The Pharmacology Graduate Group (PGG) at the University of Pennsylvania is a collaborative and interdisciplinary Ph.D. program that brings together over 95 faculty from 25 academic departments in the Schools of Arts and Sciences, Dental Medicine, Engineering, Medicine, and Veterinary Medicine at the University of Pennsylvania and in the associated Children's Hospital of Philadelphia. The PGG is part of an umbrella organization called Biomedical Graduate Studies (BGS), which provides financial support and administrative oversight.

Coursework: Every PGG student is required to take four Core courses that introduce the broad basis of modern pharmacology:
1. Cell Biology (Fall, Year 1)
2. Fundamentals of Pharmacology (Fall, Year 1)
3. Biological Data Analysis (Spring, Year 1)
4. Medical Pharmacology (Fall, Year 2)
5. Medical Physiology (Fall, Year 2)

The first 1.5-2 years of study are devoted to classes and laboratory rotations. For most students, this period begins with the Fall semester of the first year and ends with the Spring semester of the second year upon completion of the Candidacy (qualifying) examination.

A total of 20 credit units are required prior to officially beginning thesis research; students take 4 credits each semester. Most classes are worth one credit unit; exceptions are Medical Pharmacology (PHRM 600) and the laboratory rotations. PGG students also take 1–3 elective courses, chosen from all relevant, graduate-level courses offered across campus; one elective must be a “topics” course involving discussion of primary literature. Courses offered by other departments or programs can be taken with permission from the Academic Advising and Curriculum Chair.

Laboratory Rotations: Students complete three rotations during their first and second years in the program. Each rotation is chosen by the student, under the guidance of the Academic Review Committee. Rotations provide students with opportunities to learn a wide range of modern laboratory techniques and gain first-hand experiences that will aid in the selection of a thesis laboratory. Lab rotations are graded and end with a peer reviewed oral presentation.

Candidacy Exam: The Exam taken by PhD students in the spring of their second year, consists of a written Proposal (in the format of an NRSA application) and an oral Defense. Both must reflect a substantial depth of knowledge in the topics covered by the proposed thesis research and an understanding of the broader significance of the work. Preparation includes a Candidacy Exam Workshop, a 10-session scientific writing/proposal development course run by experienced faculty, with input from past students and the Chair of both the PGG and the Chair of the Department of Systems Pharmacology and Translational Therapeutics (SPATT).

Seminars and retreats: All students attend a weekly Pharmacology year-long seminar series sponsored by SPATT. Fall features outside speakers and Spring PGG graduate students. While all graduate students present their work in informal lab meeting settings, the Spring Student Seminar series forces them to present their work in a manner that is understandable and interesting to those outside their research “comfort zone”. Students are also encouraged to attend other relevant seminars throughout the University. Students participate in retreats occurring throughout the academic year, including an annual student run Symposium.

Journal clubs: All students participate in the Pharmacology Journal Club. Third-year students organize the assignment of topics and each student gives a presentation at least once per semester.

Research and Dissertation. The most important element of the Ph.D. is the generation of a body of original research, completed during the research phase. Students work with their Thesis Advisor and the student-selected Thesis Committee toward the execution of original research. The PGG expects at least one to two first authored manuscripts towards completion of the Ph.D. thesis; however, the thesis committee ultimately
determines whether the student has met this requirement. An oral defense of the document, to the Thesis Committee and an additional outside judge, completes the Ph.D.

The average (median) time to degree in our program over the past 10 years is 5.5 years but can vary for a program as large as ours (currently 65 students): the interquartile range for the past 10 years is 5.3 – 6.9 years.

\textbf{This F31 applicant (INSERT NAME HERE) is currently a (INSERT YEAR HERE) year student in the program. Thus, HE/SHE has completed ... indicate what courses you have completed and any other educational opportunities/training opportunities ...}

\textbf{Progress:} Formally monitoring and evaluation via three primary mechanisms:

1. The Academic Review Committee (ARC) provides advising, monitoring, and evaluation of all students in their first and second years. The ARC consists of five faculty who meet with students individually, twice a year. The ARC reviews and addresses any concerns from the student’s performance from the previous semester and helps finalize upcoming plans, including coursework, laboratory rotations, and the dissertation. The student is required to provide and be prepared to discuss an updated Individual Development Plan (IDP) which includes two distinct sections: i) “Skills and Motivations,” which helps the ARC get to know the student better, and ii) “Plans/Goals for the Coming Year,” which includes written lists of specific courses and laboratory rotations that are planned. Additionally, first and second year students are assigned to one faculty member of the ARC, who serves as their individual advisor. The completed form is reviewed by the PGG Chair and ARC Chair. The ARC also reviews the overall performance of all junior and senior PGG students on a yearly basis and is available to consult on any other academic-related issues for dissertation-level students.

2. The Candidacy Exam evaluates and provides feedback for students as they transition to their Thesis work. Feedback is provided via a written evaluation of both the Written Proposal and Defense, which is immediately shared with the student. Possible outcomes are i) Unconditional pass, allowing the student to begin his or her Thesis work; ii) Conditional pass, which is assigned if the Committee feels that the student would benefit by, for example, re-writing and/or re-defending part or all aspects of the proposal, which typically must be completed within 1–3 months following the initial Exam; or iii) Fail, in which case the student is told why in the most specific terms possible and is a candidate for dismissal from the PGG. The PGG and ARC Chairs review all of these evaluations and provide additional feedback, as needed, including possible dismissal following failed Exams.

3. The Thesis Committee meets with Thesis-level students every 6–12 months. At each meeting, the student is required to provide: i) a written progress report describing current progress and future plans; ii) a copy of the previous Thesis Committee Report, reminding the Committee of their progress; iii) organized, well-managed lab notebooks used since the previous meeting; iv) an up-to-date copy of the student’s CV; and v) an IDP, that includes sections on “Skills and Motivations and Career Planning,” “Achievements and Plans/Goals,” and “Skills to Improve.” The IDP and a Thesis Committee Report, which is filled out by the Committee Chair and shared with the student at the end of the meeting which is reviewed annually by the PGG and ARC Chairs, who provide additional feedback and guidance as necessary.

\textbf{Career Guidance:}
A recent supplement to the Pharmacology Pre-doctoral Training Grant supports students in years 1-3 (T32-GM008076) has allowed us to develop a Career Opportunities Website and seminar series. We believe strongly that our training mission is fully compatible with a variety of career outcomes, but that we need to facilitate exposure of trainees to skills that are valued outside of academic research and help identify career options. We have developed workshops that focus on specific skill sets related to communication and leadership that are of particular value outside of academic research.

Themes of the series include Professionalism, including e-mail etiquette and time management and Oral Presentations. Our existing curriculum has numerous mechanisms for training our students to give oral presentations in traditional, academic settings, including presenting posters, talks, and journal clubs.