

SHORT GUIDE TO REQUIREMENTS: BIOCHEMISTRY Ph.D. **University of Maryland, College Park**

This document describes the essential steps to the Ph.D in Biochemistry. The essence of the degree is the conduct of cutting-edge research in Biochemistry. Formal coursework advances the student's general knowledge and develops necessary expertise for the desired area of research. The curriculum and elective courses provide modern instruction for graduate students with a wide range of research interests. Students receive training and experience in oral and written communication of scientific results and the preparation and defense of research proposals.

I. The Ph.D. in Biochemistry must include:

- a. At least 21 credits of graduate coursework, with 19 credits completed by the end of the fourth semester with an overall GPA \geq 3.0. Note that + and – grades are considered when GPAs are calculated (see: http://apps.gradschool.umd.edu/catalog/academic_record.htm).
- b. 12 credits of Ph.D. research (BCHM 898 (pre-candidacy), BCHM 899 (post-candidacy)).
- c. Oral defense of a written research proposal and demonstration of general knowledge of biochemistry as part of advancement to candidacy.
- d. Presentation of a seminar on a topic that is different from the student's dissertation research.
- e. Independent preparation of a research aim in the area of student's own research.
- f. Preparation and oral defense of a publication-quality dissertation that advances the field.

II. Courses: items a-f below satisfy the 21 credit minimum mentioned in item (I.a) above

- a. 10 credits of required core courses (BCHM 661, 662, 671, and 675). Students must attain at least a B– in each of the four courses. Students who receive a C in one of these courses must repeat the course. At least a B– in 661 is a prerequisite for continuing in 662, except by permission of the instructor of BCHM 662.
- b. At least 2 credits of Laboratory Rotations (BCHM 699).
- c. 1 credit of Computational Tools in Biochemistry (BCHM 677), to be completed in the Winter term of the first year. Biochemistry students do not take CHEM 611 and CHEM 612.
- d. At least 4 credits (at least two courses) of electives chosen from among CHEM, BCHM, CBMG, etc., courses numbered 600 or higher, typically BCHM 669, 673, 676 or CBMG 688X modules. A student may take more than 4 credits of electives with agreement of the student's research advisor.
- e. The Biochemistry Seminar Series (BCHM 889A, 2 x 1 credit). Students are expected to attend all Biochemistry seminars (Tuesdays at 11:00 am) throughout their graduate careers, whether registered for credit or not.
- f. Seminar Preparation (BCHM 698, 2 credits), taken during the 4th year.

Typical Fall Semester 1st Year Courses:

- BCHM 661/662 (Nucleic Acids, 2+2 credits): core, at least B– required in each
- BCHM 671 (Protein Chemistry, 3 credits): core, at least B– required
- BCHM 699 (Laboratory Rotations, 2 credits): required.
- BCHM 889A (Seminar, 1 credit)

Typical Winter Term 1st Year Courses:

- BCHM 677 (Computational Tools in Biochemistry, 1 credit): required

Typical Spring Semester 1st Year Courses:

- BCHM 675 (Biophysical Chemistry, 3 credits): core, B- required.
- Two electives (2 or 3 credits each) OR one elective (2 or 3 credits) and BCHM 699. Electives offered in BCHM and CHEM have included Biological Mass Spectrometry, Structural Methods, Protein Folding and Disease, Drug Discovery, Chemical Biology, Practical Approaches to Enzymology, Biological Catalysis, Regulatory Networks.
- BCHM 889A (Seminar, 1 credit)

Students must have completed at least 15 course credits and have at least a 3.0 GPA at the end of the second semester.

Typical Fall Semester 2nd Year Courses:

- One elective (2-3 credits), if only one elective was taken in the spring of the 1st year.
- BCHM 898 (Pre-Candidacy Research, 2 credits)

III. Points of information on courses and scheduling:

- a. Pre-candidacy students on Teaching Assistantships are required to register for up to 10 credits of courses and seminars each semester.
- b. Pre-candidacy students on Research Assistantships are required to register for 2 credits of BCHM 898 (Pre-Candidacy Research) each semester if they are not taking classes.
- c. Post-candidacy students will be registered automatically by the Graduate School for 6 credits of BCHM 899 (Post-Candidacy Research) each semester.
- d. In some cases a student is asked to take undergraduate level Biochemistry (BCHM 461, 462 or 465) or Physical Chemistry (CHEM 481). The impact of this on selection of other courses in the first year will be considered on a case-by-case basis. 400-level BCHM courses do not count toward the 21-credit course requirement.
- e. Entering students are advised about course selection by faculty in the Biochemistry group during graduate student orientation. Continuing students select graduate courses after consultation with their Ph.D. advisors and dissertation advisory committees.
- f. Entering students who have performed graduate-level studies at other institutions may request a waiver of graduate course requirements. Students should submit requests for waivers to the Biochemistry Graduate Program Director.

IV. Laboratory Rotation and Research Advisor Selection Guidelines:

- a. Incoming students will do three laboratory rotations of about 7-8 weeks each, beginning at the start of the fall semester and ending in February of the spring semester. Specific dates will be determined at the beginning of the fall semester.
- b. Shortly before the first semester begins, there will be an afternoon/evening of research presentations to introduce the students to biochemical research in the department.
- c. Each student will then be asked to rank five professors with whom they would like to do rotations. The biochemistry faculty will assign each student to three rotations from the list.
- d. Students are welcome but are not required to discuss research opportunities with other faculty members besides those with whom the student rotates.
- e. At the end of the third rotation each student will submit a ranked list of three desired research advisors, which may include laboratories that were not among the rotation labs.
- f. Each student will be notified of the assignment of his/her advisor about one week after the choices are submitted. The student must then meet with the advisor to schedule the first day of work in the laboratory.

V. Advancement to Candidacy, Seminar, Independent Research Aim, and Dissertation Defense.

Note: These brief descriptions are not exhaustive. If a student's circumstances require changing the timing of any of these steps, this will be handled on a case-by-case basis. Changes must be approved in advance by the student's research advisor and the Director of the Biochemistry Graduate Program.

At all times, students must maintain reasonable progress toward the degree. This does not mean that experiments must always succeed, but it does mean that you must continue to make an effort toward successful completion of the Ph.D. It is your advisor's and your committee's responsibility to make sure that you are pursuing a reasonable path, but it is your responsibility to help choose the path and to move along it purposefully!

- a. Students select a dissertation advisory committee by October 15 of the second year. The dissertation advisory committee is made up of four Biochemistry or Chemistry faculty members. No more than one of the four can be an Affiliate faculty member. The committee must also include a Dean's representative from outside the Department. The Dean's rep is required only at the dissertation defense but must be notified of earlier meetings and may choose to participate at any time.
- b. Students take candidacy examinations by the end of May of the second year. The exam is an oral defense of a written research proposal describing the student's Ph.D. work. The oral exam also addresses general biochemistry knowledge. The student's dissertation advisory committee conducts the exam. It is the student's responsibility to contact the committee and to arrange the time and place of the examination. More detail will be provided to second-year students.
- c. The student will meet annually with his/her dissertation advisory committee, at the qualifying exam and in subsequent years until the dissertation defense. These meetings are intended to ensure that students make adequate progress toward the Ph.D. For each of the post-candidacy meetings, the student should prepare a 3-5 page written summary and a 10-15 minute PowerPoint presentation of research progress and future directions.
- d. Students present a formal departmental literature review seminar in their fourth year. The seminar is on an area of current interest in biochemistry, not related to the student's or the student's advisor's own work.
- e. Students prepare an independent research aim (IA) during the fourth year. This is a description of a research question and experiments to address that question. The aim is in the area of the student's research topic and is developed by the student without input from the research advisor. The student presents this aim to their dissertation committee as a short written document and defends it before the committee during the annual committee meeting in the fourth year.
- f. Students typically defend their Ph.D. dissertation during or after their fifth year in the program.

August, 2017