Pharmacology Graduate Program Handbook

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The Pharmacology Graduate Program

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Pharmacology at Yale University has a rich history of pre-eminence in drug discovery. Indeed, the first cancer chemotherapy clinical trials were conducted in the Department of Pharmacology here at Yale by Goodman and Gilman. Today, research in Pharmacology encompasses a broad range of fields that are both interdisciplinary and interdepartmental. The central focus remains to understand and treat human diseases.

The mission of the Pharmacology Graduate Program is to prepare students for careers as independent investigators, scientists, scholars, and in other science-related pursuits. Working closely with the Department of Pharmacology, chaired by Dr. Mark Lemmon, the program strives to create an inviting academic environment with an institutional culture of inclusivity that values and respects the unique and diverse characteristics of every individual. The richness of our program is sustained by recruiting and retaining trainees, staff, and faculty from diverse backgrounds and talents.

Research areas in the Pharmacology Program include drug discovery, neuroscience, metabolism, signal transduction, infectious diseases and structural biology, with a wide range of laboratories conducting research to choose from (see faculty listing). The single most important decision made by a graduate student is the selection of a laboratory in which to conduct their Ph.D. research under the guidance of their dissertation advisor. The best way to assess and choose a laboratory that is the best fit for you is to carry out "rotations" in at least three laboratories. The Directors of Graduate Studies (DGS), advanced students and other faculty are valuable resources in guiding the selection of rotations and ultimately your dissertation laboratory.

Admissions & Path to Pharmacology

To enter the Pharmacology Graduate Program, students apply to the Yale Combined Program in Biological and Biomedical Sciences (BBS) and will most likely select one of two interest-based tracks, in Translational, Molecular Medicine, Pharmacology and Physiology (TMMPP) or Biochemistry, Quantitative Biology, Biophysics and Structural Biology (BQBS). A strong background in basic biological sciences is recommended for admission though either of these tracks, with full details on the BBS website. After successful completion of year one within their selected track, taking course work and performing three laboratory rotations, all BBS students select a dissertation laboratory to join. This marks the passage of a student from their BBS track to their academic Graduate Program, which will typically be the Program most closely associated with the primary Department of their dissertation advisor. Selection of the dissertation laboratory must be approved by that Program's DGS and this signifies acceptance into the Graduate Program.

Program Overview

The field of Pharmacology encompasses many disciplines. Flexibility in the Pharmacology Graduate Program permits students to concentrate in the areas of their particular interest. Essential elements of the program are summarized below, and expanded as necessary in subsequent sections. A summary timeline can be found below.

Program Requirements

I. Course Requirements

Students are required to take at least five graded courses, plus at least three laboratory rotations.

- All students must take a seminar course. For those entering from TMMPP this will be the two-semester "Seminar in Molecular Medicine, Pharmacology and Physiology" (PHAR 501a and PHAR 502b). Those entering from BQBS can fulfill the seminar course requirement with "Methods & Logic in Molecular Biology" (MB&B 730a). Equivalent courses from other programs are accepted with DGS approval.
- Other required courses are selected based on the student's interest and must include at least one of the following core courses: "Molecular Mechanisms of Drug Actions" (PHAR 504a), "Principles of Signal Transduction" (PHAR 528b), "Structural Biology and Drug Discovery" (PHAR 529b), "Macromolecular Structure and Function" (MB&B 720a). A description of core and other Pharmacology courses can be found below. Other BBS courses may be accepted as the core course with DGS approval.
- Students are required to complete three laboratory rotations during their first year (PHAR 506 or equivalent).

Table 1: Typical 1st year curriculum

Seminar (varies by track)	**One** of the four core courses	**Two or three** elective courses. Common electives are listed. Any BBS course is accepted.	At least **three** laboratory rotations
TMMPP: PHAR 501a/502b BQBS: MB&B 730a Other: Consult DGS	PHAR 504a PHAR 528b PHAR 529b MB&B 720a	Additional core courses; PHAR 538a; PHAR/C&MP 550a; PATH 690a; MB&B 635a MB&B 752b; PHAR/C&MP 560b	PHAR 506 or equivalent

II. Honors Requirements

The Graduate School of Arts and Sciences (GSAS) requires students to obtain a grade of Honors in at least two of the courses that they take. Honors for laboratory rotations cannot be used toward this requirement. Students must meet this Honors requirement prior to being admitted to candidacy (end of the third year) and must maintain an overall High Pass average (see GSAS grading system). A grade of Honors or High Pass is required for each of the selected core courses. Student progress toward these goals is reviewed by the DGS at the end of the second and each subsequent semester.

III. Responsible Conduct of Research Training

Prior to registering for their second year of study, students must successfully complete PHAR 580, Responsible Conduct of Research, or the equivalent from another program (e.g., MB&B 676). In addition, B&BS 503, RCR Refresher for Senior BBS Students, must be completed by the end of the fourth year. PHAR 580 and B&BS 503 do not count toward the five required courses.

IV. Qualifying Exam (see more details below)

Students are required to pass the qualifying examination by the end of their fourth semester. In preparation for this exam, Pharmacology Graduate Program students must take PHAR 540, Qualifying Exam Prep

Class for Pharmacology, in the spring semester of their second year (this does not count toward the 5-course requirement).

V. Admission to Candidacy (see more details below)

Before the end of their third year, students must have completed all requirements to advance to candidacy for a Ph.D. degree. In addition to course, Honors and qualifying exam requirements listed above, students must have prepared and presented their dissertation prospectus to their dissertation committee by the end of the fall semester.

VI. Dissertation Completion (see more details below)

It is expected that dissertation research will be complete before the end of the sixth year. When a student's original doctoral dissertation research is largely complete, they give an oral presentation to the Pharmacology Program faculty (pre-defense) for approval. Within six months of passing this pre-defense, the student must submit a written dissertation to their Dissertation Committee and the approved external reader from outside Yale. A public Ph.D. dissertation seminar will then be scheduled, followed by a closed examination by the student's Dissertation Committee and the outside examiner. One first-author original research manuscript is required from the dissertation research and must be publicly available through publication or a preprint server (with DOI) prior to the dissertation defense seminar. Manuscripts in which the student shares first authorship (equal contribution) with another person can fulfil this requirement. Once the written dissertation is approved by the Dissertation Committee, it is submitted to the GSAS.

VII. Teaching

An important aspect of graduate training in Pharmacology is the acquisition of teaching skills through participation in teaching courses related the student's scientific interests. These opportunities can be drawn from a diverse menu of lecture, laboratory, and seminar courses given at the undergraduate, graduate, and medical school levels across multiple departments. Ph.D. students are required to participate in two semesters (or the equivalent) of teaching. Students do not teach during their first year. Most students will fulfill this requirement during their third year.

NIH Funded Training Programs and NSF GFRP

All eligible Pharmacology Graduate Program students should apply to the Predoctoral Pharmacology Training Program (PPTP) or one of the other NIH funded (T32) BBS associated NIH training programs. Applications are typically accepted in the spring semester of the first and second years and students should seek advice from their advisor and the DGS on the best program for them.

At the end of the first year, students are also encouraged to consider applying for the National Science Foundation Graduate Research Fellowship (NSF GRFP) and should discuss this with their advisor and the DGS (deadline October of Year 2).

M.D./Ph.D. Integration

M.D./Ph.D. students who enter the Pharmacology Graduate Program must satisfy all the requirements for the Ph.D. with the following modifications: (1) only two of three laboratory rotations are required; (2) some medical school courses can qualify as Graduate School courses as long as the M.D./Ph.D. student

registers for them in OCS (Online Course Selection); and (3) only one term of teaching is required. Current Graduate School courses cannot be used to fulfill any medical school course requirements.

M.D./Ph.D. students typically commence research in their dissertation laboratory in the fall of their third year while also completing additional graduate school coursework requirements. They should complete their qualifying exam (see details below) in the spring semester of their third year. In preparation for the qualifying exam, students should register for and attend PHAR 540, Qualifying Exam Prep Class for Pharmacology in the Spring semester (this does not count toward the 5-course requirement).

Qualifying Examination

During their second year of study, in addition to completing remaining course requirements, all students initiate dissertation research and prepare for their qualifying exam, which must be completed in the Spring semester of their second year. Students are required to prepare a written research proposal based on their prospective dissertation project and to defend it orally before a qualifying exam committee. To help prepare for the examination, students take the Qualifying Exam Prep Course for Pharmacology (PHAR 540), which is required for all Pharmacology students and covers all aspects of how to conceive, write, and defend a grant proposal. This course takes place during the first part of the Spring semester and the curriculum is integrated with the student's preparation for their qualifying exam so that by the end of the course students will have made substantial progress toward completing the written portion of their qualifying exam. After completion of the qualifying exams, the class reconvenes to cover how to turn the qualifying exam proposal into an F31 (or comparable) fellowship application – for which students are strongly encouraged to apply if they are eligible.

During Summer of 1st year and Fall semester of 2nd year:

In consultation with their dissertation advisor, students will decide on prospective dissertation topics, initiate lab research in this area to generate preliminary data and begin to delve into the published literature on this and related topics. A detailed knowledge of the literature will be required to identify key unanswered questions and to develop central hypotheses to be tested in the dissertation work. Students will also be expected to be knowledgeable on the background literature related to their chosen topic at the time of the qualifying exam.

By Feb 1st:

In consultation with the dissertation advisor, students will identify 3 potential members of their qualifying committee. The committee should contain two members of the Pharmacology Program faculty, of which at least one should be a primary faculty member in the Department of Pharmacology. The third member may be from outside the Program, but must have a graduate school appointment. It is anticipated, but not required, that the qualifying committee will become the student's Dissertation Committee. The qualifying committee must be submitted to the qualifying exam coordinator (David Calderwood david.calderwood@yale.edu) for approval.

By March 1st:

Students should provide their exam committee and the qualifying exam coordinator a brief Specific Aims summary (1-page maximum) outlining the proposal title, the hypothesis to be tested, why it is important,

and how it will be addressed. These Specific Aims will have been presented and discussed in PHAR 540, Qualifying Exam Prep Class for Pharmacology prior to March 1st.

Prior to March 1st, students should have set a date for the in-person oral exam to be held in late March or April. This is attended by the student, all three committee members plus the exam coordinator. Dissertation advisors are **not** present during the exam. The graduate Registrar can help with reserving a room if needed. Two hours should be reserved for completion of the exam.

At least 1 week prior to the oral exam:

Students should complete their written proposal and provide it in pdf format to the exam committee and to the exam coordinator. If the written proposal is not satisfactory, the committee can postpone the exam.

Role of the Dissertation Advisor

The student is responsible for conceiving, writing, and defending the proposal. The original idea for the thesis project may, however, come from the advisor, and the advisor is expected to provide ongoing advice and constructive feedback as the student develops their proposal. In this way, and through their participation in PHAR 540, Qualifying Exam Prep Class for Pharmacology, the student will learn how to write a compelling research proposal. With this in mind, the student should allow sufficient time for several rounds of revision in response to advisor suggestions prior to submission of the proposal. The advisor is expected to have read and approved the final version of the proposal before it is distributed to the qualifying committee. The advisor is not permitted to attend the oral exam.

Written proposal

The qualifying exam written proposal is modeled after a fellowship or grant application to the National Institutes of Health and is designed to test the student's ability to identify important innovative research questions in the context of the existing body of knowledge, to develop appropriate methods and approaches to test these questions, and to convey ideas in a concise written document. PHAR 540, Qualifying Exam Prep Class for Pharmacology takes students through the steps of proposal writing, guiding them in defining a problem of their own and training them in the mechanics of writing and editing. The qualifying proposal should include a 1-page specific aims section followed by up to 6 pages outlining the background, significance and methods. Figures should be embedded in this text as needed. Formatting should ensure a maximum of 60 lines per page with 0.5-inch margins. Use a standard font, such as Arial 11 point. The proposal should be organized as described below:

1. **Title** *(Up to 200 characters including spaces)*
   Provide a concise description of the proposed project
2. **Specific Aims** *(This section should 1 page)*
   Briefly describe the subject of your proposed research, and the major unanswered questions you hope to address. Using a single sentence, state the overall HYPOTHESIS TO BE TESTED. Using one or two sentences, state the overall objective of the proposed research, and how it relates to the hypothesis. Using single sentences, enumerate the Specific Aims. For each aim, use no more than a few sentences to describe how it relates to the hypothesis and describe the approach, rationale, and anticipated results.
3. **Significance** *(This section should be approximately 1-2 pages)*

Give a brief overview of the background leading to the proposal, critically evaluate existing knowledge, and specifically identify the gaps that the project is intended to fill or barriers to progress that the project will address. State concisely the significance of the topic, the importance of the proposed research and how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.

4. **Approach** *(This section should be around 4 pages)*
   Describe the research design and the procedures to be used to accomplish the specific aims of the project. Include how the data will be collected, analyzed, and interpreted. Describe the methodology in enough detail to allow a knowledgeable reviewer to understand what you will do, without providing excessive extraneous information (there is usually no need to list buffer compositions, PCR temperatures, oligonucleotide sequences, etc.). It is important to discuss potential difficulties and limitations of the proposed procedures and to describe alternative approaches to achieve the aims. **Preliminary data are not required** but, if available, you should include any data that you have obtained which establish the feasibility of the proposed studies and support your ability to perform the work.
5. **Literature Cited** *(Not included in page limit; use whatever space is needed)*
   Each reference must include the names of all authors, title, book or journal, volume number, page numbers, and year of publication for all cited works. Published preprints can be included in citations. The reference should be limited to relevant and current literature. There is no page limit, but it is important to be concise and to select only those literature references pertinent to the proposed research.

The Oral Exam

The oral exam typically lasts 2 hours. At the beginning of the exam, the student will be asked to leave the room so that the committee can briefly discuss the written proposal. The student will then proceed with a presentation of the proposal, using visual aids. Students should prepare a set of slides to summarize the proposal in about 20 minutes (without interruption). The student should be prepared to be stopped for questions during this presentation. Students may have additional slides/material to present beyond the initial 20-minute presentation that can be used to address anticipated committee questions.

In preparation for the oral exam, building on lessons learned in PHAR 540, Qualifying Exam Prep Class for Pharmacology, students should think of criticisms that external reviewers might raise and decide how to overcome them. The kinds of questions asked after rotation talks and RIP talks can provide a guide. Students should be prepared to present the possible outcomes of their experiments, how they may be interpreted, and why the selected strategy is better than alternative approaches. One effective way to organize your summary talk is to introduce a list of specific questions to be answered and then present lines of experimentation that will address each question. It is strongly advised that, prior to the oral exam, students present a practice talk to a group of experienced graduate students/postdocs or other group members. Students should review areas of basic pharmacology needed to defend proposed experiments (e.g., enzyme kinetics, ligand binding theory, cell regulation, hormone/receptor action, molecular biology, etc.).

At the conclusion of the presentation and discussion, the student will again leave the room for the committee to discuss. The committee will decide whether the student has fulfilled the requirements to pass. It is not uncommon for the committee to award a conditional pass that may require that the student re-write some

part of the proposal and/or repeat the oral exam after addressing some deficiencies. The goal of this is educational and not punitive, in cases where gaps in key knowledge that will be useful for further studies are identified.

In the unlikely event that that student does not pass the qualifying exam, the student will discuss with the DGS options to retake or paths to obtaining a terminal master's degree.

Criteria for Evaluation of the Qualifying Exam

- Does the student have a sound understanding of the Scientific Method?
- Can the student formulate a testable hypothesis?
- Can the student test the hypothesis with controlled experiments, collect, analyze and interpret data using the principles of statistics?
- Does the student have the creative ability to recognize important problems in pharmacology and to develop an original research plan that poses specific questions to address them?
- Has the student acquired an ability to search, read and critically evaluate the primary research literature?
- Can the student design experiments and propose the use of appropriate experimental methodology?
- Is the student developing the ability to communicate effectively with other scientists?
- Can the student write a cogent and coherent research proposal?
- Can the student orally present ideas and complex information to an audience and answer criticisms of those ideas?

Applying for External Fellowships

All Pharmacology Program students are strongly encouraged to apply for external fellowships. PHAR 540, Qualifying Exam Prep Class for Pharmacology will regroup once all students have completed their qualifying exam to assist student in preparing for submission of an NIH NRSA if they are eligible (F31 or F30 for M.D./Ph.D.; Deadlines in August and December). This will include discussion of all required elements of the applications. Students are also encouraged to consider other fellowships, especially those not eligible for NIH funding (e.g. international students). The American Heart Association is one such opportunity (deadline in September). Additional opportunities will be discussed during PHAR 540, Qualifying Exam Prep Class for Pharmacology.

Prospectus and Admission to Candidacy

Following their qualifying exam, students return to full-time dissertation research. There remain several important steps to complete before a student can become a candidate for the Ph.D. degree, and these must be accomplished by the end of the spring semester of the third year.

- The student will form a Dissertation Committee. This Committee should contain two members of the Pharmacology Program faculty, at least one of which should be a primary member of the Department of Pharmacology. The third member may be from outside the Program, but must have a Yale graduate school appointment. It is anticipated, but not required, that the qualifying committee will become the

student's Dissertation Committee. All students must have the membership of their Dissertation Committee approved by the DGS by October 15. This is particularly important where the Dissertation Committee differs from qualifying exam committee. The dissertation advisor is not a member of this committee, but it is expected that the advisor will attend all committee meetings. The Dissertation Committee will assign a chair, who must be a primary member of the Department of Pharmacology (not the dissertation advisor). **The first meeting must occur before the end of the fall semester**. It is recommended to schedule the meeting well in advance and that all meetings be on the calendar by the end of October. The graduate Registrar must be informed of the date and can help with reserving a room if needed. One-and-a-half hours should be reserved for this meeting.

- The student will prepare a written dissertation prospectus, consisting of a summary of background information in the field of interest, the specific questions to be answered, a rationale for choosing those questions, and a research plan for addressing those questions. Typically, this is an update of the qualifying exam proposal that includes progress made since the exam or changes made based on initial dissertation work. The dissertation prospectus is present to the Dissertation Committee at the first meeting in the fall semester
- All course work must have been completed with at least two Honors grades (see Course Requirements)

First Committee Meeting/Prospectus

The first Dissertation Committee Meeting consists of presentation and approval of the Dissertation Prospectus, which has the format of select components of an NIH NRSA (F31): the Specific Aims, Research Strategy, and Bibliography & References Cited. Guidance will have been provided during the latter part of PHAR 540, Qualifying Exam Prep Class for Pharmacology to assist in the transition of the qualifying exam into the F31 format.

The Prospectus will describe the specific questions (e.g. Aims) to be addressed by the student's research, the rationale for these questions, and explanation of why/how various experiments will be performed to address these questions. It is expected that the Prospectus will contain more preliminary data than required for the qualifying exam and will have been refined to reflect the current expectations for the student's dissertation project.

The student should send the written Prospectus to their Dissertation Committee at least 1 week before the committee meeting.

Prior to the first Dissertation Committee Meeting, the student must also fill out the Career Development Plan (MyIDP) with a list of objectives (see IDP section below).

At the beginning of the meeting, the student will be asked to leave the room so the Committee can discuss the Prospectus and progress with the dissertation advisor. The student may request to meet with the Committee in the absence of the dissertation advisor before the start of the presentation (the student will always meet with the Committee in the absence of the dissertation advisor at the end of the meeting).

The student will proceed with a presentation of the Prospectus, with visual aids (student should plan ~30 minutes of uninterrupted presentation). The Committee will interrupt to ask questions through the presentation and the student may have additional slides as backup for details that are not covered in the 30-minute presentation. At the conclusion of the presentation and discussion, the student will again leave the

room for the faculty to discuss and determine whether the Prospectus is suitable for the student to be admitted to candidacy. The chair of the Dissertation Committee (not the dissertation advisor) will complete the online Committee form, also available on the Pharmacology website. It is the responsibility of the student to attach a link to this form to the meeting invitation. The student will be brought back in to go over feedback from the Committee. At the end of the meeting the dissertation advisor will leave first so the student can privately discuss any additional questions with the Committee.

The committee may recommend modifications to the Prospectus and will provide guidance on what revisions are required. The student will have the opportunity to update the Prospectus and submit it to the Committee for reevaluation at a future meeting at a time determined by the Committee. Revisions must be complete, and the Prospectus approved by the end of March.

During a Department of Pharmacology faculty meeting before the end of the Spring Semester, the DGS will present all students in the cohort and the faculty will vote whether to approve advancing each student to become a candidate for the Ph.D. degree. The Registrar will then complete an Admission to Candidacy Form and submit to the GSAS.

Teaching Requirements

In accordance with the BBS program, Ph.D. students are expected to participate in two semesters (or the equivalent) as a Teaching Fellow. Teaching assignments in fulfillment of the requirement must be approved in advance by the DGS. Pharmacology Graduate Program Students do not teach in Year 1.

All graduate students are required to serve as teaching fellows for two courses at the TF-10 level (up to 10 hours per week) or one course at the TF-20 level (up to 20 hours per week). These can be chosen from numerous lectures, laboratory, and seminar courses offered at the undergraduate, graduate, or medical school levels. Please see the GSAS website for details on the different positions and types. Teaching Fellow Program | Yale Graduate School of Arts and Sciences

a) Students generally fulfill this requirement by the 3rd year.

b) There are five TF-10 level positions available for Pharmacology courses (two for PHAR 504; one for PHAR 528 and two for PHAR 529). Pharmacology students are given priority to serve as TFs for these courses. The assignment of students as TFs for these courses is managed by the Pharmacology Registrar in consultation with the course directors and DGS. Requests to serve as a TF for these courses should be directed to the Registrar prior to the end of June for assignments for the following academic year. Students will be notified so they have ample time to secure a TF position outside Pharmacology.

c) If students have a specific course outside Pharmacology that they are interested to participate in, they should contact the course professor well ahead of the course beginning and TF assignments (see section d below).

d) In the early summer, the BBS office will notify all graduate students of the courses in which teaching fellows are needed in the upcoming academic year. Students should indicate their interest in such positions and their preference for specific courses by submitting the BBS teaching survey that is sent at that time.

e) M.D./Ph.D. students are only required to complete one TF-10 level course.

f) Prior to the first semester of teaching, each student must attend Teaching @ Yale Day (T@YD). T@YD sessions are held prior to the start of each semester. Students are also encouraged to take one or more of the short teaching courses and workshops offered by the Center for Teaching and Learning.

g) Students may elect to teach beyond the two-semester requirement. Extra teaching should not take time away from dissertation research. Permission must be obtained from both the dissertation advisor and the DGS – students should not make any commitment to a course director or Department until these approvals are given. Stipends for additional teaching are determined by the University.

h) Priority for assignments is given to students needing to fulfill their teaching fellow requirements. Students are not allowed to be a teaching fellow for 2 full-term courses in one semester.

Responsibilities of a Ph.D. Candidate

Dissertation Committee Meetings

During the candidacy phase, Dissertation Committee meetings are required every 6-9 months, at the discretion of the Committee, and must be held at least every 6 months for students in years 5 and above. The Committee can aid in interpreting the results, prioritizing experiments, and assessing whether the project is on track.

Students are responsible for scheduling these meetings. The advisor and all members of the Committee should be in attendance. The Registrar will ensure that meetings occur at the stipulated intervals, and will assist with finding a room, if required. Once a meeting is scheduled, the student must advise the Registrar of the date.

One week before the scheduled meeting, the student should submit a brief, 1-2 page, written report to their Dissertation Committee – this should restate specific aims, describe research progress since the prior meeting, and outline the student's future research plans.

If a manuscript is in preparation, students are encouraged to include an outline of the manuscript in their written report. The outline could include:

- A summary of the manuscript's main points
- A list of subtitled sections
- A list of figures and tables, with brief descriptions of the data to be included in each
- It should be noted which experiments have been completed and which remain to be done

The student may share a draft or preprint of a manuscript but should also provide an outline with the elements described above.

As for the first committee meeting, the student will be asked to leave the room at the start of the meeting so the Committee can get a report from the dissertation advisor. The student should then give a brief presentation (20-30 minutes), covering the data acquired since the last committee meeting and the plans for the next 6-9 months. At the conclusion of the presentation and discussion, the student will again leave the room for the faculty to discuss and then complete the online Committee form. The student will be brought back in to go over feedback from the Committee. At the end of the meeting the dissertation advisor will leave first so the student can privately discuss any concerns with the Committee. In addition, at the

request of the student or the Committee, the student and Committee can meet in the absence of the advisor before the meeting.

If the student hopes to defend within the next 6 months, and prior to scheduling the pre-defense, a committee meeting should be scheduled at this the student should bring an outline of the dissertation. This should include:

- A list of chapters with a brief description of the information to be contained in each
- Publications and/or papers in preparation should be mentioned.

Career development should be discussed at every Dissertation Committee meeting (see IDP below)

Dissertation Progress Report (DPR)

Following admission to candidacy, all students complete an annual Dissertation Progress Report. This form gathers information on student progress, their plans and expected timeline for completion of the dissertation, and other issues related to the student's professional development. Upon completion of the student section of this report, the advisor is notified and provides their assessment. Finally, the report passes to the DGS for assessment and approval. The initial DPR will be created in April/May of the third year and should be submitted shortly thereafter. Students must then submit a new DPR after April 1 of each subsequent year until they graduate. The Registrar will monitor DPR submission to ensure timely completion by student, advisor and DGS.

Students who fail to meet departmental or Graduate School requirements by the designated deadlines, including submission of the annual DPR, can be administratively withdrawn from the Program.

Individual Development Plan

The American Association for the Advancement of Science (AAAS) joined forces with the Federation of American Societies for Experimental Biology (FASEB) and experts from several Universities to create a unique, web-based career-planning tool tailored to meet the needs of Ph.D. students in the sciences. MyIDP provides:

- Exercises to help you examine your skills, interests, and values.
- A list of 20 scientific career paths with a prediction of which ones best fit your skills and interests.
- A tool for setting strategic goals for the coming year, with optional reminders to keep you on track.
- Articles and resources to guide you through the process.

Students define their career goals and develop a plan on how to achieve them, working with their mentor, dissertation advisor, DGS, and graduate program to align expectations to achieve these goals.

a) Prior to the first committee meeting, students enter the initial information to design their professional and career development trajectory in myIDP.

b) Students are required to update their plan every 6 months to meet career objectives with a set of actions they will take to meet these checkpoints.

c) Students are encouraged to discuss their plan with their career mentor(s) within a month of large changes or steps, and at least every 6 months regardless of the student's career stage. If the student's

dissertation advisor is not the career mentor, then the student should, in addition, meet with the dissertation advisor at least every 6 months to discuss current developments and a timeline.

d) During the 4th year of study, the career mentor will discuss specific careers and job opportunities with the student regardless of when the student is projected to graduate. This is to help align the student's career development progress in a hypothetical construct with the current demands and requirements for entry into the desired field of employment. This may include looking at current job listings while meeting with the student to discuss current strengths and deficits, then discussing how the student can overcome these deficits before graduation to become an excellent job candidate.

e) Additional career development resources are available through the Yale Office of Career Strategy.

Students will receive an email reminding them of the deadline to update their IDP. Following completion of the report by the student, their dissertations advisor, in consultation with any additional career mentors, will complete their portion of the report and it will be sent to the DGS who will review. These reports remain on file at GSAS.

Additional Activities

Research In Progress (RIP) Talks

Beginning in their third year, students are required to present annually at the Research in Progress (RIP) talks. These are biweekly seminars held during the academic year typically consisting of two 20-minute presentations with questions. Speakers are drawn from the graduate students in the Pharmacology Graduate Program, graduate students funded by the Predoctoral Training Program in Pharmacology, and other graduate student and postdoctoral researchers in the Department of Pharmacology. The Registrar typically posts the schedule of RIP talks for the coming academic year in mid-August. Attendance at RIP talks is expected.

Presenting at a National or International Conference

An important part of the Graduate Program is to provide all students the opportunity to present their work at a national or international meeting. The William H. Prusoff Award is a competitive award to Pharmacology Graduate students to provide up to $2,500 travel funds to offset the cost to the advisor for a student to attend a meeting. In consultation with their Dissertation Advisor, students should select a conference and submit an abstract. Once the abstract is accepted, the student should apply for the award as described here.

Departmental Seminar Series

The Department of Pharmacology organizes a weekly seminar series on Thursdays at noon. Speakers are selected to encompass broad areas of interest to the Department and Graduate Program. Students are expected to attend all seminars. Speakers have lunch with students following the seminar, offering opportunities for students to discuss the speakers research and career path in more detail in a small informal setting. Students are encouraged to sign up frequently for lunch with the speaker and must attend at least 6 times per year.

Students have the opportunity to invite 1-2 speakers each year in the Departmental Seminar series. All students may nominate a speaker and vote to decide which nominee(s) to invite (nominees must be approved by the DGS). The student invited speaker(s) will be hosted by the nominating student(s). Speakers are typically extremely pleased to be invited by students. Participation in this experience is strongly encouraged.

Dissertation

The Nature and Role of a Doctoral Dissertation

The dissertation should demonstrate a student's mastery of relevant resources and methods and should make an original contribution to understanding in the field.

• **Originality:** The originality of a dissertation may consist in the discovery of significant new information or principles of organization, the achievement of a new synthesis, the development of new methods or hypothesis, and/or the application of established methods to new materials.

The idea for the dissertation need not originate with the student, nor must the line of research followed by the student be exclusively of his or her own design. It is understood that the ideas of faculty advisors will often play a significant role in shaping the dissertation.

• **Collaboration:** It is permissible for students to use research done in collaboration with others as the basis of their dissertations, and more than one student may obtain a Ph.D. by using a body of data derived from a common research project. Such collaboration is normal in Pharmacology dissertations, but each student is expected to write a separate dissertation from an independent perspective in which the student's independent and original contribution to the research are made clear.

Since the dissertation is expected to embody an original contribution to scholarship by a particular individual, multi-authored dissertations are not permissible, and more than one student may not obtain the Ph.D. by using the same dissertation.

• **The use of previously published work:** Previously published work by the student may be used in the dissertation as long as it represents work done after the student was enrolled in the Ph.D. program and has not been used previously to obtain another degree. It is not permissible, however, simply to append offprints or preprints to the dissertation. The previously published research must be rewritten in such a way that it fits logically into the structure of the dissertation. There is no restriction on the kind of previously published research that may be used, but if the results of the research appeared in a multi-authored article, the independent contributions by the author of the dissertation must be made clear.

• **Unity and diversity within the dissertation:** It is normally expected that a dissertation will have a single topic, however broadly defined, and that all parts of the dissertation will be interrelated. This does not mean that sections of the dissertation cannot constitute essentially discrete units, however. Dissertations in the physical and biological sciences often present the results of several independent but related experiments.

• **Dissertation length:** Given the diverse nature of the fields in which dissertations are written and the wide variety of topics that are explored, it is impossible to designate an "ideal length" for a dissertation. Virtually everyone agrees, however, that a long dissertation is not necessarily a better one, and that quality of thought and clarity of exposition, not sheer bulk, are what we value. The dissertation should help the student to get

launched on his or her professional career and should not be a towering obstacle that delays the beginning of that career.

• **Time to completion:** We feel that all students should be able to complete the Ph.D. within six years of entering the BBS Program. Once advanced to candidacy (fall of year 3), it is expected that the student will be preparing to write and defend their thesis within three years (middle of the 6th year of study). The Pharmacology Graduate Program, and the GSAS, recognize that it is not always possible to complete the Ph.D. by the end of the 6th year. Information on extended registration when necessary is described here. The Pharmacology Program requires that the student is registered, and the Dissertation Advisor continues to support the student until the dissertation is complete. Only under exceptional circumstances would the Program permit a student whose full-time registration has lapsed to submit a dissertation.

Pre-Defense

When the student, advisor, and Dissertation Committee agree that the student is ready to write and present the dissertation, the student should contact the Program Registrar and the Director of Graduate Studies to inform them of the decision of the committee and schedule a pre-defense. The pre-defense is an oral presentation to the faculty of the Pharmacology Graduate Program, with no requirement for a written report. The role of the pre-defense is for the Program faculty to view the doctoral work of the student with a "fresh pair of eyes" and give final approval for the student to start writing their dissertation. It is expected that this will occur no later than the middle of the sixth year.

The Registrar will schedule the pre-defense at a time that allows the mentor, at least two members of the Dissertation Committee, and a quorum of Pharmacology faculty to attend. Two hours should be allowed for this meeting, although in many cases the pre-defense will not take this long.

The student should prepare a presentation of about 45 minutes that outlines the story that will comprise the student's dissertation. A crucial component of this presentation is description of the work that will constitute the student's required first-author manuscript. If this work remains unpublished at the time of the pre-defense (which is frequently the case), a timeline for publication must be given. The student should also describe other work that will form part of the Dissertation, including contributions to published work as a co-author and work that may not be published prior to the student's graduation.

At the start of the pre-defense the student will be asked to leave the room and the Dissertation Committee and Advisor will provide a brief report on the student's progress. The student will then present their work with interruption only for essential clarification. Questions and discussion from faculty will follow the presentation, with the goal of providing constructive feedback and guidance for the student's next steps. Following this discussion, the student will again be asked to leave the room while the faculty discuss and vote on whether the student should proceed to write their dissertation at that time.

Selection of Outside Reader

The first task to complete after faculty approval of the pre-defense is selection of the outside reader of the dissertation. The advisor and student should discuss suitable candidates for this outside reader, who will join the final Dissertation Committee. The outside reader should be from outside Yale (with no Yale appointment in the past two years). They must hold a faculty position or be considered otherwise qualified to evaluate the dissertation by the DGS and the Graduate School. The student should not contact prospective outside readers until the reader has been approved by the Director of Graduate Studies. At this

time, the student should provide the Registrar with names and contact information for all members of the committee and the outside reader. The outside reader is expected to attend the defense either in person (if possible) or virtually if location demands. The student should discuss with the Final Dissertation Committee how much time they need to read the dissertation and take this into account when for planning a defense date.

Dissertation Writing

After completing their pre-defense, students should move to ensure timely submission of their first-author manuscript (if necessary) and begin writing their dissertation. Information on the format for the dissertation can be found here.

As outlined above, at least one first-author original research manuscript is required from the dissertation research and must be publicly available through publication or on a preprint server (with DOI) prior to the dissertation defense seminar. Manuscripts in which the student shares first authorship (equal contribution) with another person can fulfil this requirement.

The Pharmacology Graduate Program faculty recognize that some very rare circumstances may make it impossible to produce a first-author paper in a reasonable time. In such cases, this must be discussed with the Dissertation Committee, the DGS and the Pharmacology Program faculty before scheduling the pre-defense. In these exceptional cases, and with approval, the student can proceed to give the pre-defense, presenting their dissertation work essentially as described above. If there is agreement across the faculty that the student has made substantial progress in their project, the faculty can exempt a student from the first-author paper requirement by formal vote, the student may proceed to writing the dissertation and schedule the public dissertation seminar.

The Defense

Within six months of their pre-defense the student must complete dissertation writing and schedule their dissertation defense in consultation with their Final Dissertation Committee and the Registrar. It is the student's responsibility to find and set a date that works for the Final Dissertation Committee and their advisor. In scheduling their dissertation defense, students should consider the GSAS deadlines for each degree dates. To graduate with a May degree, students must notify the Pharmacology Registrar of their intent to submit no later than February 15 and the final dissertation must be submitted to GSAS no later than March 15. For a December degree, the Registrar must be notified no later than September 1 and the dissertation submitted by October 1. Since the committee may require changes to the dissertation based on the closed dissertation exam after the public defense, it is recommended that the defense is scheduled a minimum of **two weeks** before these dates (so by March 1 for a May degree and by September 17 for a December degree).

Table 2: Deadlines to ensure May or December degree conferral

Action	Deadline for May Degree	Deadline for December Degree
Notify Pharmacology Registrar of intent to submit. Provide information for the defense announcement	February 15	September 1
Defense date	No later than March 1	No later than September 17
Submit to GSAS	March 15	October 1

All members of the Committee, including the outside reader, must attend the presentation and the following oral examination period. When the date is determined, the student should reserve a room for the presentation through the Program Registrar and give sufficient information (title of the dissertation) so that announcements can be distributed. Announcements must be distributed by the department at least 2 weeks in advance. The Director of Graduate Studies will attend the exam if possible (but this does not need to be considered for scheduling). As mentioned above, in some cases the outside reader may attend the defense and oral examination virtually.

At the dissertation defense the student will give a public 45-minute oral presentation of the data in the dissertation and the conclusions drawn from the data. This will be followed by a general question period, after which the audience will leave. In the following closed scientific discussion session, the Dissertation Committee and outside reader evaluate whether the student has achieved the standard to be granted a Ph.D. The Committee may request changes to the written dissertation at this time.

When the Committee is satisfied with the dissertation, the student will submit their dissertation via the degree petition page in the Dissertation Progress Reporting and Submission (DPRS) site. Dissertations can be submitted anytime during the academic year, but attention should be paid to deadlines if a specific degree date is desired (see Table 2 above). It is essential that the date on the Title Page is the date that the degree will be conferred (e.g. May or Jun 20XX or December 20XX). This is NOT the date or year the student defended or submitted the dissertation.

Once the dissertation is submitted, the GSAS will solicit formal reader reports. The Pharmacology Program requires that all members of the Final Dissertation Committee are readers. Their details will be entered in the Notification of Readers form. The Dissertation Advisor may not be a reader. It is essential that the final version of the dissertation incorporates all requested changes from the dissertation defense.

Master's Degrees

Master of Science (M.S.)

Students are not admitted for this degree. On a case-by-case basis and subject to faculty vote, students who are not continuing for the Ph.D. may be considered for a terminal M.S. degree if they have successfully completed the course requirements for the Ph.D. degree and fulfill Graduate School of Arts and Sciences (GSAS) requirements. Students who meet this criterion are eligible to petition for the M.S degree. The M.S. degree is not awarded as an *en route* degree.

Master of Philosophy (M. Phil)

Awarded only to students who are continuing for the Ph.D. Students are not admitted for this degree. Students will be automatically petitioned by the university for a M.Phil. after successful completion of the requirements at the end of the third year. No additional action on the part of the student is required.

Program Timeline

Year 1

- Take 1-3 courses each semester
- Complete seminar course(s) based on track requirements
- Complete 3 laboratory rotations
- Select a research lab/dissertation advisor and have this formally approved by the DGS within 2 weeks of the end of your final laboratory rotation
- Initiate research in selected lab and discuss potential dissertation projects with your advisor
- Apply to the PPTP, CBTP or other BBS-associated NIH-funded training program as appropriate.
- Discuss with your advisor whether to apply for an NSF GRF (due in October of Year 2)

Year 2

- Complete additional coursework as required (see Course Requirements)
- Take PHAR 540, Qualifying Exam Prep Class for Pharmacology in the Spring semester
- Select members of your qualifying committee (see Qualifying Exam)
- Complete qualifying exam by the end of April
- Prepare and submit an NRSA F32 fellowship (or equivalent) application (NRSA deadlines: August and December).

Year 3

- Prepare your prospectus and complete initial Individual Development Plan (IDP)
- Submit your Prospectus and hold your first Dissertation Committee meeting during the fall semester
- Committee must complete Committee Form during/after this and all subsequent committee meetings
- Submit external fellowship application as appropriate (discuss with advisor).
- Advance to Candidacy following faculty vote
- Submit first DPR
- Hold a second Dissertation Committee meeting 6-9 months after the first, based on Committees' discretion
- Update the Individual Development Plan (IDP) as required (see IDP section) prior to second (and subsequent) committee meeting
- Complete Teaching Fellows requirements by serving as a Teaching Assistant (TA) in 2 Pharmacology or other program courses within BBS. Submit your choices to the corresponding department Registrar (and CC Pharmacology Registrar) by July each year
- Present your first Research in Progress (RIP) Talk

Years 4 -6

- Continue research on your dissertation project
- Submit (or resubmit) external fellowship application(s) as appropriate (discuss with advisor).

- Continue to hold Dissertation Committee Meetings every 6-9 months during year 4 and thereafter at least every 6 months
- Continue to update the IDP
- Continue to present at RIP Talks
- Complete year four responsible conduct of research (RCR) refresher
- Update DPR annually

Finishing your Ph.D.

- Prepare for your pre-defense
- Submit a first author manuscript
- Write your dissertation
- Defend your dissertation

Throughout Your Ph.D. Career

- Attend Pharmacology Seminar Series
- Regularly attend lunch with the Speakers in the Pharmacology Seminar Series (at least 6 times per academic year)
- Attend RIP Talk Presentations
- Attend student-led Research Chats
- Attend annual Yale Pharmacology Retreat

Pharmacology Graduate Courses

- **PHAR 501/C&MP 629/PTB 629/PATH 679 & PHAR 502/C&MP 630/PATH 680: Seminar in Molecular Medicine, Pharmacology and Physiology.** Course directors: Titus Boggon, Christopher Bunick, Susumu Tomita, Don Nguyen, Yansheng Liu, Hongying Shen, Arnaud Augert, Megan King (501) and Emanuela Bruscia (502). This two-semester seminar course is required for first year students in the TMMPP track. The objectives of this course are to: (1) teach students how to critically evaluate and discuss the scientific literature, (2) learn how to articulate these ideas in a written format that is relevant to grant writing, (3) improve the ability of the students to give oral presentations, and (4) provide students with the opportunity to learn about individual topics from a physiological, pathological, and molecular perspective.

- **PHAR 504 Molecular Mechanisms of Drug Actions.** Course director: Elias Lolis. This course provides fundamental background in core principles of pharmacology, molecular mechanisms of drug action, and key research areas in contemporary pharmacology. Core material includes drug-receptor theory, multiple equilibria and kinetics, pharmacokinetics and drug metabolism, therapeutic drug monitoring, and drug discovery. Specific content on the mechanisms of drug action includes agents to treat inflammatory, autoimmune, infectious, neoplastic, cardiovascular, and pulmonary disease. The course includes a self-study component consisting of video modules produced in collaboration between Yale faculty and Merck that explore the preclinical and clinical phases of drug development.

- **PHAR 528 Principles of Signal Transduction.** Course director: Anton Bennett. The majority of FDA-approved drugs target proteins involved in cell signaling such as G protein-coupled receptors and protein kinases. This course starts with an introduction to the basic principles of intracellular signal transduction and the major classes of signaling molecules. Students will then learn about specific intracellular signaling pathways relevant to a variety of physiological and pathological settings. Finally, students will learn about cutting-edge methods and approaches for analyzing signaling processes, including proteomics, functional genomics, computational modeling, and live cell imaging.

- **PHAR 529/MB&B 529 Structural Biology and Drug Discovery.** Course directors: Ya Ha and Titus Boggon. This course provides a comprehensive introduction to the concepts and practical uses of structural biology and structural biology-related techniques in drug discovery. The first half of the course focuses on techniques used to discover and optimize small molecule and biologic drugs. The second half of the course focuses on drug discovery, particularly for protein kinases. The course includes a practical component, where students conduct hands-on structural biology and biophysical experiments in a laboratory setting, and a field trip to the Yale Center for Molecular Discovery, where the students are introduced to in-house small molecule screening facilities.

- **PHAR 537 Systems Pharmacology and Integrated Therapeutics (SPIT).** Course director: Kathryn Ferguson. This course provides an in-depth experience in drug design, drug discovery, high throughput screening, state-of-the-art proteomics, and target validation. The course is divided into four modules consisting of: 1) Lectures from faculty experts on advanced topics in pharmacology, 2) Panel discussions on principles of drug discovery and development, 3) Workshops providing hands-on experience with cutting-edge instrumentation used in the drug

discovery process, and 4) Case studies in drug development featuring faculty and guest speakers with direct experience in taking a drug from the bench and moving it towards the clinic. This course is required for students in the PPTP.

- **PHAR 538 Pharmacokinetics & Pharmacodynamics in Neuropharmacology.** Course director: Jason Cai. This course provides a historical account of drug discovery and development for psychiatric and neurological diseases and introduces state-of-the-art methods to study the impact of drugs on the nervous system. It provides a scientific foundation in medicinal chemistry, neuroscience, and molecular imaging for students interested in quantitative neuropharmacology. This course also introduces the theoretical basis of advanced imaging technologies (PET, MRI, optogenetics) and their applications in preclinical and clinical neuropharmacology. Classroom sessions include didactic lectures and interactive discussion sections.

- **PHAR 540 Qualifying Exam Prep Class for Pharmacology.** Course directors: Mark Lemmon, Moitrayee Bhattacharyya, and Titus Boggon. The goal of this class is to teach students to conceive, write, and defend a grant proposal. The timing of this half-term course is aligned with the Pharmacology qualifying exam in the Spring term, for which a written research proposal is required. This course takes students through the steps of proposal writing, guiding them in defining a problem of their own and training them in the mechanics of writing. Students learn about the structure and components of fellowship and grant proposals. They engage in "mock study sections", providing written critiques and participating in discussion of sample proposals assigned by the instructors. Students give oral presentations of their specific aims followed by classroom discussion. By mid-March, students will have made substantial progress toward completing the written portion of their qualifying exam. The class will take a break while students complete their oral exams and restart once all exams are complete to discuss how to turn the qualifying exam proposal into an NIH F31 fellowship application, which is also the format for the dissertation prospectus. Open to graduate students only. Priority is given to Pharmacology Graduate Program students.

- **PHAR 550/C&MP 550 Physiological Systems.** Course Directors: W. Mark Saltzman and Stuart Campbell. The course develops a foundation in human physiology by examining the homeostasis of vital parameters within the body, and the biophysical properties of cells, tissues, and organs. Basic concepts in cell and membrane physiology are synthesized through exploring the function of skeletal, smooth, and cardiac muscle. The physical basis of blood flow, mechanisms of vascular exchange, cardiac performance, and regulation of overall circulatory function are discussed. Respiratory physiology explores the mechanics of ventilation, gas diffusion, and acid-base balance. Renal physiology examines the formation and composition of urine and the regulation of electrolyte, fluid, and acid-base balance. Organs of the digestive system are discussed from the perspective of substrate metabolism and energy balance. Hormonal regulation is applied to metabolic control and to calcium, water, and electrolyte balance. The biology of nerve cells is addressed with emphasis on synaptic transmission and simple neuronal circuits within the central nervous system. The special senses are considered in the framework of sensory transduction. Weekly discussion sections provide a forum for in-depth exploration of topics. Graduate students evaluate research findings through literature review and weekly meetings with the instructor.

- **PHAR 560/C&MP 560 Cellular and Molecular Physiology: Molecular Machines in Human Disease**. Course directors: Emile Boulpaep; Peter Takizawa. The course focuses on understanding the processes that transfer molecules across membranes at the cellular, molecular, biophysical, and physiological levels. Students learn about the different classes of molecular machines that mediate membrane transport, generate electrical currents, or perform mechanical displacement. Emphasis is placed on the relationship between the molecular structures of membrane proteins and their individual functions. The interactions among transport proteins in determining the physiological behaviors of cells and tissues are also stressed. Molecular motors are introduced and their mechanical relationship to cell function is explored. Students read papers from the scientific literature that establish the connections between mutations in genes encoding membrane proteins and a wide variety of human genetic diseases.
- **PHAR 580/C&MP 650/PATH 660, The Responsible Conduct of Research.** Course director: Barbara Ehrlich. Required for first year students in the TMMPP track. This course is taught by faculty in the Pharmacology, Pathology, Physiology, and PTB programs and two or three senior graduate students. Each session is based on case studies from primary literature, reviews, and two texts: Francis Macrina's *Scientific Integrity* and Kathy Barker's *At the Bench*. Each week, students submit a reaction paper discussing the reading assignment. Students take turns leading the class discussion. The final assignment consists of a 5-page paper on a hot topic in bioethics.

Pharmacology Graduate Program Faculty

The Faculty Members Primary Departmental affiliation is indicated in parenthesis.

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Graduate Student Organizations

Graduate and Professional Student Senate (GPSS)

GPSS is an elected body representing each of the graduate and professional schools with the mission to foster interactions among students and with key external groups, and to convey the views of students to the University leadership. Graduate and Professional Student senators serve on various University committees, including the Advisory Committee on Investor Responsibility and the Committee on Racial and Ethnic Harassment (full list here). The Life Science departments of the Graduate School are represented by up to six students on GPSS. GPSS manages and meets at The Gryphon, a center dedicated for graduate and professional student use.
Information on the GPSS can be found at: https://www.gpsenate.yale.edu/

The Graduate Student Assembly (GSA)

The GSA is a student-run democratic organization, made up of representatives from each program in the biological and physical sciences, social sciences, and humanities. Its goal is to represent the interests of all Yale graduate students and to bring students' concerns to bear on Graduate School policy decisions. For more information on the GSA and their many programs and resources, visit the web site at http://gsa.yale.edu/.

University Resources

Yale Combined Program in Biological and Biomedical Sciences

Home webpage: https://medicine.yale.edu/bbs/
Diversity at BBS: https://medicine.yale.edu/bbs/diversity/

Yale Graduate School of Arts and Science

You can find general information on Yale graduate programs and policies at the following link: https://gsas.yale.edu/

If you feel your question is not answered or that your problem cannot be or has not been satisfactorily addressed by the track DGS or Registrar, you may choose to contact the GSAS Administrative Deans:

Allegra di Bonaventura, Associate Dean for Academic Support
Matthew Tanico, Assistant Dean for Academic Support and Outreach

Email: gsasadministrativedean@yale.edu

Office for Graduate Student Development and Diversity (OGSDD)

The Office for Graduate Student Development and Diversity works to expand the diversity within the student body and to enhance awareness of diversity issues within the academic community. The Office focuses on and coordinates efforts to recruit and retain students from all backgrounds and experiences at the Yale Graduate School of Arts and Sciences. Michelle Nearon, Associate Dean for Graduate Student

Development and Diversity, works collaboratively with departments and programs to support the needs of students as they pursue graduate study. Associate Dean Nearon advises prospective and current graduate students and serves as the Graduate School's Title IX Coordinator. The OGSDD also runs the Summer Undergraduate Research Fellowship (SURF) Program, the Post-Baccalaureate Research Education Programs (ESI PREP and NIH PREP), Diversity Recruitment Days, Diversity Preview Days, Diversity Orientation Day, and the Transitions: First Year Experience Program. Graduate Student Diversity Fellows are appointed annually to assist the Office in developing and implementing their many programs and initiatives to cultivate awareness, appreciation, and knowledge of self and others. Through mentoring, the Peer-to-Peer Advising Program, and the Social Justice Discussion Seminars, topics such as discrimination, bias, imposter syndrome, and stereotypes are discussed to promote constructive dialogue among students, faculty, and staff. If you have any questions, please contact Michelle Nearon, Associate Dean for Graduate Student Development and Diversity, directly via email at *michelle.nearon@yale.edu* or (203) 436-1301.

The McDougal Graduate Student Center

The McDougal Graduate Student Center offers a place to network with fellow graduate students from across the University. For more information about program and events offered through the center visit the website or contact the McDougal Graduate Student Center office at (203) 432-BLUE or at *mcdougal.center@yale.edu.*

The Yale Poorvu Center for Teaching and Learning (CTL)

The Yale Poorvu Center for Teaching and Learning (CTL) supports graduate students, postdocs, and professional school students in their teaching development, from first-time teachers to seasoned instructors refining their practice. Located in Sterling Library, the Graduate Teaching Program of the CTL provides a space for instructors to reflect on their teaching, get feedback, and experiment with new ways to reach students.

a. Teaching at Yale Day (T@YD)

Orientation to teaching in Yale College, required for all first-time Teaching Fellows. Information here.

b. The Graduate Writing Lab (GWL)

The GWL helps graduate students become confident and prolific academic writers. The GWL team provides individual and group support to graduate students at all stages of their academic career. The lab helps students with written and oral projects related to their academic work, including written coursework, fellowships, grant applications, conference papers, dissertation prospectuses, chapters, and papers for publication. The GWL team believes that all writers benefit from sharing work in a collaborative and supportive environment and encourages students to visit the lab at various stages of their research and study. The GWL offers free assistance to graduate students through the following programs:

- ***Individual Consultations for Written and Oral Communication.*** These take place at the Center for Teaching and Learning (CTL), Medical Library, and Center for Science and Social Science during the academic year. During these sessions, trained writing consultants provide feedback and comments on the students' written and oral work. Students can schedule these consultations through the online scheduling system on the GWL website.

- ***Pitch Vantage Studio for Public Speaking.*** This is on the mezzanine floor of the CTL in room M104C. Graduate students can improve public speaking skills in this studio by practicing their oral speeches, presentations, and lectures using PitchVantage software. This software focuses on various aspects of public presentation, from pacing and pausing to pitch and tone, and evaluates performance in real time. The scheduling for PitchVantage sessions is similar to scheduling writing consultations on the GWL website.
- ***Academic Writing Workshops and Seminars.*** These are offered regularly throughout the academic year. These programs address critical skills that graduate students need to succeed as writers, researchers, communicators, and professionals and that are not usually addressed through coursework and traditional academic training. Students register for programs through the GWL website or through the weekly electronic newsletter sent to all GSAS students.
- ***Writing Retreats and Study Halls.*** These are powerful tools for collaborative writing, helping students to combat the isolation that is common in the later stages of their doctoral work. They also provide space and structured time to GSAS students to accomplish their dissertation-related projects in a distraction-free environment.
- ***Peer-review Groups.*** These provide a form for students to discuss their work under the guidance of trained writing consultants. Groups have 5-7 members so that everyone receives individual attention. At each weekly meeting, two or three members present written work for detailed feedback.

The GWL team works with faculty members and students of different academic programs to design and organize workshops tuned to their needs. The GWL issues a weekly newsletter circulated among GSAS students, program DGSs (Directors of Graduate Studies), and Registrars by email.

Office of Career Strategy

For students interested in exploring diverse career paths, the Office of Career Strategy provides resources and services to help students clarify career aspirations, identify employment opportunities, and obtain advice for every stage of the non-academic job search process. Students may make one-on-one appointments with an experienced adviser, attend skill-building workshops, network with alumni and employers, and take advantage of extensive online resources.

Office of International Students and Scholars (OISS)

OISS (http://oiss.yale.edu) is Yale's representative for immigration concerns for all foreign nationals who are or will be studying or working at Yale. This office also offers many programs for international students, including English conversation groups for students and their spouses, cultural understanding workshops and celebrations, academic success skills programs, bus trips, and a host family program. OISS supports various nationality clubs where students can meet others at Yale from their home country for friendship and support. OISS works closely with many Yale offices that assist graduate students, especially the Office of Career Strategy and Graduate Student Life, on programs and publicity. OISS is housed in the International Center at Yale, 421 Temple Street, which provides a comfortable space for international community gatherings. You can reach OISS at (203) 432-2305.