



Program Approval Form

For approval of new programs and deletions or modifications to an existing program.

Action Requested:

Create New (SCHEV approval required except for minors)
 Inactivate Existing
 Modify Existing (check all that apply)
 Title (SCHEV approval required except for minors)
 Concentration (Choose one): Add Delete Modify
 Degree Requirements
 Admission Standards/ Application Requirements
 Other Changes: _____

Type (Check one):

B.A. B.S. Minor
 M.A. M.S. M.Ed.
 Ph.D.
 Undergraduate Certificate*
 Graduate Certificate*
 Other:

College/School: **Department:**
Submitted by: **Ext:** **Email:**

Effective Term: Fall **Please note:** For students to be admitted to a new degree, minor, certificate or concentration, the program must be fully approved, entered into Banner, and published in the University Catalog.

Justification: (attach separate document if necessary)

The Chemistry and Biochemistry doctoral program requires the proposed changes in order to improve student course flexibility and to clarify some ambiguities in the original program description:

1. The core has been reduced to two courses (CHEM 817 and 833) in order to allow students more flexibility in taking discipline-centric courses, while providing them a solid foundation in basic concepts and principles relevant to all disciplines.
2. CHEM 817 has been introduced as a new core class due to the cross-discipline relevance of spectroscopy and related theory.
3. Research Emphasis Courses have been folded into the Electives.

The requirements and process for promotion to candidacy have been explained in more detail than in the original program description. The new language also clearly provides a timeline for the promotion process. Requirements for an exit seminar have been formalized.

Program Title: (Required)
Title must identify subject matter. Do not include name of college/school/dept.

Concentration(s):

Admissions Standards / Application Requirements:
(Required only if different from those listed in the University Catalog)

Degree Requirements:
Consult University Catalog for models, attach separate document if necessary using track changes for modifications

Courses offered via distance:
(if applicable)

TOTAL CREDITS REQUIRED:

Existing	New/Modified
Chemistry and Biochemistry, PhD	
See below	See below (Changes have been highlighted)

*For Certificates Only: Indicate whether students are able to pursue on a Full-time basis Part-time basis

Approval Signatures

Department _____ Date _____ College/School _____ Date _____ Provost's Office _____ Date _____
Interdisciplinary Council Use Only

If this program may impact another unit or is in collaboration with another unit at Mason, the originating department must circulate this proposal for review by those units and obtain the necessary signatures prior to submission. Failure to do so will delay action on this proposal.

Unit Name	Unit Approval Name	Unit Approver's Signature	Date

For Graduate Programs Only

Graduate Council Member _____ Provost Office _____ Graduate Council Approval Date _____

See following pages for Existing and New/Modified

Existing

Degree Requirements

Upon acceptance into the Chemistry and Biochemistry PhD program, a student will be assigned an academic advisor. Prior to registering for classes, students are required to meet with their academic advisors who will provide guidance in selecting courses that are consistent with the student's area of interest. Once a student has selected a research/dissertation advisor, that person then assumes the role of providing academic advisement to the student.

The program requires 72 total credits of coursework and dissertation. All students in the Chemistry and Biochemistry PhD program take a common core of four courses. By working with the Dissertation Committee, a student may choose to specialize in an emphasis area such as analytical, biochemistry, environmental, inorganic, organic, or physical chemistry, or others according to his or her particular interests.

A student may choose up to 24 credits in general elective graduate courses that can be applied towards the degree requirements with the approval of the dissertation advisor and the program director. Core courses not used to satisfy the core requirement can be used as elective credits.

Doctoral Course Work (48 credits)

Core Courses (12 credits)

- [CHEM 814 - Advanced Bioorganic Chemistry](#) Credits: 3
- [CHEM 821 - Theory of Analytical Processes](#) Credits: 3
- [CHEM 833 - Physical Chemistry and Biochemistry](#) Credits: 3
- [CHEM 891 - Doctoral Scientific Critique, Writing and Presentation](#) Credits: 3

Research Emphasis Courses (9 credits)

The purpose of the research emphasis courses is to provide the students with an in-depth theoretical foundation in their chosen area of expertise. Research emphasis courses are selected in consultation with the student's research advisor.

Students are required to select 9 additional chemistry credits (3 courses) in one of the three research emphasis areas listed below.

Analytical and Environmental Chemistry

- [CHEM 554 - Geochemistry of Environmental Hazards](#) Credits: 3
- [CHEM 620 - Modern Instrumentation](#) Credits: 3
- [CHEM 624 - Principles of Chemical Separation](#) Credits: 3
- [CHEM 625 - Electroanalytical Chemistry](#) Credits: 3
- [CHEM 651 - Environmental Chemistry of Organic Substances](#) Credits: 3
- [CHEM 728 - Introduction to Solid Surfaces](#) Credits: 3

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Protein Biochemistry

- [CHEM 567 - The Chemistry of Enzyme-Catalyzed Reactions](#) Credits: 3
- [CHEM 613 - Modern Polymer Chemistry](#) Credits: 3
- [CHEM 646 - Bioinorganic Chemistry](#) Credits: 3
- [CHEM 660 - Protein Biochemistry](#) Credits: 3
- [CHEM 661 - Antibiotic Chemistry and Resistance](#) Credits: 3
- [CHEM 662 - Modern Methods of Drug Discovery](#) Credits: 3
- [CHEM 665 - Protein-Protein Interactions: Methods and Applications](#) Credits: 3
- [CHEM 735 - Astrophysical Chemistry of Planetary Bodies](#) Credits: 3
- [CHEM 767 - Industrial Biochemistry](#) Credits: 3

Physical Chemistry and Spectroscopy

- [CHEM 614 - Physical Organic Chemistry](#) Credits: 3
- [CHEM 617 - Organic Structural Spectroscopy](#) Credits: 3
- [CHEM 633 - Chemical Thermodynamics and Kinetics](#) Credits: 3
- [CHEM 732 - Quantum Chemistry](#) Credits: 3
- [CHEM 733 - Polymer Physical Chemistry](#) Credits: 3
- [CHEM 735 - Astrophysical Chemistry of Planetary Bodies](#) Credits: 3
- [CHEM 736 - Computational Quantum Mechanics](#) Credits: 3

Seminar (3 credits)

- [CHEM 790 - Graduate Seminar](#) Credits: 1 (taken three times)

Electives (24 credits)

24 credits of approved elective courses chosen in consultation with the student's advisor

Dissertation Committee and Supervisor

By the end of their first year, students in the program are expected to have selected a dissertation/research supervisor and to have formed their dissertation committee. This committee will consist of at least 4 graduate faculty members (including the dissertation supervisor), with at least 2 members from the Department of Chemistry and Biochemistry. At least one member must be from outside the department. Qualified individuals who are not members of the graduate faculty, including faculty at other universities or government laboratories, may serve on the committee with the approval of the program director and the associate dean for graduate programs.

Candidacy Examinations

The student must successfully complete separate written and oral candidacy examinations prepared and administered by the dissertation committee.

Dissertation Proposal and Advancement to Candidacy

Based upon the committee's familiarity with the student's progress in the research project, the committee will determine whether a candidate is ready to write and defend the dissertation. With the approval of the dissertation committee, the student will enroll in Doctoral Dissertation Proposal (CHEM 998).

Students advance to doctoral candidacy by fulfilling the following requirements:

- The student prepares a dissertation proposal describing in detail the planned dissertation research. The proposal must be approved by the dissertation committee.
- The student must successfully complete candidacy examinations as stated above.
- Following successful completion of the research proposal and candidacy exams, the committee will recommend the student for advancement to doctoral candidacy.

Dissertation Research (24 credits)

No more than 24 combined credits from CHEM 998 and CHEM 999 may be applied toward satisfying doctoral degree requirements, with no more than 12 credits of CHEM 998.

- [CHEM 998 - Doctoral Dissertation Proposal](#) Credits: 1-12
- [CHEM 999 - Doctoral Dissertation Research](#) Credits: 1-12

Dissertation Research and Defense

With the approval of the dissertation committee, the student will enroll in Doctoral Dissertation Proposal (CHEM 998) and Doctoral Dissertation Research (CHEM 999). The dissertation research should represent a significant contribution to the appropriate scientific field(s), and it should be deemed to represent a body of work that is publishable in a refereed scientific journal. The dissertation must be presented and defended in a public forum consisting of the dissertation committee and other interested members of the George Mason University community.

Total: 72 credits

Degree Requirements

Upon acceptance into the Chemistry and Biochemistry PhD program, a student will be assigned an academic advisor. Prior to registering for classes, students are required to meet with their academic advisors who will provide guidance in selecting courses that are consistent with the student's area of interest. Once a student has selected a research/dissertation advisor, that person then assumes the role of providing academic advisement to the student.

The program requires 72 total credits of coursework and dissertation. All students in the Chemistry and Biochemistry PhD program take a common core of **two** courses. By working with the Dissertation Committee, a student may choose to specialize in an emphasis area such as analytical, biochemistry, environmental, inorganic, organic, or physical chemistry, or others according to his or her particular interests.

A student may choose up to **39** credits in general elective graduate courses that can be applied towards the degree requirements with the approval of the dissertation advisor and the program director.

Doctoral Course Work (48 credits)

Core Courses (6 credits)

- CHEM 817 - Organic Structural Spectroscopy Credits: 3
- CHEM 833 - Physical Chemistry and Biochemistry Credits: 3

Seminar (3 credits)

- [CHEM 790 - Graduate Seminar](#) Credits: 1 (taken three times)

Electives (39 credits)

39 credits of approved elective courses chosen in consultation with the student's advisor.

Dissertation Committee and Supervisor

By the end of their first year, students in the program are expected to have selected a dissertation/research supervisor and to have formed their dissertation committee. This committee will consist of at least 4 graduate faculty members (including the dissertation supervisor), with at least 2 members from the Department of Chemistry and Biochemistry. At least one

member must be from outside the department. Qualified individuals who are not members of the graduate faculty, including faculty at other universities or government laboratories, may serve on the committee with the approval of the program director and the associate dean for graduate programs.

Dissertation Proposal and Advancement to Candidacy

Prior to completing their 6th semester in the program, students are expected to have advanced to candidacy. The student's committee will determine whether a candidate is ready to begin preparation of their research proposal and approve enrollment in Doctoral Dissertation Proposal (CHEM 998), based upon their familiarity with the student's progress.

In order to advance to candidacy, students are required to fulfill the following requirements:

- 1) Students will prepare and submit a research proposal (based on their thesis research) for approval by their dissertation committee.
- 2) The student must pass a written qualifying exam prepared by their dissertation committee. The exam can be based on the student's research and/or completed coursework, with the composition of the exam being determined by the student's dissertation committee.
- 3) The final stage is an oral defense of the student's research proposal. Questions at the proposal defense may also be drawn from material covered in the written qualifying exam.

Upon successful completion of these requirements, the committee will recommend the student for advancement to doctoral candidacy.

Dissertation Research (24 credits)

No more than 24 combined credits from CHEM 998 and CHEM 999 may be applied toward satisfying doctoral degree requirements, with no more than 12 credits of CHEM 998.

- [CHEM 998 - Doctoral Dissertation Proposal](#) Credits: 1-12
- [CHEM 999 - Doctoral Dissertation Research](#) Credits: 1-12

Exit Seminar

Each Ph.D. candidate presents his or her research in a seminar in the Department of Chemistry and Biochemistry (a departmental seminar), which takes place in the same semester as the final defense of dissertation (below). The student does not have to be registered for CHEM 790 during the semester the Exit Seminar is presented.

Dissertation Research and Defense

With the approval of the dissertation committee, the student will enroll in Doctoral Dissertation Proposal (CHEM 998) and Doctoral Dissertation Research (CHEM 999). The dissertation research should represent a significant contribution to the appropriate scientific field(s), and it should be deemed to represent a body of work that is publishable in a refereed scientific journal. The dissertation must be presented and defended in a public forum consisting of the dissertation committee and other interested members of the George Mason University community.

Total: 72 credits
