

SUMMARY OF REQUIREMENTS FOR ADVANCED DEGREES IN CHEMISTRY AND BIOCHEMISTRY

2018-2019 Academic Year

Graduate students who are in residence at the University of Delaware are expected to register as a listener for one of the Divisional seminars and to participate each semester in that seminar and all departmental colloquia.

Requirements for the M.A. in Chemistry and Biochemistry

The following requirements are for the M.A. in Chemistry and Biochemistry.

- I. Admission by the Office of Graduate Studies.
- II. A minimum of 30 credit hours of graduate-level courses is required with an overall B average (3.00). A minimum of 18 credit hours must be course work at the 600 level or above (excluding pre-candidacy study, research, thesis or dissertation credits) as specified in Section II of the Ph.D. requirements. A maximum of 12 credit hours, 500 level or greater, may be taken in other departments toward the 30 credit hour requirement. No thesis is required.

The advisor for this program is the Director of Graduate Studies. All courses must have his/her approval.

Requirements for the M.S. in Chemistry and Biochemistry

The following requirements are for the M.S. in Chemistry and Biochemistry.

- I. Admission by the Office of Graduate Studies.
- II. A minimum of 30 credit hours of graduate-level courses is required with an overall B average (3.00). A minimum of 18 credit hours must be course work at the 600 level or above (excluding pre-candidacy study, research, and thesis credits) as specified in Section II of the Ph.D. requirements. A maximum of nine credit hours, 500 level or greater, may be taken in other departments toward the 30 credit hour requirement. Appendix A and B describes course requirements for students in all divisions regarding the research conducted in the Department and service as a teaching assistant.
- III. Thesis must not represent more than six credit hours. Thesis and/or research must represent a minimum of six and a maximum of twelve credit hours toward the 30 credit hour requirement.

A thesis is required. It must meet the approval of the Thesis Advisor, Department Chairperson, Dean of the College of Arts and Sciences, and the Vice Provost for Graduate and Professional Education. The requirements for formatting of the M.S. thesis are detailed in the "Thesis and Dissertation Manual." <http://grad.udel.edu/>

Students who have completed some graduate courses at other institutions may transfer up to nine credit hours of acceptable work, subject to approval by the Director of Graduate Studies and the Office of Graduate Studies. (Credit hours applied towards a degree at another institution may not be transferred.)

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Requirements for the Ph.D. in Chemistry and
Biochemistry

The following requirements are for the Ph.D. in Chemistry and Biochemistry.

I. Admission by the Office of Graduate Studies.

II. A minimum of 30 credit hours of graduate level courses is required with an overall B average (3.00). The department course requirements are a minimum of eighteen credit hours in graduate level courses (600-level or higher) excluding research and dissertation (CHEM-868 and CHEM-969). At least six three-credit courses must be taken. Appendix A describes specific course requirements for each division. Scientific courses offered by other Departments may be counted towards the course requirements as courses outside the student's division, if approved by the faculty in the student's division and the Director of Graduate Studies. The student must achieve at least a cumulative grade point average of 3.00 in the courses that fulfill this requirement. The course requirements, including the division's requirements, should be satisfied within four semesters of entering the program. Any required course may be satisfied by means of a competency examination administered by the secretary of the respective division, upon approval of the division. Appendix B describes course and additional grade point average requirements for students in all divisions regarding the research conducted in the Department and service as a teaching assistant.

III. Ph.D. Advisory Committee

(a) The Department Chairperson shall inform the GCC of his/her approval of the supervision of the student's Ph.D. research by a faculty member of the Department of Chemistry and Biochemistry. Students are not allowed to do senior research, a master's thesis, and a Ph.D. dissertation (or senior research and a Ph.D. dissertation if no master's thesis is written) with the same research advisor. In addition to attending the special seminar program for first year graduate students, each graduate student is required to meet individually with at least three faculty members before choosing a research advisor. The choice of research advisors normally occurs by December 15 to enable the student to begin his/her

research effort during the Winter Session of his/her first year.

(b) The research supervisor shall submit nominations for the student's Ph.D. Advisory Committee to the GCC for its approval no later than the beginning of the student's third semester. Members of the Ph.D. Advisory Committee should be consulted with regard to their willingness to serve by the student and/or the student's research supervisor prior to their nomination. The committee consists of at least four members: a chairperson, a faculty member in the primary research area of the dissertation, a faculty member outside the primary research area of the dissertation, and an external member. If appropriate, the committee may include up to two additional members. If the chairperson of the committee does not have a primary appointment in the Department of Chemistry and Biochemistry, then another member of the committee having a primary faculty appointment in the Department must serve as a co-chair. At least half of the members shall have a primary faculty appointment in the Department of Chemistry and Biochemistry, and at least half of those members shall represent the primary area of study. The external member must be a faculty member having a primary appointment in another department in the University or a scientist from outside the University. An external member having a regular faculty appointment in the University may serve as a co-chairperson. All committee members from outside the University must have outstanding credentials as judged by the GCC. A faculty member having a secondary appointment in the Department of Chemistry and Biochemistry may serve as either an internal or external member of the committee. In order to convene a meeting of the Ph.D. Advisory Committee, at least 75% of the committee members must be present. A temporary and/or permanent substitute for a regular committee member must be approved by the GCC.

(c) In addition to the specified times listed in the sections below, the student has the right

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to convene a meeting of the Ph.D. Advisory Committee at any time they deem appropriate.

IV. Candidacy Examination

- (a) Prior to the end of the fourth semester, the student must request a meeting of the Ph.D. Advisory Committee and convene a candidacy examination, consisting of a written dissertation proposal and an oral examination, each being independently evaluated. The candidacy examination will determine the student's fitness for Ph.D. studies and advancement into Ph.D. candidacy. Both the written and oral examinations must be satisfactorily completed to pass the candidacy examination.
- (b) The written dissertation proposal should clearly and effectively outline the proposed dissertation research of the student seeking Ph.D. candidacy, and MUST be submitted to the Ph.D. Advisory Committee no less than two weeks prior to the scheduled oral examination. The proposal will, at minimum, define 2-3 research aims, at least one of which must be independently conceived by the candidate without input from the research advisor. It should describe the background, significance, and feasibility of the proposed research plan, and should review the pertinent literature. It should also describe preliminary results that have been obtained towards the research plan.

The written dissertation proposal should be ten pages of single-spaced text (not including references), with one-inch margins, an 11-point standard font (such as Arial, Times, or Helvetica), inclusive of embedded figures.

At the discretion of the Ph.D. Advisory Committee, an appendix including experimental or computational details of research completed at the time of submission may also be required. This appendix will be formatted using the appropriate American Chemical Society format and does not have a page limitation. Students should check with their Ph.D.

advisory committee before they begin preparing their dissertation proposal to determine whether they should prepare an appendix, and if so, what specific materials should be included in that supplemental document.

The Ph.D. Advisory Committee shall evaluate the dissertation proposal for quality and clarity of writing, the proposed research plan (including the independently conceived aim), and the student's research progress to date.

Where the written dissertation proposal does not meet the expectations for advancement to candidacy, the Ph.D. Advisory Committee may recommend discontinuation of Ph.D. studies, or may request that part or all of the proposal be rewritten for re-evaluation by the committee. Students who fail to submit the dissertation proposal to the Ph.D. Advisory Committee at least two weeks before the oral examination will not be allowed to re-write the document.

Only a single opportunity to re-write the dissertation proposal is allowed.

- (c) The oral examination shall be held before the Ph.D. Advisory Committee to assess the candidate's qualifications. The student should present a brief (approximately 45 minute) talk about the proposed Ph.D. research project(s). As part of the presentation, the student should clearly describe the research aims, and the background, significance, and feasibility of the proposed research plan. This should include a review of the pertinent literature. The student should also present a detailed description of any research progress. Finally, the student should be prepared to demonstrate and articulate a general knowledge and understanding of chemical principles appropriate to a Ph.D. candidate in the field.

The Ph.D. Advisory Committee will evaluate the oral examination for appropriate quality and clarity of presentation, knowledge and understanding of the proposed research, knowledge and

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understanding of chemistry in general, and research progress.

Where the results of the oral examination do not meet the expectations for advancement to candidacy, the Ph.D. Advisory Committee may recommend discontinuation of Ph.D. studies, or may request re-examination at a later date. Only a single opportunity for students to repeat the oral examination is allowed.

- (d) The Ph.D. Advisory Committee shall provide written feedback to the student regarding both the written dissertation proposal and the oral examination no later than two weeks after the completion of the exam.
- (e) The Ph.D. Advisory Committee shall inform the GCC of the suitability of the student and the proposed research program for a Ph.D. in Chemistry and Biochemistry, by means of the "Approval of Ph.D. Research Program" form. This form may be obtained in the office of the Chair's Administrative Assistant in Chemistry & Biochemistry or online: <https://www.chem.udel.edu/graduate/graduate-student-forms>. For the student to continue in the program, the Ph.D. research program MUST be approved before the end of the student's fourth semester.
- (f) If the research topic is changed substantially at a later stage of study, or if the student changes research groups, the student shall convene a meeting of the Ph.D. Advisory Committee to discuss and approve the outline of the new research topic.
- (g) Requests for appeal of the recommendation of the Ph.D. Advisory Committee must be submitted in writing to the Director of Graduate Studies by the candidate within one week of being informed of that decision. Requests should include a detailed explanation of why appeal is sought and justified. Appeals will be considered by the Graduate Curriculum Committee.

V. "Recommendation for Candidacy for the Ph.D. Degree" Form

This form must be submitted to the Chair's Administrative Assistant in the Department of Chemistry and Biochemistry and then to the Department Chairperson and Office of Graduate Studies after the student has fulfilled the following requirements:

- (a) Course requirements
- (b) Research project and program of study approval by Ph.D. Advisory Committee, and "Approval of Ph.D. Research Program" submitted to the Graduate Curriculum Committee (see Section IVe)
- (e) One year residence as specified by the University.

This form may be obtained from the Chair's Administrative Assistant in Chemistry and Biochemistry or online: <http://grad.udel.edu/>

VI. Additional Ph.D. Advisory Committee Meetings

For full time students, a second meeting of the Ph.D. Advisory Committee must be held no later than the end of the 11th semester of study so that the committee can assess progress towards degree. Ph.D. Advisory Committee meetings will be held at least annually, thereafter, until graduation.

VII. Preliminary Oral Examination(s) of Research Progress

At least one meeting of the Ph.D. Advisory Committee must be held no less than six months preceding the day of the final dissertation defense. The Ph.D. Advisory Committee shall inform the Chair's Administrative Assistant of this meeting by means of the "Record of Preliminary Oral Examination" form. This form may be obtained from the Chair's Administrative Assistant or at <https://www.chem.udel.edu/graduate/graduate-student-forms>.

VIII. "Application for Advanced Degree" Form

This form must be submitted to the Chair's Administrative Assistant in the Department of Chemistry and Biochemistry by the Office of

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Graduate Studies established dates for the Spring, Summer, Fall, and Winter graduations. The form can be found at <http://grad.udel.edu/>

Administrative Assistant in the Department of Chemistry and Biochemistry must be notified three weeks in advance of the date of the exam so that the appropriate notification of the University community can be made. A hard or electronic copy of the dissertation must be available for examination in the Department of Chemistry and Biochemistry Chair's Office at least two weeks in advance of the date of the exam. In the event that a student is unsuccessful, the Ph.D. Advisory Committee may arrange for the student to be reexamined.

X. Dissertation

A dissertation is required. It must meet the approval of the Dissertation Advisor, the Ph.D. Advisory Committee, the Department Chairperson, the Dean of the College of Arts and Sciences, and the Vice Provost for Graduate and Professional Education. The requirements for formatting of the Ph.D. dissertation are detailed in the "Thesis and Dissertation Manual" which may be found on the Graduate Studies website, <http://grad.udel.edu/>

XI. Final Oral Defense of Dissertation

The Department of Chemistry and Biochemistry requires that the final examination for the Ph.D. include a public oral presentation of the candidate's dissertation results that meets the approval of the Ph.D. Advisory Committee. The presentation should be about one hour long. The Chair's

XII. "Certificate of Ph.D. Dissertation" Form

This form must be submitted to the Office of Graduate Studies with the Dissertation. It may be obtained from the Graduate Studies website: <http://grad.udel.edu/>

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APPENDIX A

Divisional Course Requirements

A course is defined as a unit of three credit hours. In the case of a divisional course requirement where a particular course is not specified, this "course" may be satisfied by a combination of graduate level courses whose value equals or exceeds three credit hours. Other stipulations of the division concerning the nature of courses must be satisfied (divisions are also called concentrations by the University).

Specific course requirements by division are outlined below. If a student wishes to take courses other than those specified, then each of these courses must be approved in writing: (a) at the Fall and Spring advisements for first-year graduate students by the representative from the respective Division on the Graduate Curriculum Committee, and (b) at other times by the research advisor.

The remaining courses satisfying the departmental course requirement of 18 credits in graduate level coursework can be selected from offerings in the Department of Chemistry and Biochemistry, or appropriate graduate level courses in other Departments.

All students pursuing a degree program in Chemistry and Biochemistry need to secure the written permission from both their research advisor and the Director of Graduate Studies prior to enrolling in any course not bearing a CHEM6XX or CHEM8XX designation.

Course requirements for students in the various divisions are:

Analytical Six credit hours of graduate analytical courses from the list below plus six additional credit hours of graduate coursework approved by the research advisor. Analytical courses that can satisfy these requirements include CHEM620, CHEM621, CHEM622, CHEM623, CHEM624, CHEM625, CHEM628, CHEM629, and CHEM820.

Biochemistry At least 9 credits in graduate-level biochemistry courses. CHEM 641 must be taken as one of these courses unless this requirement is waived by the Biochemistry Division. The Division, or the student's research advisor, must approve the courses used to satisfy the departmental course requirement of 18 credits in graduate level courses. Biochemistry courses that can satisfy these requirements include CHEM641, CHEM642, CHEM643,

CHEM644, CHEM645, CHEM646, CHEM648, CHEM684, and CHEM686.

Inorganic

Inorganic students must take at least nine credits from courses with a CHEM65x or CHEM85x designation, or an equivalent graduate level inorganic course.

Organic

Students in the organic division are free to select coursework that best meets personal educational and professional goals. First year students in the division should consult with the division's representative on the Graduate Curriculum Committee to tailor a course plan that best meets these needs. In general, it is recommended that all organic students take CHEM633 and CHEM634, and at least one additional course (3 credit hours) with a CHEM63X or CHEM83X designation.

Physical

A minimum of three courses from among the following: CHEM671, CHEM672, CHEM674, and CHEM677. The student may substitute for one of these three courses from physical-chemistry related three-credit courses upon the approval of the research advisor. Students must take at least one core course in the Department of Chemistry and Biochemistry outside of the Division of Physical Chemistry.

APPENDIX B

Departmental Course and Grade Requirements

Full-time students must be registered each semester for at least nine hours of graduate credit, not including courses for which he/she is registered as a listener or courses which are not for graduate credit (400 series and lower courses).

Part-time students will develop a course plan with their advisor. This plan must be approved by the director of graduate studies before the start of study, and before any changes are made to the plan.

After admission to candidacy, the candidate shall register for a total of nine hours of CHEM-969 (Ph.D. Dissertation). Following these registrations, if the dissertation has not been submitted to the Office of Graduate Studies, the candidate shall register for UNIV-999 (Sustaining) status each semester in the fall or spring semester, or register as full-time if on contract during these periods. Sustaining or other registrations shall be required for summer session if the candidate graduates during that session.

Graduate students are required to maintain continuous registration each fall and spring semester to be eligible to continue in a graduate degree program. Failure to comply with the requirement of maintaining continuous registration in the fall and spring semesters either in courses, in sustaining credit, or with approved leave of absence will be taken as evidence that the student has terminated his/her graduate program, and the matriculated

status to the graduate program will be terminated. In addition, all students, including sustaining students, must be registered in the semester in which the degree is officially awarded.

A student who receives a master's degree and wishes to continue for the Ph.D. must submit a Graduate Student Change of Classification form to his/her Ph.D. advisor requesting reclassification as G1 (graduate pre-candidacy). The form is approved in turn by the Chairperson of the Graduate Curriculum Committee, the Director of Graduate Studies, the Department Chairperson, and the Office of Graduate Studies.

All students are required to maintain a cumulative grade point average of 3.00. Students with cumulative grade point averages below 3.00 will not be considered to be in good standing and are subject to the Academic Probation Policies established the Office of Graduate Studies and Professional Education. Details of that policy can be found here: <http://grad.udel.edu/policies/graduate-academic-policies/>. **In addition, any student who has not yet entered Ph.D. candidacy and earns two or more grades of C+ or lower in any 3-unit (or greater) courses can be recommended for dismissal from the program.**

All students are also subject to the Office of Graduate Studies and Professional Education Academic Policies, see: <http://grad.udel.edu/policies/graduate-academic-policies/>.

APPENDIX C

Other Departmental Course Requirements

All full-time students in the M.S. and Ph.D. programs must enroll in CHEM-865 *New Student Seminar* during their first fall of residence. **Withdrawal from CHEM-865 *New Student Seminar* without the permission of the instructor constitutes resignation from the graduate program.** CHEM-865 *New Student Seminar* must be passed by all full-time students in the M.S. and Ph.D. programs within their first two years of residence.

Sept. 1, 2018