Translational & Molecular Medicine, Pharmacology & Physiology (TMMPP) Track

A Quick Start Handbook for First Year Graduate Students

Yale University

2025 - 2026

Important Contacts

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Introduction

The Translational and Molecular Medicine, Pharmacology and Physiology Track offers the opportunity for students to use the tools of biochemistry, cell and molecular biology, physiology, structural biology, systems biology and genetics to investigate the mechanisms of disease and pathogenesis (including: cancer, diabetes, obesity, heart disease, inflammatory diseases, aging and others) the molecular actions of drugs that treat these diseases, and how genes, proteins and small molecules are integrated to produce the specific functions of our cells, tissues, and organs. The faculty in this interdisciplinary track is drawn primarily from the Departments of Cellular and Molecular Physiology, Pathology, Pharmacology, and Medicine, with participating faculty from Biomedical Engineering, Cell Biology, Comparative Medicine, Genetics, Immunobiology, Microbial Pathogenesis, Molecular Biophysics & Biochemistry, Molecular, Cellular & Developmental Biology, Neurobiology, Psychiatry, and Therapeutic Radiology, plus the Yale Cancer and Stem Cell Centers.

Students will be in the TMMPP track until the end of their first year of study, at which point they will join a lab, a graduate program and meet the requirements of that program. The first year TMMPP track curriculum has been designed for compatibility with the requirements of the major programs whose faculty are members of the track. Typically, most students join one of four track programs: Cellular and Molecular Physiology (CMP), Pathology and Molecular Medicine (Path), Pharmacology (Pharm), or Translational Biomedicine (PTB), but have the flexibility to join other programs within the BBS (Biological and Biomedical Sciences). Students should consult the handbooks of any program they may consider joining to learn about additional requirements and procedures that will apply to them in years two and beyond.

Participating TMMPP Faculty
Please visit Translational Molecular Medicine, Pharmacology, and Physiology (TMMPP) Track < Biological & Biomedical Sciences for the complete list of participating faculty members in the track.

Curriculum

Program of Study
In their first year, students must complete three rotations, take the seminar course (Fall and Spring) and complete the Responsible Conduct of Research course. In the fall, students typically take at least one of these three courses: C&MP 5550, PATH 5690, PHAR 5504. Students will also select core courses from the list below.

Cellular and Molecular Physiology:
C&MP 5550 (Fall): Physiological Systems
C&MP 5560 (Spring): Molecular Machines in Human Disease
C&MP 5580 (Spring): Mitochondrial Bioenergetics and Intermediary Metabolism
C&MP 5700 (Spring): Physiology in Medicine

Pathology and Molecular Medicine
PATH 5690 (Fall): Molecular Mechanisms of Disease
PATH 5650 (Spring): Biology of Cancer

Pharmacology:
PHAR 5504 (Fall): Molecular Mechanisms of Drug Actions
PHAR 5528 (Spring): Principles of Signal Transduction
PHAR 5529 (Spring): Structural Biology & Drug Discovery
MB&B 720 (Fall): Macromolecular Structure & Biophysical Analysis

Translational Biomedicine:
PTB 5604 (Spring): Physiologic function and cellular structure of organ systems

TMMPP Track students choose a program affiliation (usually the same as that of their research advisor) at the end of their first year no later than the end of August. Each of the major participating programs has course requirements that can be satisfied in large part by courses from the four core areas mentioned above. Additional electives are selected depending on the student's interests and in consideration of the requirements of the program the student anticipates joining (see below). Students typically take three to four course credits per semester.

First Year TMMPP Course Schedule example ***Indicates a Required First-year course*

Fall
- Lab Rotations**
  (C&MP 5511/PATH 5620/PHAR 5511/PTB 5620)
- Seminar in Translational Molecular Medicine, Pharmacology and Physiology**
  (C&MP 5629/PATH 5679/PHAR 5501/PTB 5629)
- CMP 5550, PATH 5690, PHAR 5504 or other core course(s) from list above

Spring
- Lab Rotations**
  (C&MP 5512/PATH 5622/PHAR 5512/PTB 5622)
- Seminar in Translational Molecular Medicine, Pharmacology and Physiology**
  (C&MP 5630/PATH 5680/PHAR 5502/PTB 5630)
- Responsible Conduct of Research course**
  (C&MP 5650/PATH 5660/PHAR 5580/PTB 5650)
- PTB 5604 or other additional core or elective course(s)

Meeting Program Course Requirements

Students in the TMMPP track choose a program affiliation at the end of the first year. In addition to the Track Requirements, each of the participating programs has course requirements that can be satisfied in part by courses within the above subject areas. The following are the additional course requirements for the four programs in the track. For course requirements in other programs, please contact the program's Director of Graduate Studies (DGS) for approval.

Cellular and Molecular Physiology:

Required courses are C&MP 5550: Physiological Systems **and one of the following** 3 courses - C&MP 5560: Molecular Machines and Human Disease, C&MP 5580: Mitochondrial Bioenergetics and Intermediary Metabolism, C&MP 5700: Physiology in Medicine.

Pathology and Molecular Medicine:

The following three courses are required:
PATH 5640, Developing and Writing a Scientific Research Proposal; PATH 5650, Biology of Cancer; PATH 5690, Molecular Mechanisms of Disease

Pharmacology:

Students entering Pharmacology are required to take **one** of the following courses:
(1) Pharm 5504: Molecular Mechanisms of Drug Actions, (2) Pharm 5528: Principles of Signal Transduction, (3) Pharm 5529: Structural Biology and Drug Discovery, or (4) MB&B: 7200 Macromolecular Structure and Biophysical Analysis. Students must also take PHAR 5540, Qualifying Exam Prep Class for Pharmacology in their second year.

Translational Biomedicine:

PTB students are required to take PTB 5604 (Physiological Function and Cellular Structure of Organ Systems – offered in the spring) and one course with a focus in biostatistics (students choose from several offered as is appropriate for their research focus, e.g. BIS560 – Introduction to Clinical and Translational Informatics or IMED5645 – Introduction to Biostatistics in Clinical Investigation). In the second year, PTB students take two ungraded Sat/Unsat (Pass/Fail) courses: 4 modules of the Mentored Clinical Experience (8 class meetings per semester, PTB5610 and 5611) and PTB 5605 (Grantsmanship and Preparing Training Award Applications – one hour per week for 10 weeks in the spring).

Faculty Advisory for Incoming Students

At the start of the first year, each student plans his or her course schedule and first laboratory rotation assignment in consultation with the track DGS, David Zenisek. Meetings usually take place in the last week in August.

Responsible Conduct of Research

Education in the ethical and moral dimensions of scientific research is an integral and essential component of the graduate program and of a research career. Specifically, the National Institutes of Health (NIH) has stipulated that: "all training programs supported by federal funds provide predoctoral and postdoctoral fellows with exposure to information dealing with recommended standards of conduct. Questions ranging from the procedures governing the appropriate use of human subjects, experimental animals, radioisotopes, etc. to issues involving conflicts of interest and commitment and the regulations that every institution must establish to deal with misconduct in science, should be addressed."

To meet this important requirement, TMMPP students:

1) Are required to pass the Responsible Conduct of Research course (C&MP 5650/PATH 5660/PHAR 5580/PTB 5650), at which some of the basic features of life in contemporary research and some of the personal and professional issues that researchers encounter in their work are discussed in a seminar/round table format.
2) Are required to participate as a Senior Student Assistant to at least one of the RCR sessions during a student's 3rd, 5th, or 6th year.
3) Fourth Year Students must take Responsible Conduct of Research, consisting of 8 contact hours of in-person training.

Laboratory Rotations: Introduction to Research

Aug 25 – Sept 5	Rotation Shopping Period
Sept 8 – Oct 24	Rotation 1 (7 weeks)
Oct 27 – Jan 9	Rotation 2 (11 weeks, includes Thanksgiving, finals, and Winter Break)
Jan 12 – Feb 27	Rotation 3 (7 weeks, selection of dissertation lab begins at end of this rotation)
Mar 2 – May 1	Rotation 4 *Only if required* (9 weeks, includes spring break)

Choosing Lab Rotations

During the academic year, students rotate through 3 laboratories. Students learn about the labs available to them by looking in the TMMPP or BBS brochures and websites, by talking to more senior students and by attending short faculty talks held in late August/early September.

Students should contact the faculty directly to set up the lab rotation and notify the Track Registrar once the arrangements have been made. When engaging a faculty member for lab rotation, it is important to confirm the PI (principal investigators) is currently accepting students and that the mentoring style and research focus of the PI align with students' individual interests.

Students who remain uncertain about their choice of laboratory for dissertation research can take a fourth rotation following the completion of the third rotation. *All students must join a lab by the end of August before the start of their second year.*

What Students Should Do During Lab Rotations

Students should balance their time between rotations and course work, allowing time for lab work every week but not spending so much time in lab that course work suffers. Students will be given a desk and bench space in their rotation lab and will determine in discussions with the rotation advisor what to do during the rotation. Typically, a more senior student, postdoctoral fellow, or the professor will supervise the student in carrying out an experiment that will help familiarize the student with the science in the lab. While students should try to achieve results in their project, they should realize that the brief period of the rotation often prevents this from being possible, and obtaining results is not necessary to the success of a rotation. Besides carrying out experiments, rotation students also should familiarize themselves with the intellectual basis of research in the lab by participating in lab meetings/seminars/discussions and by reading papers related to their rotation work. The purpose of rotations is to allow you to decide if you want to join the lab. If a student should realize within the first two weeks that their selected rotation lab is not a good fit and is not one they would choose to join, students may choose to switch to another lab to continue the rotation. Generally, after 2 weeks into a rotation, the student should complete the rotation with the chosen lab. **If at any point during a rotation a student has a serious conflict with the rotation lab advisor and/or lab members, the student should contact the Track DGS and/or Track Registrar immediately.**

Rotation Talks

At the end of each rotation period, each first-year student gives a brief talk on the topic on which he or she did their rotation. These talks help students crystallize their thoughts about their rotation research and provide practice and training in the important skill of giving scientific presentations. Because significant results may not been obtained, the talks typically focus on the background and experimental approach behind the project. Students should endeavor to give a clear and simple description of their project and its rationale. The talks are usually 10 minutes followed by a 5-minute question period. The track Registrar arranges the sessions during which the talks are given, and the talks are attended by fellow classmates, rotation supervisors, lab mates, and open to all members of the program. After the talks, students should arrange to discuss their presentations with their rotation advisor.

Labs may formally start accepting students at the end of the third rotation. **Dissertation Advisor forms should be completed and submitted to Track Registrar within 2 weeks of the final rotation end date.*

GRADES

Graduate courses are graded Honors (H), High Pass (HP), Pass (P), and Fail (F). The Graduate School requires that students receive at least two Honors. The Honors requirement must be met in courses other than those concerned exclusively with dissertation research and preparation. Grades in Lab Rotations do not count toward this requirement.

Some programs have additional requirements. For example, Pharmacology requires that students maintain an average of High Pass. Please check with any program you are considering joining to discuss their requirements.

THE SUMMER AFTER THE FIRST YEAR

Students are expected to begin working in the lab as soon as they complete their third rotation and formally join their dissertation lab. Students will formulate a plan for their dissertation research through discussion with their advisor and others in the lab and will begin planning for their qualifying exams (taken in year two). Since each program has its own requirements and timeline, it is imperative that students meet with their program's DGS and familiarize themselves with their program's Graduate Handbook early on.

Some students choose to do a summer internship the summer after their first year. The student's adviser, DGS (of chosen program) and GSAS Dean need to approve of this. **A summer internship cannot start before June 1st.**

Additional Student Resources at Yale

Who to See About Academic or Administrative Issues

Specific Graduate School Concerns:

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

GSAS Administrative Deans:

Allegra di Bonaventura, Associate Dean for Academic Support
Sarah Insley, Assistant Dean for Academic Support

Email: *gsasadministrativedean@yale.edu*

GSAS Embedded Mental Health Services:

Graduate students have access to free mental health services through the GSAS Embedded Mental Health office, located in the McDougal Graduate Student Center in Founders Hall. You can find information on programming and schedule confidential drop-in therapy appointments on the website: *https://gsas.yale.edu/gsas-embedded-mental-health-services*

Student Accessibility Services:

Student Accessibility Services (SAS) works with all Yale students with disabilities to determine and provide appropriate accommodations, auxiliary aids, and services. For more information or to make a request, please visit the website: *https://sas.yale.edu*

Student Support and Community Standards:

For assistance in navigating support, resources and options for a broad number of student concerns outside of the academic setting.

Kristina Lynch, Assistant Director
Email: kristina.lynch@yale.edu,
Phone: (203) 436-8477

UNIVERSITY LIBRARIES

For all Yale main library buildings and hours go to: *http://web.library.yale.edu/buildings*

Libraries of particular interest to the sciences include:

- Center for Science and Social Science Information (CSSSI): *http://csssi.yale.edu/*
  Location: 219 Prospect Street, Concourse Level, Kline Biology Tower, New Haven, CT

- Medical Library: *http://library.medicine.yale.edu/*
  Location: Sterling Hall of Medicine, 333 Cedar Street.

Miscellaneous Information

Registration

All students must register online with the Graduate School. Registration for the Fall Term occurs in April, with add/drop available in late August/September. Registration for the Spring term occurs in November, with add/drop available in January. Students will continue to register every term for the entire time they are a student at Yale, even if they are not taking any classes.

Annual Retreats

Students will find the retreats beneficial and enjoyable. First-year TMMPP students are encouraged to attend the retreats in Pharmacology, Physiology, PTB and Pathology. Please be on the lookout for information about the retreats.

Seminars

Participation in the seminars and colloquia held throughout the University is an important part of every student's education. Many departments have weekly seminar series. All students are expected to attend seminars regularly.

Vacation and Leave

First-year TMMPP students are expected to be present on campus throughout the academic terms, including Fall and Spring break, except for University holidays.

The course of study and graduate student stipend are based on a 12-month commitment. It is expected that students will take no more than two weeks of vacation, in addition to university holidays. Note that breaks in course work (Fall or Spring break, Christmas/New Year's Day, beyond the official university holiday days, summers) are not holidays for graduate students. If the student needs to take a leave of absence, a personal leave of absence form must be filled out. In no case may vacations conflict with any academic obligations.

The policy regarding student vacations conforms to the stipulations of the federal training grants that provide support for most first through third year students. The excerpt below appears in an announcement of regulations contained in the application material for NIH National Research Service Award Institutional Grants (*i.e.* training grants), dated May 16, 1997: "In general, trainees may receive stipends during periods of vacation and holidays observed by individuals in comparable training positions at the grantee institution. For the purpose of these awards, however, the period between the spring and fall semesters is considered to be an active time of research and research training and is not considered to be a vacation or holiday."

Once students enter the second year of their program, they are covered by the University's collective bargaining agreement with Local 33 and their compensation and benefits, including paid time off, are governed by the contract.

Graduate School Organizations

The Graduate and Professional Student Center at Yale (Gryphons) located at 204 York Street provides a central meeting place for graduate and professional students, faculty, and alumni. Open only to members and their guests, Gryphons operates a full-service bar with reduced prices; sponsors receptions, dances, and parties; and hosts conferences, rehearsals, and exhibitions. Gryphons is overseen by the Graduate-Professional Student Senate (GPSS), a university-wide organization of graduate and professional students. Consult the website for current restrictions during the pandemic.

The Graduate Student Assembly (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, visit the web site at *http://gsa.yale.edu/*.

The McDougal Graduate Student Center
https://gsas.yale.edu/mcdougal-graduate-student-center
The McDougal Graduate Student Center is at 135 Prospect Street and is open Mondays through Thursdays from 9:00 am through 10:00 pm, Fridays from 9:00 am through 8:00 pm and on weekends from 12:00 pm through 6:00 pm during the academic term. You can contact the McDougal Graduate Student Center office at (203) 432-BLUE or at *mcdougal.center@yale.edu.*

See the GSAS Events calendar: *https://yaleconnect.yale.edu/gsasmcdougalgsl/events/*

Graduate Student Life

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 at *ocs.yale.edu*.

The Yale Poorvu Center for Teaching and Learning (CTL) *https://poorvucenter.yale.edu/*

a. Graduate and Postdoctoral Teaching Development

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.

Teaching at Yale Day: orientation to teaching in Yale College, required for all first-time TFs (Teaching Fellows).

b. The Graduate Writing Lab (GWL)
http://ctl.yale.edu/writing/graduate

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*** 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*** is on the mezzanine floor of the CTL in room M104C. In that studio, graduate students can improve public speaking skills by practicing their oral speeches, presentations, and lectures with 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*** are offered regularly throughout the academic year. These programs address critical skills graduate students need to succeed as writers, researchers, communicators, and professionals 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*** are powerful tools for collaborative writing. These groups help students 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*** help students 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 International Students and Scholars (OISS) ***http://oiss.yale.edu/***

OISS 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.

Office for Graduate Student Engagement and Development (OGSED)
yale.edu/office-graduate-student-engagement-development-ogsed

The Office for Graduate Student Engagement and Development is committed to maintaining a supportive and inclusive academic community at the Yale Graduate School of Arts and Sciences, where students from diverse backgrounds and experiences can thrive and achieve their personal and professional goals. Associate Dean Nearon advises prospective and current graduate students and serves as the Graduate School's Title IX Coordinators. The Summer Undergraduate Research Fellowship (SURF) Program, the Post-Baccalaureate Research Education Programs (ESI PREP and NIH PREP), Recruitment Preview Days, and the Transitions: First Year Experience Program fall under the purview of the OGSED. OGSED Fellows are appointed annually to assist the Office in developing and implementing 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 Engagement and Development, directly via email at *michelle.nearon@yale.edu* or (203) 436-1301.

Yale Shuttle:

The free shuttle is available to all students, staff, and faculty.
The Daytime Campus Shuttles operates from 7:20 AM to 6:00 pm Monday through Friday. *Yale ID required to ride the Yale Shuttles*. View more information on Yale Shuttles or View the Yale Shuttle buses in real-time also available by downloading the Downtowner App on your mobile phone.

Public Safety Campus

Public Safety Website.

Police Emergency: 911
University Police: 203-432-4400
Campus Crisis Services (24-Hour Hotlines): 203-789-8104

Nighttime Safe Rides (via TapRide app)

Walking Escorts 203-432-9255

Students, Staff or Faculty may request a Security Escort by calling 203-432-WALK (203-432-9255).

Special Services Van

Yale Transit operates a Special Services Van that transports members of the Yale community who are permanently or temporarily disabled. Passengers are picked up upon request and transported within the Shuttle boundary. To register, contact the Resource Office on Disabilities (203-432-2325).

Mental Health & Counseling

24/7 on-call service: 203-432-0290