S. degree candidates. The oral examination consists of two parts. An hour-long presentation of the research work will be given before all faculty, graduate students and interested parties. This will be followed by an oral defense that will be held before the student's Thesis committee.
- c. Additional Requirements
 - i. Student-specific requirements
 - 1. The student's graduate advisor and thesis committee will determine the specific requirements for each student within the above framework.
 - ii. Division-Specific Requirements
 - 1. There are, at present, no division-specific requirements
- d. Ohio-Leipzig Double Master's program – Specific Requirements:
 - i. The full name of the program, as stated in the Cooperation Agreement between Ohio University and Leipzig University (Leipzig, Germany), is "Double Master's Program, Master of Science (M.Sc.) in Chemistry and Biotechnology (LEIPZIG) / Master of Science (M.S.) in Chemistry (OHIO)".
 - ii. Candidates for the M.S. degree, with the exception of students enrolled in a non-Thesis option M.S. degree, and/or to whom section VI.a.iii applies, can petition the Graduate Committee to join the Ohio-Leipzig Double Master's program, upon recommendation by their research advisor. The Graduate Committee grants admission into the program on a case-by-case basis.
 - iii. The research project assigned to the double M.S. degree candidate must be supervised jointly by the student's advisor at Ohio University, and by his/her collaborator at Leipzig University.
 - iv. The student enrolled in the program must earn at least 50% of his/her credits at Ohio

University. A student with a B.S. in Chemistry from Ohio University may be eligible to start the dual program immediately after graduation, and complete the double M.S. degree in 18 months. In any case, the last 18 months before the defense of the M.S. thesis are typically organized as follows:

1. Summer semesters (May – August): the student works on the joint research project at Ohio University, and enrolls for a minimum of 1 credit.
 2. Fall Semester (August – December): the student registers to 3 classes (classes are selected by both Ohio and Leipzig advisors to satisfy the M.S. and M.Sc. degree requirements), 1 seminar, and works on his/her research project at Ohio University, for a total of 18 credits.
 3. January – March: the student attends German language classes at Leipzig University, and works on his/her research project in Leipzig.
 4. April – July: the student attends classes at Leipzig University (delivered in English; classes are selected by both Ohio and Leipzig advisors to satisfy the M.S. and M.Sc. degree requirements), and works on his/her research project. The combined coursework and research experience in Leipzig translates into 12 Ohio University credits.
 5. Fall Semester (August – defense): the student completes his/her research project, writes his/her thesis, and proceeds to defense. Students must satisfy the thesis submission and defense requirements for both universities and enroll for a minimum of 1 credit in the semester in which they defend.
- v. The administrative details of this program are as articulated in the Cooperation Agreement between Ohio University and the University of Leipzig

VII. Ph.D. Specific Requirements

- a. Advancement to Ph.D. Candidacy
 - i. Ph.D. candidates must submit and orally defend a dissertation research proposal to their dissertation committee no later than during their fifth semester, excluding summers (i.e. in the Fall of their 3rd year for students who joined in the Fall).
 - a. The proposal must be submitted to the student's committee two weeks *BEFORE* the scheduled oral exam date.
 - b. The oral exam may also include comprehensive questions on scientific knowledge and creativity.
 - ii. The research proposal must be based on the student's intended dissertation research project, written in the student's own words (i.e., not copied from one or more literature sources) and must contain the sections listed under Proposal Requirements (see Appendix A). The proposal must be at least 2000 words and 10 pages (single-spaced, 1" margins) in length (not including references).
 - iii. Successful completion of this process will be determined by consensus of the student's dissertation committee. The outcome of this examination will determine whether the student may proceed to the Ph.D. degree or be limited to a terminal M.S. degree. The student's dissertation committee may also request changes to the proposal or a second defense, at its discretion. In any case, the student must satisfy all requests by the end of the fifth semester of study (excluding summers).
 - iv. Appeals of the decision for candidacy need to be made to the Graduate Committee before the end of the fifth semester (excluding summers)
 - a. A positive appeal is only granted for exceptional circumstances and if proper written documentation is supplied from the student, research advisor and the dissertation committee.
 - v. If the student fails to advance to Ph.D. candidacy then financial support is terminated

- after the fifth semester of support (excluding summers).
- vi. Students will not be recommended for Ph.D. candidacy until the written proposal, oral examination, competency coursework and the major coursework requirements have been successfully completed.
- b. Starting in their third year, students are typically required to give a graduate seminar (up to 50 minutes) on their current research project. Thorough coverage of background and motivation is recommended. Coherent presentation of experimental results obtained to date is expected, as is an in-depth, logical analysis of those results. It is understood by the audience that these seminars will present a 'work in progress' they need not tell the story of a completed research project. Accordingly, time should be devoted to explain the future directions of the project and how the future work will resolve the problems that remain unanswered.
 - c. Starting in their third year, all students must present posters at the annual Ohio University Student Research & Creative Activity Expo.
 - d. Pre-defense committee meeting
 - i. At least one meeting with the student's Dissertation Committee to discuss research progress should be held before the final dissertation defense.
 - ii. Typically this meeting will be in the student's fourth year and ideally no later than 6 months before anticipated defense date.
 - e. Dissertation
 - i. A written dissertation with an oral defense is required.
 - ii. The dissertation must be acceptable to the student's advisor, dissertation committee, the Department, the College, and the University.
 - f. Dissertation Defense
 - i. A written dissertation with an oral examination is required for completion of the Ph.D. degree.
 - ii. The oral examination will consist of two parts. A full period (50 minute) presentation of the research work will be made before all faculty, graduate student, and interested parties. This will be followed by an oral defense of the dissertation, which will be held before the dissertation committee.
 - g. Additional Requirements
 - i. Student-specific requirements
 - 1. The student's graduate advisor and dissertation committee will determine the specific requirements for each student within the above framework.
 - ii. Division-Specific Requirements
 - 1. There are, at present, no division-specific requirements

VIII. Policies and Procedures

- a. Limits on Financial Support
 - i. Time limits for associateship, fellowship and/or scholarship support of graduate students seeking Master's (M.S.) degrees shall normally be limited to a total of no more than seven (7) semesters (including summers).
 - ii. Time limits for support of graduate students seeking the Ph.D. degree shall normally be limited to a total of no more than nineteen (19) semesters (including summers; i.e. 6 years + 1 semester) beyond the bachelor's degree. Students with a Master's (M.S.)

- degree are limited to no more than eighteen (18) semesters of support (including summers; i.e. 6 years). These limits are comparable to national average (ACS survey 2007). The national mean time to a Ph. D. degree is 5.2 years. Faculty members are thus encouraged to organize student research plans not to significantly exceed this duration. Students are expected to work diligently to graduate in such a time frame.
- iii. The University sets final limits on support based on the number of semesters of graduate study and previous degree(s) obtained.
- b. Termination of Financial Support or Dismissal from Program
- i. Failure to make adequate progress toward your degree or to adequately perform any of the duties assigned or required in conjunction with your associateship/assistantship are grounds for non-renewal of financial support (including tuition scholarships) and grounds for dismissal from program as determined by the Graduate Committee.
 - ii. For non-native English speaking students, lack of progress in English language skills can be viewed as failure to make adequate progress.
 - iii. In the event that a student's ability to graduate may be negatively affected by a departmental-related decision (e.g., removal of TA support or dismissal from the program) the student may appeal their case to the Graduate Committee. At any time, the student may also discuss their case with the University's Office of the Ombudsman.
- c. Scholarly Discipline Requirement
- i. There is no "scholarly discipline" requirement.
- d. University Requirements
- i. Each student is responsible for insuring that the plan of study (including but not limited to course work, thesis/dissertation preparation, the maintenance of grade standards, and meeting established time limits) conforms to the University-wide standards as published in the current Graduate Catalog.
 - ii. The requirements of the Department of Chemistry and Biochemistry indicated in this document are in addition to those stated in the Graduate Catalog.
- e. Professional Ethical Conduct
- i. Students are expected to maintain standards of professional and ethical conduct in keeping with Ohio University policy and the scientific discipline (see appendix).
 - ii. Student conduct gauged to be professional ethical misconduct may result in termination of support, dismissal from the program and/or referral to University authorities as determined by the Graduate Committee.
- f. Changes in Coursework Requirements
- i. Students are expected to follow coursework requirements in effect at the time of their initiation of graduate work.
 - ii. If the coursework requirements are changed during the period of study, the student has the option of following the original set of requirements or adopting in entirety a new set of requirements.
 - iii. The Graduate Committee must approve any change in the coursework requirements.
- g. Keys
- i. You will be issued keys to the building, your office and any other room to which you

- ii. need access.
 - ii. Key request forms must be obtained from the chemistry office.
 - iii. Failure to return keys will result in an academic hold on your University record and non-clearance for graduation.
- h. Computer Usage
- i. The department provides access to several computer stations and each research lab should have access as well.
 - ii. Computers are available for departmental graduate students, authorized undergraduate students and faculty use only. Some software and manuals are available. Do not remove these materials from the room.
 - iii. The Ohio University Student Code of Conduct Policy defines the Misuse or Abuse of Computers – as the “misuse, or abuse of any computer, computer system, service, program, data, network, cable television network, or communication networks.” Students found in violation of this policy are subject to a possible sanction of suspension or expulsion from Ohio University. Additionally, the Computer and Network Use Policies (91.003) provide guidelines on acceptable computer use. The following are considered Misuse of Computers. Students found to have engaged in such actively will be referred to the Ohio University Office of Judiciaries for a disciplinary hearing.
 - 1. **Pornography**- There will be NO browsing, downloading, printing, bookmarking, creating shortcuts, etc. to pornography on ANY computer.
 - 2. **Printing** – Printers are provided as a convenience in the use of computers. Printing of materials necessary for research and courses is acceptable practice. It is NOT acceptable to print large files of nonuniversity related items. For example, printing a newspaper is not allowed.
 - 3. **Software** is not to be installed on these machines without prior
 - 4. permission from the system manager.
 - 5. **File-sharing (P2P)** of materials (e.g., movies, music, and books) protected by copyright is forbidden by Ohio University and has resulted in criminal prosecution.
 - iv. Copier Usage
 - 1. Graduate students are entitled to 100 copies per month. Anyone averaging more than 100 copies per month over a six-month period will be billed for additional copies at a rate of 5 cents per copy.

IX. The Department of Chemistry and Biochemistry reserves the right to change or modify these requirements as necessary and without prior notice.

APPENDIX

A1. RESEARCH PROPOSAL REQUIREMENTS (students should discuss with their advisor and committee members the expected scope of the proposal significantly in advance of submitting it for review)

a. Proposal Summary (1 page)

- i. The proposal summary contains a description of the proposed activity suitable for publication. It should NOT be an abstract of the proposal, but rather a self-contained description of the activity that would result from the research.
- ii. The summary should be written in the third person and include a statement of objectives (Specific Aims and sub-aims) and methods to be employed.
- iii. It should be informative to other persons working in the same or related fields and insofar as possible, understandable to a scientifically or technically literate lay reader.

b. History and Background (minimum 3 pages)

- i. How did this research area develop?
- ii. What is already known?

c. Significance (1 page)

- i. Why is this research area important?
- ii. What important questions in this research area remain to be answered?

d. Research Design and Methods (minimum 5-6 pages)

- i. Describe how your research plan will accomplish the specific aims of the project.
- ii. Describe and critically discuss the experimental techniques that you plan to use in your project.
- iii. Discuss any possible difficulties that may occur and possible solutions
- iv. Provide a timeline for completion of each specific aim (and sub-aims)

e. Preliminary Results (as appropriate)

f. Conclusion (1/2 page)

- i. Discuss the anticipated outcomes/results and their significance
- ii. Discuss how the proposed project will add to the knowledge base of the discipline.

g. References

- i. References must be sequentially numbered in the text and cited according to standard ACS format with complete titles.
- ii. The bibliography must include at least 30 citations.

A2. PROGRESS TOWARDS DEGREE EXPECTATIONS

Satisfactory semester and yearly progress is expected of all graduate students in the Department of Chemistry & Biochemistry. Only with satisfactory progress will it be possible to complete a Ph.D. (or M.S.) degree before reaching the University and College imposed term limits regarding tuition support. Criteria necessary to successfully complete a degree are detailed elsewhere in the Graduate Requirements document and are not affected by the term limit rules.

In addition to satisfying the curricular requirements, satisfactory progress will minimally require that the student:

1. Work on thesis/dissertation project during registered semesters as directed by advisor.
2. Work on thesis/dissertation project during breaks, intercessions and non-registered semesters as directed by advisor.
3. Obtain prior approval from the Graduate Chair for time off during registered semesters. The Graduate Chair will confer with the student's advisor and other affected faculty).
4. Obtain prior approval from advisor for time off during winter intercession or other breaks between semesters. (NOTE: International students may need additional approvals depending on their visa and should consult with the Graduate Chair and International Student Services)

A3. TEACHING ASSISTANT EXPECTATIONS

All graduate students supported on a TA are expected to fulfill the time-commitment specified on their contract via direct teaching of students, evaluation/grading of student work, or preparation for student instruction as directed by the TA coordinator and/or course instructor.

In addition, all TAs will have to achieve competency with the material they are teaching/grading. This may be demonstrated by methods such as passing a competency exam, attending relevant course lectures or solving assigned problems as directed by the TA coordinator and/or course instructor.

Satisfactory performance of TA duties is expected and will be monitored by the TA coordinator and/or course instructor. Any TA with a less than satisfactory performance will be reported to the Graduate Chair.

A4. Professional Ethical Conduct

The scope of professional conduct expected is exemplified by the "Chemical Professional's Code of Conduct" adopted by the American Chemical Society in 2007 and copied below (http://portal.acs.org:80/portal/acs/corg/content?_nfpb=true&_pageLabel=PP_ARTICLEMAIN&node_id=1095&content_id=CTP_004007&use_sec=true&sec_url_var=region1: accessed May 6, 2008)

"The Chemist's Creed," was approved by the ACS Council in 1965. The principles of The Chemist's Code of Conduct were prepared by the Council Committee on Professional Relations, approved by the Council (March 16, 1994), and replaced "The Chemist's Creed". They were adopted by the Board of Directors (June 3, 1994) for the guidance of Society members in various professional dealings, especially those involving conflicts of interest. The Chemist's Code of Conduct was updated and replaced by The Chemical Professional's Code of Conduct to better reflect the changing times and current trends of the Society. It was approved by Council on March 28, 2007 and adopted by the Board of Directors on June 2, 2007.

Chemical Professionals Acknowledge Their Responsibilities

To the Public

Chemical professionals have a responsibility to serve the public interest and safety and to further advance the knowledge of science. They should actively be concerned with the health and safety of co-workers, consumers and the community. Public comments on scientific matters should be made with care and accuracy, without unsubstantiated, exaggerated, or premature statements.

To the Science of Chemistry

Chemical professionals should seek to advance chemical science, understand the limitations of their knowledge, and respect the truth. They should ensure that their scientific contributions, and those of their collaborators, are thorough, accurate, and unbiased in design, implementation, and presentation.

To the Profession

Chemical professionals should strive to remain current with developments in their field, share ideas and information, keep accurate and complete laboratory records, maintain integrity in all conduct and publications, and give due credit to the contributions of others. Conflicts of interest and scientific misconduct, such as fabrication, falsification, and plagiarism, are incompatible with this Code.

To Their Employer

Chemical professionals should promote and protect the legitimate interests of their employers, perform work honestly and competently, fulfill obligations, and safeguard proprietary and confidential business information.

To Their Employees

Chemical professionals, as employers, should treat subordinates with respect for their professionalism and concern for their well-being, without bias. Employers should provide them with a safe, congenial working environment, fair compensation, opportunities for advancement, and proper acknowledgment of their scientific contributions.

To Students

Chemical professionals should regard the tutelage of students as a trust conferred by society for the promotion of the students' learning and professional development. Each student should be treated fairly, respectfully, and without exploitation.

To Associates

Chemical professionals should treat associates with respect, regardless of the level of their formal education, encourage them, learn with them, share ideas honestly, and give credit for their contributions.

To Their Clients

Chemical professionals should serve clients faithfully and incorruptibly, respect confidentiality, advise honestly, and charge fairly.

To the Environment

Chemical professionals should strive to understand and anticipate the environmental consequences of their work. They have a responsibility to minimize pollution and to protect the environment.