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. The preparation and defense of research proposals is integral to the training. Effective communication of results is essential to scientific research.

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 +'s and −'s are considered when GPAs are calculated (see: [http://apps.gradschool.umd.edu/catalog/academic_record.htm](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 and an independent research proposal in an area unrelated to the student’s or research advisor’s own work.
   e. 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 671, 661/662, and 675): at least a B− must be attained in each of the four courses. If a student receives a C in one of these courses, the course must be repeated. 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 Tuesday at 11 am Biochemistry seminars 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 671 (Protein Chemistry, 3 credits): core, at least B− required
- BCHM 661/662 (Nucleic Acids, 2+2 credits): core, at least B− required in each
- BCHM 699 (Laboratory Rotations, 2 credits): required. Graded Sat/Unsat
- 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.
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- Two electives (2 or 3 credits each) OR one elective (2 or 3 credits) and BCHM 699. Electives offered in BCHM and CHEM include Regulatory Networks, Biological Mass Spectrometry, Structural Methods, Practical Approaches to Enzymology, Biological Catalysis.
- BCHM 889A (Seminar, 1 credit)

Students must have completed 15 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 (Research)

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 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 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 through the Biochemistry group. Students should submit requests for waivers to the Biochemistry Graduate Program Director.

IV. Laboratory Rotation and Research Advisor Selection Guidelines:

a. 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.
b. 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.
c. 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.
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.

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.
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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 independent research proposal is done in the fourth year. The student presents a formal departmental literature review seminar on an area of current interest in biochemistry, not related to her/his own work or his/her research advisor’s current work. The student then prepares an independent research proposal in the area and defends it before the dissertation advisory committee. The proposal concerns what the student would do as a postdoc in a lab of the student’s choice in the field. It is the student’s responsibility to schedule the proposal defense within 4 weeks after the seminar. More detail will be provided to fourth-year students.

d. The student will meet annually with his/her dissertation advisory committee - at the qualifying exam, once during the third year, once in the fourth year for the independent proposal defense, and in subsequent years until the dissertation defense. These meetings are intended to ensure that adequate progress is being made toward the Ph.D. For each of the post-candidacy meetings, including the independent proposal defense, the student should prepare a 3-5 page written summary and a 10-15 minute PowerPoint presentation of research progress and future directions. Students typically defend their Ph.D. dissertation during or after their fifth year in the program.

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