Chemistry Graduate Student Handbook

Entering Class of 2021

Chemistry Graduate Student Handbook

Table of Contents **Page**

Abbreviations
CBI: Chemistry/Biology Interface Training Grant
CBIC: Yale Chemical and Biophysical Instrument Center
CRB: Chemistry Research Building
CTL: Poorvu Center for Teaching and Learning
DCC: Diversity and Climate Committee
DGS: Director of Graduate Studies
EHS: Environmental Health and Safety
GSA: Graduate Student Assembly
GSAS: Graduate School of Arts and Sciences
HPC: Yale High Performance Computing
JST: Joint Safety Team
KBT: Kline Biology Tower
KCL: Kline Chemistry Laboratory
MCDB: Molecular, Cellular and Developmental Biology
NIH: National Institutes of Health
NSF: National Science Foundation
PDN: Professional Development Network
PI: Principal Investigator (laboratory advisor)
PPE: Personal Protective Equipment
OCI: Online Course Information
OCS: Office of Career Strategy
OGSDD: Office for Graduate Student Development & Diversity
SCL: Sterling Chemistry Laboratory
SPL: Sloane Physics Laboratory
TF: Teaching Fellow
YSB: Yale Science Building

Useful Links
25Live: https://25live.collegenet.com/pro/yale#!/home/search/event/list
CBIC: https://cbic.yale.edu
Center for Research Computing: https://research.computing.yale.edu
Chemistry Department: https://chem.yale.edu
Chemistry Department Useful Links: https://chem.yale.edu/intranet/useful-links
COVID-19 Testing: https://covid19.yale.edu/health/screening-program/screening-program-faculty-staff-and-graduate-and-professional-students
Daily Health Check: https://covid19.yale.edu/health/daily-health-check
Discrimination and Harassment Concerns: https://student-dhr.yale.edu
EHS: https://ehs.yale.edu
EHS Integrator (Chemical Inventory): https://ehsis.yale.edu/EHSIntegrator/Dashboard
Facilities Requests: https://facilities.yale.edu
Glass Shop: https://glassshop.yale.edu
GSA: https://gsa.yale.edu
LiveSafe App: https://your.yale.edu/community/public-safety/stay-safe-campus/livesafe-app
Off-Campus Access to E-Resources: https://guides.library.yale.edu/OffCampusAccess
Poorvu Center for Teaching and Learning: https://poorvucenter.yale.edu/
Popular Resources: https://your.yale.edu/popular-resources
Student Groups: https://chem.yale.edu/student-groups
Student Information Systems: www.yale.edu/SIS
Software Library: https://software.yale.edu
Workday (Chemical Purchasing): https://workday.yale.edu
Yale Health: https://yalehealth.yale.edu/directory

Faculty and Student Contacts/Resources for 2021–2022

Graduate Student Assembly (GSA) Representatives: Ethan Perets (ethan.perets@yale.edu), Sam Bhutto (samuel.bhutto@yale.edu), Tyler Myers (tyler.myers@yale.edu), Hannah Nedzbala (hannah.nedzbala@yale.edu), Ellie Stewart-Jones (eleanor.stewart-jones@yale.edu); The GSA representatives are elected annually to represent chemistry graduate students. They communicate concerns to faculty leadership within the chemistry department and leadership in the Graduate School of Arts and Sciences, and work alongside these individuals to find solutions.

Director of Graduate Studies (DGS): Jonathan Ellman (chemistry.dgs@yale.edu); The DGS is the first point-of-contact for questions from students in their first year and beyond. The DGS manages course registrations, teaching assignments, rotations and selecting or changing advisors, department-specific and university requirements, such as course requirements, and forms for exams and dissertation submissions.

Department Chair: Kurt Zilm (kurt.zilm@yale.edu); The department chair acts as the chief academic officer for the chemistry department. The chair handles issues related to chemistry department policies. The chair is another point-of-contact for issues relevant to the DGS and DGSCD. The department chair also acts on public-facing matters relevant to the department.

Director of Graduate Student Climate & Diversity (DGSCD): Patrick Holland (patrick.holland@yale.edu); The DGSCD is responsible for leading the chemistry department's Diversity and Climate Committee. The DGSCD acts as an additional point-of-contact, alongside the DGS and chair, to address community or individual concerns relevant to department climate, diversity, or Title IX (sexual misconduct).

Academic Support Staff: Kara Swenson, Maggie Simonsen, and Lisa Hines. The academic support staff can answer any questions related to the completion of chemistry academic requirements, including course registration and management of forms for exams and dissertation submission alongside the DGS. Please contact the academic support staff by emailing chemistry.dgs@yale.edu and the appropriate individual will reply promptly.

Stockroom: Bret Haughwout (bret.haughwout@yale.edu) and Brian Coburn (brian.coburn@yale.edu); Stockroom staff are the first point-of-contact to answer any questions related to shipping and receiving of research supplies, or stockroom inventory.

Chemistry Finances: Kelly Kellerman (chemistry.finances@yale.edu); The first point-of-contact for answering any questions related to procurement, usage of research funds, including research grants, and reimbursements.

Lead Administrator: Erin McAvoy (erin.mcavoy@yale.edu).

Environmental Health and Safety (EH&S): Anna Kim (anna.kim@yale.edu); The EH&S Officer for the chemistry department is responsible for all matters related to research safety, including handling and disposing of research materials and chemical waste, and required safety trainings. The EH&S officer can help you to address any questions or concerns relevant to research safety, or to develop effective safety protocols for your research project.

Department-wide Communications: Lisa Turner (chemistry.events@yale.edu); Responsible for management of all department-wide communications, including preparation of the weekly chemistry newsletter. The first point-of-contact if you wish to disseminate a communication to the chemistry department.

I. Welcome

A. Introduction. Graduate study is an exciting departure from your experience in undergraduate education. The main goal is to prepare you for a career in scientific research, and the program aims to give you the tools you will need: detailed knowledge, ability to apply that knowledge, independent thought, communication skills, teamwork, teaching, and safety. The first two years of the program lead to a M.Sc. degree, and include coursework and other formal requirements in addition to research with one or more faculty members. For those that continue to the Ph.D., this culminates in a "qualifying examination" in which you demonstrate your ability to explain your research plans for the Ph.D. dissertation to a panel of faculty members, in both written and oral form. Prior to the end of your fourth year, you hone your skills in coming up with independent research ideas through an outside proposal, completely from your own interests and separate from your Ph.D. project. Finally (generally after five years total), your research is summed up in a written dissertation.

B. Mentorship. During this time, you are guided by a faculty member as your PI. This faculty member takes the main responsibility for your research, communication, teamwork, and laboratory training during your graduate career, and becomes a guide and mentor for the rest of your scientific career. This "apprenticeship" model has been the path for many previous Yale graduates who have gone on to leading positions in industry, government, academia, and other directions.

Students also seek mentorship from other graduate students. Each first-year graduate student is matched with two current graduate students in the summer before starting. These students are a resource for you to learn about New Haven, Yale, and the Chemistry department, both in terms of the academic and social culture. When you arrive, the department has numerous training opportunities to enhance your skills and experience. Please see the beginning of this document and the department website for contacts for questions.

II. Course Registration and Course Schedules

A. Course Registration

Registration for Fall semester courses is required before the September 10th deadline. Prior to this deadline, the Chemistry Department will provide first-year students with advice about courses, including a meeting with a divisional faculty advisor and advice from current graduate students. Each student chooses a program of coursework for the first year in conjunction with the divisional advisor, based on the student's field of interest, previous education, and experience. Many students also consult potential PIs to find out what coursework is typical for students in their lab. The divisional advisor will be asked to approve your course choices prior to you registering for courses online through Online Course Information (OCI) at www.yale.edu/SIS. The dates for registration for Spring semester courses will be announced later this semester.

All upper-year students must register each semester for research and group/departmental seminars, in addition to any course that is being taken for credit. Guidelines for course registration are available separately by contacting chemistry.dgs@yale.edu and are typically distributed each semester prior to registration in an email to all graduate students as a reminder. Upper-year students must also register for classes online through OCI at www.yale.edu/SIS.

B. Course Schedules

All graduate students must successfully complete five (5) credits of graduate courses (numbered 500 or higher) prior to the qualifying exam (see Section III), unless they have permission from the DGS (see next paragraph). The vast majority of graduate level courses in the Yale Chemistry Department are half (0.5) credit classes and run for half of the semester. Splitting the courses in this way provides greater flexibility in the topics that can be studied. In the context of satisfying course requirements, ten half credit courses are required to satisfy the five credit requirement. Most of these courses should be completed in the first year and typically a student will take 5-6 half credit courses in the fall semester, and 4-5 in the spring semester. Graduate courses are graded on a letter scale of Honors (H), High Pass (HP), Pass (P), and Fail (F). The Chemistry Department requires the weighted average from graduate classes (the average is weighted depending on whether the course is 0.5 or 1 credit), exclusive of Chem 700, be at least HP for a student to remain in good standing. The Graduate School requires that each student receive Honors in two credits worth of classes (this can either be four Honors in 0.5 credit courses or two Honors in one credit courses) within the first two years, exclusive of research, seminar, and shop courses. Only one credit of the required two Honors credits can be earned in a laboratory course (*e.g.*, Chem 560L). All first-year students are required to take *Ethical Conduct and Scientific Research* (Chem 590) in the fall semester, which does not count toward the five required courses.

Some recommended courses are not offered every year, so if interested, students should take advantage of the course when it is offered. Permission to complete fewer than five credits prior to the end of the second year requires approval of the Director of Graduate Studies (DGS). Graduate students who need certain preparation may "sit in" an upper-division undergraduate course, but it does not count toward the five credit requirement. Each sub-discipline has different course recommendations that are outlined on the following pages. Students with interests in Materials Chemistry can choose either the Inorganic or the Physical course requirements, in consultation with their advisor, as there are not yet separate requirements for the Materials division.

1. Course Requirements in Preparative Chemistry. A student in the Inorganic, Chemical Biology, or Organic track must complete five course credits during the first three semesters or receive special permission from the DGS. These courses should reflect the breadth of current research in these areas of chemistry. Thus, students are encouraged to complete at least one course in each of the following areas: synthetic chemistry, transition-metal chemistry, chemical biology, and theory or reaction mechanisms. The breadth of courses taken can be adjusted to fit your background, specific areas of research interest, and the schedule of course offerings.

The following table indicates which courses may be categorized as synthesis, transition-metal chemistry, chemical biology, and reaction mechanisms [*all courses are 0.5 credit classes*].

Synthetic Chemistry	Transition Metals	Chemical Biology	Theory and Mechanism
Organic Structure and Energetics (Chem 516)	Fundamentals of Transition Metal Chemistry (Chem 502)	Foundations of Chemical Biology (Chem 519)	Inorganic Reaction Mechanisms (Chem 505)

Kinetics and Thermodynamics in Organic Systems (Chem 517)	Fundamentals of Organometallic Chemistry (Chem 503)	Foundations of Chemical Biology II (Chem 522)	Organic Structure and Energetics (Chem 516)
Natural Product Synthesis (Chem 528)	Applications of Organometallic Chemistry (Chem 504)	Applications of Chemical Biology to Therapy (Chem 524)	Kinetics and Thermodynamics in Organic Systems (Chem 517)
Synthetic Methods in Organic Chemistry I (Chem 532)	Inorganic Reaction Mechanisms (Chem 505)	Fundamental Medicinal Chemistry (Chem 535)	Computer Simulations of Organic and Biomolecular Systems (Chem 536)
Synthetic Methods in Organic Chemistry II (Chem 533)	Bioinorganic Spectroscopy (Chem 506)	Protein NMR Spectroscopy (Chem 585)	Introduction to Quantum Mechanics I (Chem 566)
Synthetic Methods in Drug Discovery and Development (Chem 534)	Principles of Materials Chemistry (Chem 508)	Quantitative Biochemical Imaging (Chem 586)	Introduction to Quantum Mechanics II (Chem 567)
			Computational Chemistry (Chem 596)

Students in Preparative Chemistry must also audit the *Current Topics in Organic Chemistry Seminar Series* (Chem 720/721), *Seminar in Chemical Biology* (Chem 740/741), or *Seminar in Inorganic Chemistry* (Chem 760/761) depending on their specific sub-field throughout their residence at Yale.

2. Course Requirements for Chemical Biology. Chemical Biology students should take five (5) credits worth of courses by the end of their first year. Specific courses are chosen in consultation with a divisional faculty advisor, who can also advise students about eligibility and requirements of the Chemistry/Biology Interface (CBI) training grant. By the end of the second year in residence, students should possess a solid background in both organic and chemical biology, as well as an understanding of important methodologies in cell, micro, and/or molecular biology. This background may come through a combination of courses at Yale and courses taken as an undergraduate. If a Chemical Biology student is a Teaching Fellow (TF) during the first year and is not eligible for the CBI training grant, then it may be reasonable to take some of these classes during the second year.

In addition to fulfilling the requirements for Preparative Chemistry described above, students in Chemical Biology are recommended to take one elective from each of the two topic listings below. Other advanced courses related to your research interests may be appropriate and may be considered in consultation with your advisor. These electives each count for one credit.

Chemical Biology Electives (one elective from each topic is recommended):

Biochemistry/Structural Biology	Cell and Molecular Biology
Biochemical Rates & Mechanisms (Chem 592 / Chem 593)	Cellular and Molecular Physiology (MCDB 560)
Biochemistry (MB&B 500)	Molecular Cell Biology (MCDB 602)
Biochemical and Biophysical Approaches (MB&B 630)	Biotechnology (MCDB 570)
Illuminating Biomolecular Mechanism with Structure (MB&B 431)	Biology of the Immune System (MCDB 530)

Chemical Biology students must also audit the *Current Topics in Organic Chemistry Seminar Series* (Chem 720/721), *Seminar in Chemical Biology* (Chem 740/741), or *Seminar in Inorganic Chemistry* (Chem 760/761) depending on their specific sub-field throughout their residence at Yale.

3. Course Requirements in Biophysical Chemistry. Students must take five (5) credits worth of courses by the end of their first year. Specific curricula are designed in consultation with a designated faculty advisor using the following guidelines.

By the end of the second year in residence, students should have obtained a solid background in physical chemistry and an understanding of the major molecular biophysical methods (NMR, spectroscopy, X-ray crystallography, EPR, Imaging, etc.). This background may come through a combination of courses at Yale and courses taken as an undergraduate.

In addition, all Biophysical students should take *Lab Rotations for First Year Biophysical and Chemical Biology Graduate Students* (Chem 700) for credit in their first year. All Biophysical students must audit the *Biophysical Chemistry Seminar Series* (Chem 750/751) throughout their residence at Yale. The rotation and seminar classes do not count toward the five full-semester courses. For students who have not taken biochemistry as an undergraduate, *Principles of Biochemistry I & II* (MB&B 600/601) is required in addition to the course requirements listed below.

Course requirements:

(1) Six half credit courses in biophysical/physical chemistry:

- *Statistical Methods and Thermodynamics* (Chem 572/Chem573) or *Quantum Chemistry* (Chem 566/Chem567)
- *Biochemical Rates & Mechanisms* (Chem 592/593)
- *Biophysics* (Chem 551/559) or *Biophysical Spectroscopy* (Chem 585/586)

(2) Two course credits worth of electives. We recommend that one be an advanced biological course, such as molecular biology, cell biology, chemical biology, or bioinorganic chemistry, and the other an additional advanced course on physical chemistry such as *Statistical Methods and Thermodynamics* (Chem 566/567), *Quantum Chemistry* (Chem 566/Chem567), *Molecules and Radiation* (Chem578/Chem579) or *Computational Chemistry and Biochemistry* (Chem 596).

4. Course Requirements in Physical Chemistry. Students are expected to take at least two (2) full-semester courses for credit during each term of their first year. Individual programs of study that take into account pertinent undergraduate experience must be arranged in consultation with a designated faculty advisor. By the end of the second year of residence, and ideally after the first year, it is expected that a student will have completed the equivalent of five (5) full-semester lecture courses for credit (where two ½ credit courses count as a single full-semester course), thereby demonstrating proficiency in the basic material covered by the following core classes:

Introduction to Quantum Mechanics I & II	(Chem 566 & 567; ½ credit each)
Introduction to Statistical Mechanics I & II	(Chem 572 & 573; ½ credit each)
Fundamentals for Physical Chemistry	(Chem 576; ½ credit)

The remaining credits may be chosen from the following table to complete the five (5) full-semester credit requirement. Entering students who already have taken classes with substantially the same content as the core courses listed above still need to complete the equivalent of five (5) full-semester courses for credit but may choose to substitute courses from the following table with the approval of their faculty advisor or DGS.

Spectroscopy & Kinetics	Theory & Computation	Preparative Chemistry	Physics & Engineering
Bioinorganic Spectroscopy (Chem 506)[a]	Computer Simulations of Organic & Biomolecular Systems (Chem 536)[a]	Fundamentals of Transition Metal Chemistry (Chem 502)[a]	Classical Mechanics (Phys 410)
Molecules & Radiation I & II (Chem 578 & 579)[a]	Advanced Quantum Chemistry (Chem 568)[a]	Fundamentals of Organo-metallic Chemistry (Chem 503)[a]	Electromagnetic Fields and Optics (Phys 430)
Protein NMR Spectroscopy (Chem 585)[a]	Machine Learning & Quantum Computing (Chem 584)[a]	Applications of Organo-metallic Chemistry (Chem 504)[a]	Mathematical Methods of Physics (Phys 506)
Time-Resolved Spectroscopy (Chem 587)[a]	Computational Chemistry (Chem 596)[a]	Inorganic Reaction Mechanisms (Chem 505)[a]	Introduction to Atomic Physics (Phys 522)
Biochemical Rates and Mechanisms I & II (Chem 592 & 593)[a]		Principles of Materials Chemistry (Chem 508)[a]	Solid-State Physics I & II (Phys 548 & 549)
Resonant and Non-Resonant Interactions of Light (Chem 594)[a]		Organic Structure and Energetics (Chem 516)[a]	Quantum Many-Body Physics (Phys 610)
		Kinetics and Thermo-dynamics in Organic Systems (Chem 517)[a]	Mathematical Methods I (ENAS 500)

[a] Denotes ½ credit courses.

With the agreement of their designated faculty advisor or Director of Graduate Studies (DGS), a student may replace one or more of the core courses by an appropriate alternative course. Students especially interested in experimental Physical Chemistry also are expected to pursue the *Laboratory in Instrument Design and the Mechanical Arts* (Chem 562L), though this is typically not counted toward the five (5) full-semester credit requirement.

The mathematical background of Physical Chemistry candidates should include linear algebra and calculus at least to the level of differential equations. If this material was not covered in the student's undergraduate curriculum, they should consider strengthening their mathematical abilities through supplementary courses such as *Linear Algebra with Applications* (Math 222), *Ordinary & Partial Differential Equations with Applications* (ENAS 194), *Introduction to Mathematical Methods of Physics* (Phys 301), *Mathematical Methods I* (ENAS 500), and/or *Mathematical Methods of Physics* (Phys 460).

All students in physical chemistry are expected to audit the *Molecular Science Seminar Series* (Chem 730/731) throughout their residence at Yale.

III. Choice of Research Advisor

A. Research Rotations

The choice of research advisor ("PI") is an extremely important decision because the research advisor has many roles: providing guidance on courses, research direction, and professionalization, providing funding and space for research, providing regular feedback on your growth as a scientist, helping you to find future career positions, and forming a partnership for continued advice throughout your career. An informed decision uses information from several sources: watching research video presentations during the first weeks of the first year, multiple discussions with faculty members, reading of manuscripts from the research groups of interest, attendance at group meetings, visiting of group websites, and familiarizing oneself with the group culture and expectations of the research advisor through discussions with the PI as well as students in the research group. *Once you have settled on a first choice of research group, you must inform the research advisor that they are your first choice.*

To facilitate the process of joining a research group, Yale Chemistry has instituted a system of research rotations. This starts with a series of videos that provide an overview of faculty laboratories and research, which will be available beginning on August 27th at the Canvas site https://yale.instructure.com/courses/61991. Every first-year student, regardless of their research area, should plan to watch at least ten of these videos. Be aware that not all students in a lab are involved in all projects. It is best to reach out directly to the PI to understand what research projects are available for a new student to work on.

Beginning with the third week of the Fall term, participation in a formal laboratory rotation is required. Rotation schedules vary between subdivisions (see below). By September 10th, students in all areas of chemistry should submit a list of at least three research groups with which they wish to rotate. Submissions use an online "Rotation Selection Form" which can be found on the Chemistry "Useful Links" webpage. Students should wait for the approved rotation schedule to be posted on the following Tuesday (September 14th), and the rotations begin immediately thereafter.

The content of the rotation depends on the student and the faculty member. At a minimum, the student is expected to visit the PI for an introduction and to meet a second time to follow up on the initial discussion. Rotating students should read key publications from the group, attend scheduled group meetings, and discuss ongoing projects with the graduate students and the postdoctoral fellows currently in the group. Many of our faculty have written a "Mentoring Philosophy" document, which outlines their expectations of group members and group policies.Students can request these documents from the DGSCD, and they can be used to open conversations to learn whether you and the PI have matching styles.

During the rotation period, if the student feels that they need to sample more than three groups, they may choose to conduct two rotations simultaneously. If, at the end of the rotation period, the student feels that they would benefit from rotating in another laboratory, it is possible that this can be arranged. Any student having difficulty choosing a group should immediately contact the DGS and Academic Support Staff (Kara Swenson or Margaret Simonson).

1. Rotation Schedule in Preparative Chemistry. Organic, Inorganic, and Materials graduate students conduct three-week rotations in three different research groups during the Fall of their

first year. Students choose the groups in which they rotate in mid-September, and the three rotations run through the middle of November. During the rotation, students typically attend group meetings, speak one-on-one with members of the laboratory, and have at least one conversation with the proposed advisor regarding potential thesis topics.

2. Rotation Schedule in Chemical Biology. Students conduct eight-week rotations in three different research groups during their first year. At the end of each rotation, students formally prepare and present their rotation project and results to the other trainees and participating faculty and students. Chemical Biology students are required to register for Chem 700-02/701-02 for Credit (Sat/Unsat).

3. Rotation Schedule in Biophysical Chemistry. Biophysical students conduct eight-week rotations in three different research groups during their first year. At the end of each rotation, students formally prepare and present their rotation project and results to the other trainees and participating faculty and students. Biophysics students, regardless of funding support, are required to register for Chem 700-01/701-01 for Credit (Sat/Unsat).

4. Rotation Schedule in Physical Chemistry. Students in physical and theoretical chemistry conduct three-week rotations in at least three different research groups during the Fall of their first year. The precise nature of such rotations differs from group to group, but students are expected to attend group meetings, interact broadly with current research-group members, and have at least one consultation with the proposed advisor regarding potential thesis topics.

A summary of the schedule for events related to group selection in 2020-21 follows:

All First-Year Students:

Aug. 27 – Sept. 10	View at least ten faculty presentations
Sept. 10	Submission of rotation selections
Sept. 14	Rotations start

First-Year Biophysical and Chemical Biology Students:
All Biophysics students are required to register for Chem 700-01/701-01 for Credit (Sat/Unsat)
All Chem. Bio. students are required to register for Chem 700-02/701-02 for Credit (Sat/Unsat).

Sept. 14 – Nov. 5	First rotation (Zoom presentation at Noon on 11/5)
Nov. 8 – Jan. 28	Second rotation (Intentionally longer to accommodate the winter break, Zoom presentations on 1/28)
Jan. 31 – March 25	Third rotation (Zoom meeting on 3/25)
Apr. 1	Submission of top three choices for advisor by the biophysical and chemical biology students

All Other First-Year Students:

Sept. 14 – Oct. 1	First rotation
Oct. 4 – Oct. 22	Second rotation
Oct. 25 – Nov. 12	Third rotation
Nov. 15	Submission of top three choices for advisors

B. Advisor Selection

Selection of a research advisor is a significant decision and should be carefully considered. It is crucial that you familiarize yourself with the group culture and expectations of the research advisor, through discussions with the PI as well as past and present students in the research group. Talk through your options with a trusted friend, with an advanced graduate student, or with the DGS/DGCD. The Yale Guide to Advising Practices for Faculty and Students also lists some questions to consider when choosing a research laboratory and advisor.

You are *required* to discuss joining a research group with the faculty member *before* submitting your list of choices. All agreements for choice of research advisor require review and approval by the DGS. The DGS should be consulted promptly if any difficulties arise in reaching an agreement.

Research advisors are selected by completing the online "Advisor Selection Form", which involves ranking their three preferred research groups. The top lab is ranked #1. The form can be found on the Chemistry "Useful Links" webpage. At any time, when you become sure of the lab that you want to join, you are *required* to reach out to the faculty member and make the PI aware of your intention to join the lab, preferably well in advance of the advisor selection deadline. Be aware that a student's first choice of a lab cannot always be honored.

C. Selection of an Advisor Outside of the Chemistry Department

Faculty members who hold joint appointments in Chemistry or are affiliated with the Chemistry Department through the Biophysics or CBI training grants can be selected as a research advisor. This requires no prior permissions. It also is possible to join the research group of a faculty member who is not affiliated formally with the Chemistry Department provided that the student works on a thesis project having sufficient chemical content and chooses a Ph.D. committee with two faculty having primary appointments in Chemistry. If a student wishes to join a group outside of the Chemistry Department, they meet with the DGS.

D. Changing of Research Advisors

Because of the obvious disruption of progress toward the Ph.D. degree from changing research advisors, students are strongly urged to make a well-informed and careful choice of research advisor from the onset of their Ph.D. studies. A desire to change research groups should be discussed with the DGS and with the proposed new research advisor. If appropriate, the student might also consider discussing their plans with the student's current research advisor. If the current advisor is the DGS, the student can consult with the Director of Graduate Student Diversity and Climate or the Departmental Chair. *Prior to a change in group, the student must clean their laboratory equipment and space, and must provide a comprehensible research report, as well as lab notebooks and pertinent research data, to the advisor.*

E. Graduate Student Funding

All Ph.D. students are guaranteed five years of stipend support towards their Ph.D. In the first year of the Ph.D., students are supported as a TF, on a university training grant, or through external funding obtained by the student. After the first year, once a student has joined a research group, the student may be supported through various means. These include grants, university fellowships, chemistry research fellowships, external fellowships, training grants, or additional teaching (all students are required to be a TF for at least two semesters, but in most cases a student

will not teach more than five semesters of the Ph.D., and often students teach much less than this). The Graduate School of Arts and Sciences does not guarantee stipend support to students after the sixth year of study. Beyond year six of the Ph.D., the availability of funding must be discussed between the student, research advisor, and DGS.

IV. Second-Year Candidacy Examination

A. General Information

The purpose of the candidacy examination is for the student to demonstrate: (*i*) a thorough understanding of the background and methods of their Ph.D. project; (*ii*) significant research progress that indicates the candidate will successfully complete a satisfactory dissertation within a reasonable length of time (4.5–6 years), even if the experimental work so far has not yet been productive in terms of publishable results; (*iii*) an ability to develop independent research ideas from first principles and literature study related to their Ph.D. project; and (*iv*) proficiency in communicating chemistry principles in both a written and oral format. These skills are essential to be an effective chemistry researcher, and the candidacy examination requires the student to exhibit aptitude in all of these areas.

The candidacy examination should be completed before the last day of reading period in the spring semester of a student's second year in the Ph.D. program, with timing details reached through consultation with their advisor. Candidacy examinations are conducted by a three-member committee formed by the student's research advisor and two faculty members familiar with the student's area of research. In all cases, at least two of the committee members must be faculty whose primary appointment is in the Chemistry Department. The student, in consultation with their research advisor, is responsible for selecting appropriate members. Students should ask faculty to be on their committee *at least two months* before they wish to take the examination. The committee that administers the candidacy examination normally forms the student's final thesis committee. It is the student's responsibility to verify their availability for the candidacy examination with their committee members one to two months in advance of the proposed date. Once a date and time has been established, the student should reserve a room using 25Live (or as appropriate schedule a Zoom meeting). Written documents (see below) should be provided to the committee at least one week before the scheduled examination date. Students must download a 2nd year oral exam form from the Chemistry "Useful Links" webpage and bring it to the examination.

The thesis committee, in addition to conducting the candidacy exam, acts as a supplemental resource for the student. For example, students may seek out their committee members for advice on project direction, various expertise in areas of research unfamiliar to the student, as well as life and future career advice, including writing recommendation letters. When choosing potential committee members, students should seek advice from older graduate students as well as their advisor for whom they think may be a good fit for the student's project. As committee members are also invaluable resources for general advice, students should consider the approachability and ease of conversation with potential members.

In addition to a student's performance in the oral and written components of the examination (see below), candidates will be judged on progress in research. At the close of the candidacy exam, the student leaves the room, and the committee discusses the results in order to come to a decision that is delivered immediately to the student (students are also entitled to meet with committee members

without their advisor present). Possible outcomes of the exam are Pass, Conditional Pass, or Fail:

Pass = The student is advanced to candidacy (after filing the appropriate form).

Conditional Pass = The student has not yet demonstrated all four of the pillars listed above (*i-iv*) needed for advancing to candidacy. The committee establishes a set of activities that will help the student to improve their performance. This may include additional written work, enrolling in additional courses, and/or retaking the oral examination. The committee will provide to the student a written summary of recommendations recorded by the academic support staff.

Fail = A student who fails the exam can choose to repeat the examination, or to leave the Ph.D. program.

In all of these outcomes, students who have fulfilled the appropriate course requirements can receive a Master's degree (see section D below).

B. Specific Description of the Candidacy Examination

The candidacy examination consists of both written and oral components. In each component students will be expected to demonstrate a thorough knowledge of the thesis area and related areas of chemistry, and to discuss competently the results that have been obtained and the future direction(s) of the project(s). In the written component students are expected to produce a proposal based on their Ph.D. project. The proposal should contain information about results obtained to date and planned future work. A general format for the proposal is provided below with approximate guidelines for section lengths given in parentheses:

1. **Title Page:** State the title of the proposal, list the committee members, and include the date/time/location (or Zoom link) for the oral examination.
2. **Background and Significance:** Briefly describe existing knowledge relevant to the proposed research and identify any gaps that the proposed work is intended to fill. (1–2 pages)
3. **Specific Aims:** State the specific objectives of the research project(s) being described in the proposal. (0.5–1 page)
4. **Preliminary Results:** Summarize your own completed and ongoing studies. (2–3 pages)
5. **Proposed Research:** Outline the experimental design and the procedures to be used to accomplish the specific aims of the project. (3–4 pages)
6. **Conclusions:** Summarize the proposal and describe the impact of the results on the field of study. (<0.5 pages)
7. **References:** List relevant literature citations. For appropriate style, consult either ACS (*e.g.*, *J. Am. Chem. Soc.*) or APS (*e.g.*, *J. Chem. Phys.*) guidelines.

The relative length of the sections does not have to exactly follow the suggestions above, but the final written document is expected to be ten pages or less excluding references. The written proposal should be provided to the committee at least one week before the oral examination.

More specific instructions for formatting the proposal are as follows:

1. Type density, including characters and spaces, must be no more than 15 characters per inch

with no more than six lines of text per inch. Use one of the following typefaces:

- Arial, Courier New, or Palatino Linotype at a font size of 11 points or larger
- Times New Roman at a font size of 12 points or larger
- Computer Modern family of fonts at a font size of 11 points or larger

2. Set page margins to 0.75 inches.
3. A font size of less than 10 points may be used for mathematical formulas or equations, figure/table/diagram captions, and when using a Symbol font to insert Greek letters or special characters, but it must be in a black font color, readily legible, and follow the font typeface requirement.
4. Color can be used in figures; however, all text must be in a black font color, clear and legible.

The oral examination consists of a two-hour examination based on the written proposal. For the oral examination, students should plan to arrive with ~45 minutes' worth of prepared material summarizing their written proposal (students often choose to use PowerPoint, Keynote, or similar presentation software), but should anticipate being interrupted with questions. In addition to testing the student's knowledge of their Ph.D. project, the examination emphasizes fundamental chemistry and probes the candidate's comprehension of necessary background material, including topics that go beyond those specifically related to the thesis. The most fruitful exams evolve into a discussion on the student's ideas for the project and are an excellent opportunity for feedback and student development. After the examination, students submit their signed oral exam form and a copy of their written report to chemistry.dgs@yale.edu.

C. Advancement to Candidacy

At the end of the second year of study, qualified students advance to candidacy for the Ph.D. degree. To advance to candidacy, students must have met the following criteria:

1. Complete the course requirements: As noted above, the Graduate School requires that each student must receive at least two term grades of Honors within the first two years, exclusive of those for research, seminar, and shop courses. Only one of the required two Honors can be earned in a laboratory course (*e.g.*, Chem 560L). Students must also attain an average of at least High Pass for their top five grades, exclusive of Chem 700.
2. Passed the candidacy examination. As described above, in the case of a Conditional Pass, additional requirements may have been added to ensure that the student is on a successful track for Ph.D. completion.

A student who has not satisfied these requirements by the end of the second year will be reviewed by the Department. If the evaluation indicates that the student is unlikely to complete the requirements for the Ph.D., they will be asked to withdraw from the program and referred to the Dean of the Graduate School. However, if the evaluation indicates that the student is likely to advance with further effort, they will be given a deadline for completion of the requirements for advancement to candidacy.

D. Master's Degrees

Students may apply for a Master of Science degree when the necessary requirements are met or if they decide to leave the Ph.D. program. The requirements for the M.S. are as follows:

1. Residence: A student must have at least one academic year of residence.
2. Courses: A student must pass at least five graduate-level term courses relevant to their field of study and exclusive of seminars and research. In addition, an overall average (exclusive of seminars and research) of High Pass must be maintained across all courses. The DGS may approve substitution of graduate-level courses in other departments.

V. Requirements Beyond the Second Year

A. Annual Progress Reports, Independent Proposal, and Public Presentations

In years without a required committee meeting, students have the option to meet with their committee once per year. These meetings give students the opportunity for additional insights into their research, to discuss career advice and their experience during the Ph.D. so far. Faculty on committees are required to make themselves available for at least one annual committee meeting.

By the end of the fourth year, students are encouraged to make at least one public presentation of their research progress and present an independent proposal to their thesis committee. Information about each of these activities is provided below.

1. Dissertation Progress Reports (DPRs). Once a student has advanced to candidacy, the Yale Graduate School of Arts and Science will notify them annually by email to fill out the online Dissertation Progress Report form. Once requested by the Graduate School, the student will not be able to register for the next semester until their portion of the form has been submitted. The student is asked to provide a summary of their research progress and plans for the coming year. The descriptions can be brief but should clearly convey the student's progress and what their research plans and goals are. Students often supplement their descriptions by attaching documents such as published or submitted manuscripts or a written copy of their candidacy exam when the DPR is requested at the time that the student has advanced to candidacy. Depending on the student's year, they might be asked additional questions such as to provide the nature and frequency of their meetings with their advisor or the date at which they expect to submit their dissertation. The student's advisor is next required to complete a parallel set of questions, including their evaluation of the student's progress, appropriateness of future plans, and agreement on the date specified by the student for submitting their dissertation The DGS then completes the report and looks to see that students are making progress toward their Ph.D. degree and that there are no serious discrepancies between the student and advisor regarding future goals or dissertation submission timelines. Each student has online access to their completed DPRs, including those sections filled out by their advisor and the DGS.

2. Independent Research Proposal Examination. Part of being a Ph.D. chemist is the ability to devise, research, and defend new research directions. In order to provide training in this area, students are required to write and defend an independent research proposal after candidacy and before the end of the spring semester of their fourth year of graduate studies. The exact timing of the proposal will be determined by the student and their research advisor, in conjunction with the thesis committee.

The format of the independent research proposal examination is similar to that used to advance

the student to candidacy and involves both a written and oral component. The major difference is that instead of preparing a proposal based on their own research, students now are expected to craft an independent proposal that is not related to their Ph.D. work. This is defined as a proposal based mostly on literature that the student would not normally read to directly support their thesis project. This also should not be on the topic of specific ongoing research in the department, because it should require the student to independently devise the ideas. Research advisors must approve the topic of the proposal prior to the student beginning an in-depth investigation.

The independent research proposal must follow the guidelines for the NIH Ruth L. Kirschstein National Research Service Award (NRSA), as described on the NIH website.

The essentials of this format are:

1. Specific Aims (Limited to 1 page): State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved. List succinctly the specific objectives of the research proposed, for example, to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm, address a critical barrier to progress in the field, or develop a new technology.
2. Research Strategy (Limited to 6 pages including all figures, charts, and tables): *Background and Significance* (Typically 1–2 pages): Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses. Explain how the proposed project will enhance scientific knowledge. Explain how the approach pursued differs from others, and what will render this approach superior to what has come before. If no related work has been done in the area, discuss the conceptual advances that lead to your approach.
   Approach (Typically 4–5 pages): Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project. Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.
3. Literature Cited (No page limit): Provide a bibliography of any references cited. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication.

Format specifications are as follows:

1. The page margins must be at least 0.5 inches.

2. Use black Arial, Helvetica, Palatino Linotype, or Georgia typeface, and a font size of 11 points or larger. Type density, including characters and spaces, must be no more than 15 characters per inch with no more than six lines of text per inch.

3. For Figures, Graphs, Diagrams, Charts, Tables, Figure Legends, and Footnotes one may use a smaller type size but it must be in a black font color, readily legible, and follow the font typeface requirement. Color can be used in figures; however, all text must be in a black font color, clear and legible.

The oral part of the proposal assignment will consist of a 60–90 minute examination based on the

written proposal. Students should plan to arrive with ~30 minutes' worth of prepared material summarizing their written proposal (students often choose to use PowerPoint, Keynote, or similar presentation software), but should anticipate being interrupted with questions.

As with the candidacy examination, it is the responsibility of the student to verify with their committee members their availability for the independent research proposal examination one to two months in advance of the proposed date. Once a date and time has been established, the student should reserve a room using 25Live. Written documents should be provided to the committee at least one week before the scheduled examination date. Results of the examination are provided immediately after a brief discussion of the examination among the members of the examining committee. The committee will provide to the student a written summary of recommendations to be recorded by the academic support staff. Students should download a form for this purpose from the Chemistry "Useful Links" webpage and bring it to the examination. After the examination, students must submit their signed oral exam form and email to chemistry.dgs@yale.edu.

B. Thesis Requirements

In general, the thesis topic is initially decided in consultation with the research advisor. The direction of the thesis topic develops based on outcomes from the student's research in the laboratory and may be constrained from sources of funding supporting the student's research.

1. Thesis Format. The Graduate School has a number of detailed requirements for the format of the thesis and such criteria should be consulted by the student prior to beginning to write the thesis. A link to the requirements is available online on the Chemistry "Useful Links" webpage. After all of the changes recommended by the thesis committee have been made, an electronic PDF copy should be emailed to chemistry.dgs@yale.edu. The thesis committee members and the graduate school degree committee determine the final acceptance of a thesis.

2. Thesis Deadlines and Tuition Bills. A typical time for completion of the PhD degree is 4.5–6 years and depends on the progress of the student's research and fulfillment of the thesis requirements (see below). All Ph.D. candidates in years one through four are charged full tuition. Once a student has met the four-year tuition requirement, the University charges a continuing registration fee (CRF) per term until the dissertation is submitted. These charges are covered by the research grants of their advisors and/or University Fellowships, but not by the student (through the sixth year of study). A special petition from the department is required to extend a terminal date beyond the sixth year. Online forms can be found on the University Registrar website under "Forms".

Thesis for December degrees are submitted at the beginning of October, and by mid-March for May degrees.

Detailed instructions for the steps needed to graduate will be sent to all students starting in their fourth year of study. Students should contact the academic support staff at least one year in advance of their intended graduation to ensure they are aware of all pertinent deadlines and requirements to be able to participate in graduation and receive proof of degree prior to employment. All necessary forms and templates can be found on the Chemistry "Useful Links" webpage.

3. Thesis Seminar. Each student will conclude their research activities by presenting an open seminar on their thesis work to the department. Exceptions may be made in rare circumstances, and only with the concurrence of the thesis advisor and the DGS. At least two of the thesis committee members must attend the thesis seminar. At least two weeks prior to the thesis seminar, the student should provide each committee member with a copy of the thesis that is complete and formatted according to the requirements of the Graduate School.

4. Departure. Preparation for further employment is primarily done in close consultation with the research advisor. The thesis committee is another valuable resource, and many informational programs are held by the Yale Office of Career Services, the Chemistry department Professional Development Network, and other organizations on campus. It is appropriate to start thinking about next steps at the end of the fourth year of the Ph.D., if not earlier.

Before students leave the Department, it is necessary to certify that all keys, books, lab coats, and laboratory equipment have been returned, that all computer files and records have been organized and transmitted to the faculty advisor, and that the student's research area has been cleaned and left free of hazards. Proper disposal of residual chemicals by each student is required prior to departure because it is tremendously expensive and unsafe to dispose of unknown chemicals. All students must also fill out a "Notification of Leave/Graduation" form to let the department know they are leaving and any future employment and contact information. Students who intend to submit their thesis after January 31 or September 1, but who intend to leave New Haven prior to these dates should inform the academic support staff.

Students who are considering leaving the Ph.D. program prior to their terminal degree should schedule a discussion with the DGS or the Director of Graduate Student Climate & Diversity.

The department has a Climate Exit Survey that all departing students (irrespective of degree status) should complete.

VI. Teaching and English Language Requirements

A. Teaching Requirements

Students are required to serve as Teaching Fellows (TFs) at the TF20 level for two (2) semesters during their studies. Typically teaching requirements are fulfilled in the first two semesters of study, but graduate students on training grants often delay fulfilling their teaching requirements to their fourth year in consultation with their thesis advisor. Graduate students entering the program with an external fellowship (e.g., NSF fellowship) should consult with their primary thesis advisor or DGS to determine if they should defer the start of their fellowship to fulfill teaching requirements during the first year. The workload inevitably varies with the course assignment, but a student should report to the DGS if they are being asked for duties that exceed 20 hours per week for a TF20 assignment.

In later semesters, graduate students may teach additional semesters, at the discretion of the research advisor. Students should be advised that the Poorvu Center for Teaching and Learning

at Yale (https://poorvucenter.yale.edu/) offers in-depth instruction on teaching as well as a program to earn a *Certificate of College Teaching Preparation*, for students who have teaching in their career aspirations.

B. Graduate School Regulations on Outside Work

The Graduate School has rules and regulations regarding employment outside of the chemistry department. The Graduate School regulations (https://gsas.yale.edu/resources-students/finances-fellowships/student-employment) state, "*Part-time employment at the University or elsewhere should not conflict with your degree program or interfere with your academic progress. If you seek part-time employment beyond an average of ten hours per week, you need to get permission from your Director of Graduate Studies in consultation with the appropriate associate dean of the Graduate School. See the Programs and Policies handbook for more information*." Outside employment, of any type, by a graduate student also must be approved by the student's research advisor.

The Graduate School will allow most graduate students to tutor in courses they are not teaching. However, specific approval must be obtained from the research advisor before committing to other obligations of this sort. Generally, only limited hours will be approved because the focus of each student's Ph.D. work must be research.

C. English Language Requirements

International students must demonstrate proficiency in spoken English prior to being assigned as a TF. Proficiency can be demonstrated by obtaining a score of 26 or higher on the TOEFL Speak test, 50 or higher on Yale's SPEAK test, or completing a degree with at least two years of study from a university other than Yale in which the language of instruction is English. The SPEAK test is given at Yale three times each year: in August, just prior to the start of the Fall term, in December, and in May. Any student who has not fulfilled the spoken-English proficiency requirement must take the SPEAK test every time it is offered. Students who have not completed the spoken-English proficiency requirement must enroll in a course in spoken English at the Yale English Language Institute. Attendance of this course is mandatory during each academic term, as well as over the summer, until the spoken-English proficiency requirement is completed.

VII. Student Health and Safety

A. Community Standards of Behavior

The Yale Chemistry Department is committed to promoting a diverse, equitable, and inclusive community that celebrates and emphasizes respect for individuals from all races, nationalities, ethnicities, genders, sexual orientations, backgrounds, socioeconomic statuses, religions, identities, abilities, and ideologies. Diversity is a core value that guides departmental decisions and policies. As such, harassment and discrimination of members of our community are not tolerated, and there are University-level mechanisms for reporting, investigating, and determining repercussions of behavior that falls outside of our community standards. Any misconduct can be reported to the Director of Graduate Student Diversity and Climate, the Director of Graduate Studies, the Dean and Director of the Office of Graduate Student Development and Diversity (Michelle Nearon), a Title IX Coordinator (https://provost.yale.edu/title-ix/coordinators), or the SHARE Center (https://sharecenter.yale.edu). The systems for reporting sexual, racial, and other harassment are connected enough that you can contact any of these resources and it will be

transferred to the appropriate office. For additional resources, see https://student-dhr.yale.edu.

B. Chemical Safety

Safety should be a primary concern of all students working in a research laboratory. Safety in the laboratories begins, first and foremost, with a sense of responsibility to yourself and your colleagues because failure to comply with safety policies puts everyone at risk. Any lab-related injuries or the use of a fire-extinguisher must be reported immediately to the research advisor and to EHS at 203-785-3555, and those affected must seek medical attention.

1. Safety Training. All incoming graduate students are required to complete Web-based Laboratory Chemical Safety training courses (https://ehs.yale.edu/trainings/laboratory-chemical-training) prior to beginning any laboratory work. Depending on the nature of your lab work, graduate students may need to complete additional training courses that can be found on the EHS website (https://ehs.yale.edu/training). Each year during orientation, the department holds a Safety Day at which attendance of all incoming students, post-docs having started after the previous year's Safety Day, and lab safety officers is required. Individual research groups also have more specific safety policies. Contact the safety officer and PI of your lab to learn these lab-specific policies.

2. Personal Protective Equipment. All graduate students are expected to comply with appropriate personal protective equipment (PPE) requirements appropriate to the nature of their lab work. The Chemistry Stockroom provides all students with two flame-resistant lab coats, which can be cleaned by placing dirty lab coats in the designated receptacle outside of the Chemistry Stockroom. Safety glasses can be purchased from the Chemistry Stockroom or Kline Stockroom located in the Bass Center basement. Prescription safety glasses can also be obtained by contacting the Chemistry Stockroom.

Following CDC recommendations for COVID-19, all students can obtain disposable masks, hand sanitizer, and disinfecting wipes at the following link: https://ypps.yale.edu/return-yale-orders. The Chemistry Stockroom also provides flame-resistant face masks to graduate students and post-docs upon request.

3. Waste Disposal. The U.S. Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) have strict regulations on the handling of chemicals and waste. Yale Environmental Health and Safety (EHS) conduct periodic on-site inspections of all laboratories and facilities. Deficiencies identified during the inspections must be corrected and answered promptly. EHS may impose additional sanctions if items are not resolved within a reasonable time. Federal and local agencies conduct periodic unannounced inspections. These agencies have legal authority to fine or close the labs should there be deficiencies that may accompany severe safety consequences.

All chemical waste must be placed in a secondary container. It is critical that every waste bottle (i) be labeled with a proper waste tag, (ii) the contents of the bottle be listed in English words, not formulas or structures, and (iii) that the vessel is always capped except when actively adding material to the bottle. Waste labels are provided by EHS and supplied in the Chemistry Stockroom. Chemical, biomedical/sharps, and solid waste can be picked-up by request (https://ehs.yale.edu/request-waste-pickup). Broken glass can be discarded into cardboard boxes lined with designated plastic bags obtained from the Chemistry Stockroom. Filled boxes can be taped, labeled as "broken glass", and placed in the hallways outside of your lab for pick-up. Labs

that are large generators of chemical waste may be on automatic weekly pick-up schedules.

For additional safety resources, see https://ehs.yale.edu and https://jst.chem.yale.edu.

4. Safety Compliance. Adherence to the established safety procedures is required for all individuals to remain in good standing. Occasionally there are individuals who are repeatedly unable or unwilling to abide by safety policies. To resolve such cases, the following program has been instituted:

Step 1: Individuals whose research advisors find them to be repeatedly out of compliance with our safety policies will be required to discuss the issues in question with their advisor and the DGS. This is meant to give both parties an opportunity to articulate their position and basis for behavior and come to a mutually agreeable solution that addresses all issues. The individual may be reprimanded by actions including, but not limited to, suspension from laboratory work, assignment of additional laboratory duties, or routine safety inspections. A written summary of this meeting will be kept in the student's file.

Step 2: If the efforts above are unsuccessful, there will be a formal meeting of the student's thesis committee. In cases where a thesis committee has not been formed (*e.g.*, first-year graduate students), an *ad hoc* committee composed of three faculty members will be established. The committee may recommend additional actions. A summary of this meeting will be recorded.

Step 3: If both of the above meetings are unsuccessful, the individual will be referred to the Dean of the Graduate School with the recommendation that they be transferred to an alternative program or dismissed from the University.

Each laboratory has one or more designated safety officer(s), who help the PI to ensure laboratory members are in compliance with all safety rules on a day-to-day basis. The safety officers also are instructed by the faculty to bring repeated instances of non-compliance to the attention of their faculty advisor.

5. Near Miss Reporting. Near misses are any incident that could have resulted in injury, property damage, or death, but did not. Reporting safety incidents and near-misses allows our community to learn from the mistakes of others, and decreases the chance of similar incidents happening again. Regardless of whether an incident occurred or whether it was prevented in time, we encourage everyone to report incidents that they believe others can learn from. Near miss reports can be submitted and viewed online (https://jst.chem.yale.edu/near-miss-reports-0).

6. COVID-19 Safety. All students, staff, and faculty are required to follow safety protocols including pandemic prevention. A member of the Yale community who has a concern about compliance with COVID-19 health and safety policies or regulations may raise that concern to a supervising faculty member or may make an anonymous or identified report through the University Hotline (877-360-YALE). The hotline is available 24 hours a day, seven days a week. University policy prohibits retaliation against community members who in good faith report possible violations of Yale policy, including possible violations of health and safety standards related to COVID-19.

C. Personal Health and Safety

Research productivity should not be allowed to compromise students' health and safety. Taking care of your health is an important part of life as a graduate student. All GSAS students have access to Yale Health, which is the comprehensive, on-campus, full-service health center and health care plan for students and their family members. Yale Health Basic Coverage is provided at no cost to students enrolled at least half-time in M.A., M.S., and Ph.D. programs. You may also enroll in optional Graduate and Professional Student Dental and Vision Care plans. For information about Yale Health, see https://gsas.yale.edu/resources-students/health-wellness.

Good mental health and wellness are critical to your success as a graduate student. There are many supportive resources and people at Yale to help. Students are encouraged to seek professional counseling when needed. Yale Health offers free and confidential Mental Health & Counseling (https://yalehealth.yale.edu/directory/departments/mental-health-counseling). For additional resources, see https://gsas.yale.edu/resources-students/health-wellness.

Yale Public Safety provides many services designed to keep the Yale community safe. The LiveSafe app is available, which gives students an effective way to communicate with the Yale Police (https://your.yale.edu/community/public-safety/stay-safe-campus/livesafe-app). Students also have access to the Yale Shuttle Bus service (https://your.yale.edu/work-yale/campus-services/parking-and-transportation-options/shuttle) and nighttime shuttle safe rides available from 6 PM to 6 AM that take you door-to-door (within the campus boundary) by using TapRide or calling 203-432-6330. For additional resources, see https://your.yale.edu/community/public-safety/stay-safe-campus.

Moreover, students should obey all University-declared weather emergencies.

D. Leaves of Absence

The Yale Graduate School manages requests for leaves of personal or medical reasons, and also offers parental leave for new parents of any gender. Students desiring a leave of absence should discuss with the DGS and/or their thesis advisor as the point of first contact.

When arranging any leave of absence, the student, advisor, and DGS should determine a schedule of follow-up contacts. Ideally, the student and advisor should communicate halfway through a leave of absence to ensure that the advisor and the student have a plan for how and when the student will return, and what aid is needed. In many cases, there are additional requirements for return to ensure that the student is prepared to resume graduate study; this commonly involves the submission of a piece of academic work that the student's advisor deems satisfactory for their return. Once approved by their advisor, the student should contact the DGS who will then notify the Dean of Graduate Students of the student's department-approved submission. If the student does not intend to return and/or does not reply within a week, the advisor will notify the DGS. If the student does not register for the term of the planned return, they will be administratively withdrawn from the Graduate School.

Please consult the GSAS website for more information (http://catalog.yale.edu/gsas/policies-regulations/academic-regulations/#leavesofabsence).

E. Vacation Time

All graduate students are entitled to a minimum of 12 days** vacation time beyond the designated

University/Federal holidays (https://your.yale.edu/work-yale/benefits/paid-time/official-yale-holidays): New Year's Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day. **A day is defined as a normal workday for your lab.

Research advisors should be notified of students' intentions to use vacation time. Additional vacation time falls under the jurisdiction of the research advisor and should arise from a discussion with them.