



Department of Chemistry  
University of Utah

# Graduate Program Handbook

**Date Created: April 2020**  
**Last Revised: March 2022**

*For updates and feedback, contact*  
*Prof. Ilya Zharov, [i.zharov@utah.edu](mailto:i.zharov@utah.edu), 801-587-9335*  
*Ms. Jo Landa Vallejo, [jvallejo@chem.utah.edu](mailto:jvallejo@chem.utah.edu), 801-581-4393*

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## Welcome to the Chemistry Department Graduate Program

*Welcome from the Department Chair, Professor Matt Sigman.* Thank you again for selecting the University of Utah to pursue your graduate studies in chemistry! Our department provides you with an exceptional and inclusive environment to explore your passion for science. Not only do we have outstanding faculty and facilities, but we also provide you with an interactive environment to pursue an impactful and rewarding doctoral degree. The department is highly collaborative working in both basic and applied areas of chemistry with many research teams involved in interdisciplinary research goals. This collegial environment provides you with many opportunities to expand into new and emerging areas of chemistry.

Personally, I viewed my time in graduate school as incredibly rewarding. It allowed me to grow extensively as a scientist, make lifelong friends, and mature as a person overall. I hope you experience a similar life changing path – one that will define you as a scientist, professional, friend and person as you move through your career. I wish you my best in your scientific explorations and defining your learning opportunities as you move through graduate school.

## Support and Administrative Structure

The Department of Chemistry created a support structure designed to assist graduate students at every stage of their progress toward the Ph.D. Below are the key participants of the support and administrative structure most directly involved in the graduate program at the Chemistry Department. These individuals are also responsible for making sure that the graduate program is governed by clear policies and those policies are followed and applied uniformly and fairly to all students and faculty.

**Director of Graduate Studies (DoGS).** The Director of Graduate Studies oversees the graduate program together with the Graduate Education Committee. The DoGS also is a resource for questions about the program, Departmental policies and decisions. The DoGS, amongst other responsibilities, (1) keeps up to date the Departmental Graduate Handbook, which is the manual for incoming and current graduate students; (2) meets informally with graduate students to resolve issues, especially for students who appear to be stuck and not making progress towards finding a research supervisor, completing degree, etc.; (3) maintains a departmental web page for graduate students; (4) keeps track of changes in University policies regarding graduate students and communicates this with the students/faculty; (5) helps resolve issues of graduate student support; (6) runs graduate student town meetings to assess issues in the department that are affecting graduate students; (7) organizes orientation sessions for incoming graduate students; (8) approves graduate students' selections of Research Advisor and Supervisory Committee members. DoGS is an advocate for the graduate students and can mediate between the students and their Research Advisor, Graduate School and the University, if needed. If a student has a problem that cannot be solved by Research Advisor, or is unsure about what needs to be done to meet Departmental or Graduate School requirements, the student can talk to DoGS at any time. For a student who is not meeting milestones, DoGS determines whether progress is sufficient to warrant exceptions, funding, and/or continued participation in the program.

**Graduate Education Committee.** This Departmental committee consists of three Chemistry faculty and is headed by the DoGS. The faculty composition of the committee is meant to reflect the diversity of research programs in the Department of Chemistry. The committee has several important roles in overseeing the graduate program; these include identifying means to support

students in reaching their academic goals, formulating graduate program policies, advising students, monitoring student progress, and selecting awardees for fellowships.

**Graduate Coordinator.** The Graduate Coordinator runs the graduate program on a day-to-day basis and helps with all administrative steps that are required of students as they progress toward their degree. The Graduate Coordinator is also a resource for questions about the program. The Graduate Coordinator is responsible for keeping all records relating to the academic progress of the graduate students. All the various instructions and forms a student will need during their career as a graduate student may be obtained from the Graduate Coordinator.

**Research Advisor.** The Research Advisor is the primary research mentor for a student until graduation. Once the Research Advisor is selected, that person is assigned as Chair of the Supervisory Committee.

**Supervisory Committee.** After a doctoral student chooses a Research Advisor, in consultation with the advisor the student selects four faculty members to this advisory committee that monitors student progress, approves the program of study, and administers exams, including the thesis defense.

**Department Chair.** Along with the DOGS, the Chemistry Chair can help with problems that might arise during a students' graduate career. The Chair is the person who may participate in resolving a variety of graduate students-related problems, and also the person who participates in decisions regarding graduate student support and dismissal.

**Graduate Student Advisory Committee (ChemSAC).** The ChemSAC, composed of current Chemistry graduate students, (1) organizes social and professional graduate student activities; (2) makes formal reports to the department concerning promotion, tenure, and retention of faculty members; (3) makes informal recommendations it feels appropriate concerning the graduate program to faculty and leadership of the Department; and (4) assists the Department in communicating and explaining policies and requirements to graduate students.



## Contact Information

### Faculty & Leadership Contacts



#### **Director of Graduate Studies**

Prof. Ilya Zharov  
[i.zharov@utah.edu](mailto:i.zharov@utah.edu)  
801.587.9335  
Office: TBBC 3416



#### **Department Chair**

Prof. Matthew S. Sigman  
[sigman@chem.utah.edu](mailto:sigman@chem.utah.edu)  
801.585.0774  
Office: HEB 3210

### Administrative Staff



#### **Graduate Program Coordinator**

Ms. Jo Landa Vallejo  
[jvallejo@chem.utah.edu](mailto:jvallejo@chem.utah.edu)  
801.581.4393  
Office: TBBC 4404



#### **Graduate Program Administrative Assistant**

Ms. Eden Wolfgramm  
[eden.wolfgramm@utah.edu](mailto:eden.wolfgramm@utah.edu)  
801.585.5931  
Office: TBBC 4408

## Student Contacts



**ChemSAC co-President**  
Hanna Clements  
[hanna.clements@utah.edu](mailto:hanna.clements@utah.edu)



**ChemSAC co-President**  
Dale Cummings  
[D.Cummings@utah.edu](mailto:D.Cummings@utah.edu)

## Departmental Directory

Directory including faculty, staff and facilities can be found on the departmental website, <https://chem.utah.edu/>

# Doctor of Philosophy Degree

## Program Description

The goal of the Ph.D. program within the Department of Chemistry at University of Utah is to prepare students for successful careers in industry, academia, and government at the Ph.D. level. This requires advanced fundamental knowledge in chemistry, the ability to conduct independent and collaborative research, to teach, to provide training and mentorship, to conceive and write research proposals and plans, and to communicate research results in oral and written form. The goal of the program is achieved by obtaining experiences in laboratory and computational research, teaching, independent proposal development, and preparation of manuscripts and a dissertation for publication, as well as attending lecture courses and presenting seminars. The aim of the program is for our Ph.D. chemistry students to gain the learning outcomes listed below.

## Expected Learning Outcomes

### **Discipline Knowledge**

1. Broad knowledge of chemistry
2. Deep understanding in area of chemical specialization which includes an understanding of modern research methods and the frontiers of knowledge in the area of specialization

### **Critical Reasoning and Communication Skills**

1. Ability to critically analyze and interpret scientific literature
2. Ability to effectively present scientific ideas and results in written communication
3. Ability to effectively present scientific knowledge, ideas and results in oral communication

### **Research Design and Independence**

1. Ability to independently propose new research directions and meaningful, testable hypotheses
2. Ability to independently design experiments to investigate scientific hypotheses

### **Experiment Planning, Performance and Interpretation of Results**

1. Ability to independently plan and carry out experiments safely, using proper equipment and techniques
2. Ability to independently analyze and evaluate data, and interpret experimental results to advance new scientific knowledge
3. Ability to work independently and in a team
4. Ability to provide project leadership and to mentor junior co-workers

## Program Timeline

### Milestones

	<b>Due Date</b>	<b>Milestone</b>
<b>First Year</b>	<b>By the start of the Fall semester</b>	Complete orientation and register for Fall classes
	<b>By the start of the Spring semester</b>	Register for Spring classes
	<b>March 15</b> (recommended December 15)	Complete three lab rotations
	<b>March 15</b> (recommended December 15)	Select Research Advisor
	<b>End of Spring semester</b>	Complete coursework
<b>Second Year</b>	<b>September 1</b>	Select Supervisory Committee
	<b>September 1</b>	Schedule Departmental Seminar
	<b>November 15</b>	Present Departmental Seminar
	<b>March 1</b>	Submit Oral Exam Written Report
	<b>March 1</b>	Schedule Oral Exam
	<b>May 1</b>	Pass Oral Exam
<b>Third Year</b>	<b>September 1</b>	Schedule Research Proposal Exam
	<b>September 1</b>	Submit Specific Aims for approval
	<b>October 15</b>	Submit Written Research Proposal
	<b>November 15</b>	Pass Research Proposal Exam
<b>Fourth Year</b>	<b>March 1</b>	Schedule Research Progress Meeting
	<b>April 1</b>	Submit Written Research Progress Report and Preliminary Dissertation Outline
	<b>May 1</b>	Attend Research Progress Meeting
<b>Fifth Year</b>	<b>Two weeks before the defense</b>	Submit Written Ph.D. Thesis
	<b>End of the 5<sup>th</sup> year</b>	Defend Ph.D. Dissertation

## University Deadlines

- Academic calendar deadlines  
<https://registrar.utah.edu/academic-calendars>
- International Teaching Program deadlines  
<https://gradschool.utah.edu/ita/important-dates-and-deadlines>
- Thesis Office manuscript submission deadlines  
<https://gradschool.utah.edu/thesis/calendar>
- University Fellowship deadlines, including Teaching Assistantship & Research Assistantship deadlines  
<https://gradschool.utah.edu/tbp/graduate-fellowship-opportunities>
- Graduation deadlines  
<https://registrar.utah.edu/graduation>

## Admission Requirements & Procedures

### Requirements

- Graduation with a recognized four-year degree
- Minimum GPA of 3.0

### Application Process

Apply using the University of Utah Graduate Admissions Application. Follow the instructions on the application site to submit the following:

- original transcripts
- three letters of recommendation (at least one from a faculty member in the college or university you attended)
- GRE (general) scores – currently suspended
- statement of purpose
- CV
- TOEFL scores (only for international students who did not complete a degree in the US)

Note: application fee to the University of Utah is covered by the Chemistry Department - you should not pay the application fee on the Graduate Admissions page.

### Application and Acceptance Dates

For priority consideration, completed applications should be received by December 1. Applications received after that date and until February 1 will be reviewed on an ongoing basis. By agreement with other US universities, we ask that you make your decision to accept our chemistry graduate offer by April 15. In order to accept our offer simply send an e-mail to that effect to the Graduate Coordinator.

### International Students

#### Requirements

In addition to the general requirements, international students have to take the TOEFL or IELTS and attain the score around 105 or 7.5, respectively, for admission into the program.

#### Visa Instructions

An I-20 Certificate of Eligibility is necessary to apply for an F-1 student visa through a U.S. Consulate abroad or to maintain F-1 student status in the United States. The University of Utah will begin processing I-20 after a student accepted our admission offer. Contact the Graduate Coordinator for questions related to obtaining the F-1 visa and refer to the Admissions Office for detailed instructions: <https://admissions.utah.edu/i-20-information/>

## Program Orientation

Incoming graduate students will be set up in the program during the Departmental Orientation. The orientation takes place one week before the start of fall classes. International students should arrive two weeks before the start of fall semester in order to attend the international student orientation and International Teaching Assistants Program (ITAP) training. The orientation includes a number of mandatory activities and is organized by the Director of Graduate Studies and the Graduate Coordinator. The incoming students will receive detailed instructions for the orientation before their arrival and should direct any questions to the Graduate Coordinator.

Note that students will need to obtain an University ID number to complete all on-line activities, and University Identification Card to gain access to the buildings and facilities, recreation center and public transportation. Students are required to use UMail for all communications related to their studies and work at the University of Utah. It is also imperative that students ensure that their UMail addresses have been added to the graduate students' mailing list in order to receive all announcements in a timely manner. Students must also join the Canvas class called "Department of Chemistry Graduate Students 20XX", where XX stands for the year when the student starts in the program, in order to follow the program of study, use the appropriate forms and upload required documents.

### Mandatory Activities During Orientation Week

- Obtain UNID and University Identification Card
- Set up UMail account
- Add UMail address to the Chemistry graduate student email list following the Departmental IT person's instructions
- Accept e-mail invitation to the graduate students' class on Canvas
- Set up payroll at the Department
- Participate in TA training
- Participate in safety training
- Participate in Office of Equal Opportunity training
- Meet with Graduate Education Committee member to discuss and receive approval of coursework selection
- Submit Course Selection Form
- Register to courses
- Participate in faculty poster presentations
- Submit Rotation 1 Selection Form

### Additional Mandatory Activities for International Students

- Visit International Student and Scholar Services (ISSS) for international student orientation
- Participate in International Teaching Assistant Program (ITAP) in order to obtain clearance for teaching

## Financial Support and Tuition Benefits

Under current Department of Chemistry guidelines, any graduate student who is admitted into the Chemistry graduate program with BS/BA and is in good academic standing is guaranteed financial support for 5 years as a Ph.D. candidate (students arriving with a MS receive 4 years of financial support). This support may come in the form of a Research Assistantship received through research funding or a Teaching Assistantship. Please be aware that the only departmental source of financial support to graduate students is in the form of Teaching Assistant positions. Thus, the guarantee of financial support presupposes that a student can function satisfactorily as a Teaching Assistant, and has had an acceptable level of achievement as a TA. A student is ineligible for a TA position and a guarantee of financial support if the student is not qualified to teach. Reasons for ineligibility include but are not limited to: poor evaluations from students or faculty supervisor, failure to obey safety regulations, or inability to communicate effectively in English. This policy only supports students who are making normal progress towards a degree, and is designed to assure that the Department of Chemistry will support students even if (for example) their Research Advisor's research support is unexpectedly cut off.

In addition, graduate students' tuition is covered by tuition benefits programs. Ph.D. students supported as TAs receive up to 5 years of tuition covered through the Graduate School's Tuition Benefit Program (TBP). M.S. students supported as TAs receive up to 2 years of tuition covered through TBP. Ph.D. students supported as RAs receive tuition benefits through the Extended Tuition Benefit Program (xTBP) paid by research funds of their Research Advisor.

Any financial support beyond the guaranteed periods depends on the arrangements made with the Research Advisor and might need to be negotiated with the Department Chair.

More details of the Graduate School policy on Tuition Benefits can be found here:

<https://gradschool.utah.edu/tbp/tuition-benefit-program-guidelines>

## Teaching Assistant Responsibilities & Evaluation

Teaching Assistants are professional members of the teaching staff of the Chemistry Department. They are required to provide undergraduate students the quality of education they expect and deserve to receive at the University of Utah. Teaching Assistants are required to follow the regulations of the University with respect to all aspects of their professional conduct. During the semester, TA duties take highest priority. No one, including Research Advisors, can impose requirements that keep TAs from fulfilling TA obligations.

Students awarded a teaching assistantship must attend the Department of Chemistry orientation and training and on-line FERPA (Family Educational Rights and Privacy Act of 1974) training. In addition, students must demonstrate suitable proficiency in the English language (see below).

Students supported as TAs will be assigned specific duties, such as teaching laboratory sections, leading lecture discussions, tutoring, grading papers, and proctoring exams. Specific teaching responsibilities are assigned by the Chemistry Department, but students are welcome to communicate their preferences to the faculty. The TA must recognize the authority of the faculty instructor responsible for the course and attend all meetings with the faculty instructor. TAs have a responsibility to arrive on time and be present at all times in the laboratories, tutorial sessions and exams to which they have been assigned, as well as all relevant meetings. TAs are required to inform the lab manager/instructor at the earliest possible time of an inability to cover a teaching



assignment. Unexcused absences are not permitted. The TA must make arrangements with another TA to cover the missed assignment. The TA must complete grading and other assignments promptly according to course requirements.

The TA must be competent with the concepts and materials being taught in his/her course. If the TA is unfamiliar with the material they must attend course lectures, do the assigned homework and/or experiments. Faculty members in charge of the course may require such attendance and training. Laboratory TAs must take their safety and the safety of their students seriously. The TA must enforce safety standards set by the Department and by individual instructors.

It is expected that graduate students who are employed as TAs by the Department of Chemistry make every effort to perform their duties to the satisfaction of the Department and the University of Utah. TA performance will be reviewed each term by the Undergraduate Education Committee. In the event that the performance of a TA is deemed unsatisfactory in any term, the TA may be placed on teaching probation. The TA will be informed in writing of the TA's specific teaching deficiencies. Such improvement will be measured in the next term in which the student is employed as a TA. In the event that the deficiencies are remedied, the probationary status of the TA will end. In the event that deficiencies are not remedied, the TA will become ineligible to work as a TA in the Department of Chemistry. If a student's TA position is terminated, they will no longer receive financial support through the Department of Chemistry, and they will lose their tuition benefit. Repeated deficiencies in fulfilling the TA responsibilities could lead to the student losing the status of Good Standing.

#### English Language Certification for International Students

All international students must demonstrate to the University that their English is at a level consistent with that expected for a TA who will be teaching undergraduate students. International students whose first language is not English and who have been awarded financial assistance in the form of teaching assistantships by the Chemistry Department must be cleared by the International Teaching Assistant Program prior to beginning their TA assignment. Students who are not cleared for teaching before the semester begins and for whom an alternative position could be found are not eligible to receive a tuition benefit as a TA. Details of the ITAP clearance process can be found here: <https://gradschool.utah.edu/ita/ita-clearance-process/>.

#### Research Assistant Responsibilities

Through mutual agreement, a student may work for a Research Advisor on a research problem and while doing so be supported as a Research Assistant. The duties and responsibilities of such an assignment are given to the student by the Research Advisor and are related to the source of the research funding, most often a federal granting agency. Continuation in these Research Assistantships is based upon availability of research funds and adequate performance of the students in achieving the goals of their research program and making progress toward completion of their degree program. Regardless of the specifics of the research project, it is expected that the graduate students devote their full effort to the duties and responsibilities set forth by their Research Advisor.

## Graduate Assistants & Fellows Responsibilities

Graduate Assistants and Fellows perform the same duties as Research Assistants but are funded through different mechanisms, such as foundations or fellowships. It is important to emphasize that the same requirements regarding the performance of the students in achieving the goals of their research program and making progress toward completion of their degree program are applied to GAs and GFs as to RAs.

## Holidays and Vacations

Graduate students are entitled to observe University closings for Holidays and other recognized events. The University currently recognizes 10 named holidays and 2 personal preference days (<https://www.hr.utah.edu/benefits/holiday.php>).

Graduate students are entitled to ten additional paid days during the calendar year that can be used for vacation and/or as personal days, as long as the vacation dates do not interfere with teaching and/or research responsibilities (see below). The times between academic terms and the summer are considered part of the active training period and vacation days taken during these times are counted toward the annual allotment. Vacation is not accrued or carried over, nor is there any monetary compensation for vacation time at the time a student leaves the program.

For Teaching Assistants supported by the Chemistry Department as a part of its educational mission, vacation cannot interfere with teaching responsibilities. TAs must obtain leave approval from their teaching supervisor(s). As a general rule, TAs are not allowed to take vacation during weeks that classes are in session or during reading period and exam time.

Research Assistants are generally paid from research grant funds, which are allocated by various agencies to work on specific research problems in a given time frame, with required annual progress reports and milestones. Detailed working conditions for these grants may differ, but they commonly do not include funds set aside for paid vacation time. Therefore, any vacation days beyond the ten working days' allotment, such as for extended international travel, require approval of the Research Advisor who is responsible for the administration of the research grant from which the research assistant is paid. The dates of vacations must be approved in advance by the student's Research Advisor to ensure that time-sensitive work is not disrupted and the effect on the research program is minimal.

International students who plan to travel abroad must contact the University of Utah International Student and Scholar Services to make sure that they comply with their visa regulations and do not experience difficulty returning to the United States. International students must also discuss with their Research Advisor the potential complications that may arise as the result of delays in obtaining visas.

## Outside Employment Policy for Graduate Students

The faculty of the Department of Chemistry expects the graduate students to devote their full effort to the completion of the Ph.D. (or M.S.) in chemistry. By accepting a TA/RA stipend or fellowship, a student agrees not to work at a second job, either within or outside of the Department, without prior consent from his/her Research Advisor and the Director of Graduate Studies. Students who

pursue additional employment without such prior consent are not considered to be in good standing, which may result in immediate discontinuation of their TA/RA stipend or fellowship.

## Student Health Insurance

For the protection of its students, the Department of Chemistry requires all graduate students to have health insurance. The University of Utah Graduate School has worked out a plan of coverage with United Healthcare Insurance Company to provide coverage for up to \$500,000 of expenses. See the website [www.uhcsr.com/utah](http://www.uhcsr.com/utah) to view the student health insurance plan. The department (or the Research Advisor, through research grants) will pay for \$500,000 worth of coverage for all graduate students. If the student wishes to have health insurance for a spouse and/or children, the student can supplement the premiums paid by the department to purchase the additional coverage.

Students are not obligated to accept coverage through United Healthcare. If a student prefers a different insurance policy, the department will reimburse the student for the cost of insurance, up to the cost of the United Healthcare policy. International students declining the student health insurance must select an insurance policy that complies with the standards required by the University. See [studenthealth.utah.edu/international-students/](http://studenthealth.utah.edu/international-students/) for international student-specific insurance guidelines.

At the beginning of every semester, all graduate students are required to sign a declaration that they are either accepting the United Healthcare coverage, or arranging coverage through a different company. The department uses the resulting list to make sure that all students desiring coverage through United Healthcare are indeed covered. *If a student fails to sign this declaration at the beginning of each semester, the department accepts no responsibility should a claim need to be filed.*

Graduate School policy on insurance subsidy for students and relevant deadlines can be found here: <https://gradschool.utah.edu/tbp/insurance-information>.

## Residency

In order to continue to qualify for the tuition benefit program, all domestic and non-resident alien graduate students who are not Utah residents are required to submit evidence to the Graduate School that they have made a good faith effort to apply for and obtain Utah residency after their second year (40 credit hours) of graduate study. However, if residency is denied, their tuition benefit status will not be affected. International students are not affected by this requirement because they cannot qualify for resident status.

A residency application will be sent to all domestic and non-resident alien students at the end of the second year in residence by the Academic Program Coordinator in the Graduate Office. There are no non-resident fees required of those who attend the University during summer semester. In addition, students registered for only CHEM 7970 (Thesis Research) are charged at the in-state tuition rate. Students are encouraged to review the residency requirements at: <https://gradschool.utah.edu/tbp/tuition-benefit-program-guidelines/#residency-and-meritorious-status>.

*To maintain TBP eligibility, all domestic nonresident students must apply for Utah residency upon completion of 40 graduate level semester credit hours at the University of Utah. Go to*

[www.admissions.utah.edu](http://www.admissions.utah.edu) for details on how to qualify and how to apply for residency reclassifications.

Graduate School policies on residency can be found at: <https://gradschool.utah.edu/tbp/tuition-benefits-qa>.

## Student Involvement and Participation

### Seminars, Colloquia and Special Lectures

The department offers seminars, colloquia and special lectures series in the areas of Analytical/Physical, Biological, Inorganic, Materials and Organic Chemistry. Speakers are students, faculty, and outside visitors. Students are expected to attend the seminars in their primary research area and are encouraged to attend others as long as the seminars do not interfere with courses, teaching assignments, or research responsibilities.

The Department also offers a Colloquium series by invited speakers on topics of general chemical interest. These provide an important view of what is currently going on in chemistry and an opportunity to hear distinguished speakers from all over the country and abroad. All students are expected to attend. These Colloquia are preceded by a brief social period in which refreshments are served. Currently, the following special lectures are offered:

*Henry Eyring & Bryant A. Miner Lectures, Ragsdale Lecture, Giddings Lecture, Dale and Susan Poulter Lecture, Parry Lecture, Sessler-Burrows-Stang Lecture, Edward M. Eyring Lecture, Henry Eyring Lecture, Distinguished Faculty Colloquium, ChemSAC Student Seminar, Student Electrochemistry Society (ECS) Seminar, Distinguished Alumnus Seminar*

### Town Hall Meetings

These meetings are organized for graduate students by the ChemSAC once per semester, to freely discuss any problem or topic related to graduate student education, research and life. ChemSAC will invite the Director of Graduate Studies and/or the Department Chair to the meetings.

### ChemSAC Activities

#### Monthly Coffee and Bagels

The monthly coffee and bagels (CB) event is for graduate students to discuss any concerns or questions regarding their experiences as graduate students. Some CB are social events where graduate students can come to catch up with each other. Other CBs will include special guests such as Chemistry Department professors and personnel to bring our faculty and students closer and to answer questions.

#### ChemSAC Guest Speaker Seminars

ChemSAC will host 4 guest speakers per year to present on the topics of professional development, scientific seminars, soft skills and networking with alumni.

#### Faculty Interview Lunches

ChemSAC is also involved in the faculty hiring process by hosting graduate student group lunches with perspective faculty candidates. The lunches are a means for graduate students to ask faculty candidates questions about their research, mentoring style and teaching pedagogy. Students are then asked to fill out a questionnaire about the faculty candidate. The ChemSAC representatives present a summary of the student assessments of the faculty candidates to the faculty hiring committee. Feedback obtained from the students is valuable in hiring decisions.

#### RPT Participation

All graduate students are invited to a lunch to provide feedback regarding faculty undergoing the Retention, Promotion and Tenure (RPT) process. Separately, ChemSAC meets with graduate

students working in the groups of the faculty undergoing RPT process. All feedback obtained from the students is used when the Department is making its RPT decisions.

#### Student Mentor-Mentee Connection

All graduate students in their 1<sup>st</sup>-3<sup>rd</sup> year have an option to connect with graduate student mentors for a guidance on qualifying exams and graduate program advancement. Based on the need of each student, ChemSAC provides a tailored mentoring support.

#### Curie Club Activities

The Curie Club offers professional development lectures and workshops as well as peer- and alumni-mentorship activities, led by women and open to everyone. Find out more at:

<https://chem.utah.edu/community/curie-club.php>

## Program Coursework

Before admission to the Ph.D. degree track, graduate students are required to complete a series of graduate courses. At least eight courses must be completed (including waived courses) with the grade of “B” or higher in the first academic year. Only the Graduate Education Committee has the authority to make exceptions to this rule. A course may be dropped or changed to Audit only by permission of the Graduate Education Committee. Until the course requirement is met and a Research Advisor is selected, students must register for minimum of six credit hours per half-semester term.

Up to four courses (eight credit hours) may be waived on the basis of satisfactory prior completion of comparable courses elsewhere. Occasionally, credit may be established by examination. In either case, the student must discuss this option with the professor in charge of the course in question, who will then make a recommendation to the Graduate Education Committee.

### Course Selection

The first-year course sequence is designed to give students a strong, fundamental background for advanced graduate work in their primary research area and to assist the faculty in evaluating new graduate students. The courses provide exposure to material in a student's area of interest while maintaining necessary breadth in other basic areas of chemistry.

The graduate student in the Chemistry Department are required to complete eight half-semester courses in the first year. The combination of the eight required courses is referred to as the core course requirement. See Appendix I for the list of Core Courses.

Students in analytical, biological, inorganic, organic, or physical chemistry must complete eight half-semester courses in the first year with the following distribution:

- Four courses in your primary research area.
- Two breadth courses from other areas of chemistry.
- Two elective courses.

Materials students must complete eight half-semester courses in the first year following the instructions found in the list of Core Courses (see Appendix I).

Upon beginning the program, each student selects a primary research area that the student wishes to emphasize in coursework during the first year. One of the six areas of chemistry (analytical, biological, inorganic, materials, organic, or physical chemistry) may be chosen as the primary area of study. During the student's fall semester and until a Research Advisor is selected, course selections must be approved by a member of the Graduate Education Committee prior to registration. Once a student has chosen a Research Advisor, the student makes course selections in consultation with his/her advisor. Financial support will not be provided for students who fail to have their course selection approved as described above.

Students may substitute courses from other science or engineering departments (*e.g.*, physics, computer science, biochemistry, materials science) for either the breadth or elective courses upon approval from his/her advisor and the Chair of the Graduate Education Committee. The student must petition in writing to take courses from other departments, explaining how the course will benefit his/her research program. The written petition and signed letter from the Research Advisor

should be submitted to the Graduate Coordinator. Only those students who have selected a Research Advisor may elect to take courses from outside of the Chemistry Department.

### Other Coursework

All students are required to take a course in Laboratory Safety (CHEM 5510) and Research Ethics (CHEM 5570). These courses are mandatory for all students and cannot be waived. Prior to being admitted to Ph.D. candidacy, all graduate students must enroll in and successfully complete each of these courses.

1. CHEM 5510 “Introduction to Laboratory Safety” (1 credit hour). This course in laboratory chemical safety is required for all entering chemistry graduate students. Topics to be covered include laboratory emergencies, chemical hazards, lab inspections and compliance, managing and working with chemicals, waste handling, case studies of university accidents, laboratory equipment, biosafety, radiation, and animals, and microfabrication and nanomaterials.
2. CHEM 5570 “The Ethical Pursuit of Scientific Research” (1 credit hour). This course will discuss contemporary topics in scientific ethics and is required of all graduate students. The class will lead to a better understanding of what responsible scholarship means for researchers in chemistry.

Occasionally, students may need to learn the material that is taught in an undergraduate course (such as a Computational Science programming course). Students in this position are encouraged to ask the instructor of the appropriate course to take a directed reading class from them, at the 5000-level, for one credit hour and then sit in on and complete the assignments and exams for the undergraduate course. The student will then obtain a grade in the directed reading course, which qualifies for a tuition benefit. To make this a legitimate graduate course, the Research Advisor (not the instructor of the course) should give the student a project that is to be completed during the semester. The Research Advisor then reports the grade to the instructor of the directed reading course, who then submits the final grade.

Most faculty allow students to audit the graduate courses later in their graduate career. However, such auditing cannot interfere with teaching and/or research responsibilities and has to be approved by the student’s Research Advisor.

### Course Registration Instructions

After obtaining the approval of a GEC member or of the Research Advisor regarding the course work selections, the students must register for the courses. The instructions and deadlines are found here: <https://registrar.utah.edu/register/how-to-register.php>. The Graduate Coordinator can answer any questions related to the course registration.

### First Year Coursework Progress Review

The Graduate Education Committee will review the progress of each student every semester. After two semesters in the program (excluding summer semesters), the performance of the student in the core courses will be evaluated by the Graduate Education Committee, and a recommendation will be made to the full faculty. A student will ordinarily be recommended for Category I if the set of 8 core courses have been completed with grades of “B” or better. If the eight core courses have not yet been completed with grades of “B” or better, a recommendation will be made to the full



faculty that the student be placed in Category IIa, IIb, or III. The final decision as to how the student will be categorized rests with the full faculty.

Upon placing a student in Category IIa, the Chemistry Department faculty will normally recommend courses that must be completed satisfactorily or other action that must be taken in order to be reconsidered for acceptance into the Ph.D. degree track.

A student placed in Category IIb may petition to be reconsidered for the Ph.D. degree track after the completion of a thesis M.S. degree. The decision of the faculty as to whether an M.S. student shall be permitted to pursue a Ph.D. degree will then be based both upon the extent to which the student has demonstrated ability in research, and the degree to which the academic course requirements for the Ph.D. have been mastered. If the student wishes to be reconsidered for the Ph.D. track, the M.S. thesis defense will also be attended by two additional faculty members, who are chosen to supplement the three M.S. committee members in such a way that the proper composition for a Ph.D. committee is achieved. These additional members will participate in a private oral examination after the public portion of the thesis defense. On the basis of the oral exam, the committee will make a recommendation to the full faculty regarding the student's continuation toward the Ph.D. degree. If the faculty votes to place the student into Category I, this oral exam will serve as a part of the qualifying exam. Successful defense of the M.S. thesis will not necessarily constitute passing the oral examination for the Ph.D. degree, since a higher level of performance is expected for the Oral Exam.

Category I	Category IIa	Category IIb	Category III
Accepted into the Ph.D. degree track	Accepted into the M.S. degree track, courses must be satisfactorily completed or other action that must be taken in order to be reconsidered for acceptance into Category I	Accepted for the M.S. degree track only	Dismissed, not acceptable as a candidate for a graduate degree in the Department of Chemistry

## Selection of Research Advisor

The selection of a Research Advisor is one of the most significant decisions that students will make in graduate school. Students should realize that the choice of a Research Advisor will greatly influence the next three to five years of their lives and, in all likelihood, the rest of their careers. Therefore, the decision should be made after careful consideration of many factors. In general, the student should expect the Research Advisor to:

- be willing to meet with the student regularly
- be someone with whom the student can talk freely and easily about research ideas and professional development
- provide timely feedback on the quality of the student's work and the direction of the dissertation project
- be someone the student can trust to look out for his/her professional interests
- be willing and enthusiastic in giving the student credit for his/her work
- be willing to tell the student when his/her work does or does not meet the standards set for their research program
- be willing to help the student graduate in a reasonable time frame, with a dissertation which tells a complete story and is representative of Ph.D. level research at all of the peer institutions

The Department has three activities to help students with the Research Advisor decision described below.

### Orientation week poster sessions

During the orientation week, the Department will host poster sessions by faculty members that will be accepting students into their labs that year. Each student must attend all poster sessions and interact with all faculty in each session. The poster presentations will provide students with sufficient introduction to the Department and the various research programs.

### Laboratory rotations

Students are required to carry out three laboratory rotations. These rotations are an opportunity to experience the culture of the lab, interact with faculty, students, and postdocs. Each lab is encouraged to tailor the student experience to provide the rotating students a sense of the research being carried out. The rotations will take place in September (Rotation 1), October (Rotation 2), and November (Rotation 3). Students must indicate three possible choices on the corresponding form and submit the form on Canvas. The form for the first rotation must be submitted on the first day of classes. Approximately 1-2 weeks prior to the end of the first and second rotations, students will be asked again for their choice of three labs for the next rotation. The GEC will make the laboratory assignments based on the student choices and after consultation with faculty on availability of slots. An additional, fourth, rotation, can be requested by the students in January, if needed to make a meaningful selection of a Research Advisor.

### Faculty Interviews

To ensure that a thorough and thoughtful deliberation of potential Research Advisors is undertaken, during the rotations, a meaningful interview with the faculty member is required. The

students are encouraged to meet with the faculty members outside the rotations as needed to make a meaningful selection of a Research Advisor.

### Formalizing Research Advisor Selection

After carefully considering all your interactions and interests, (1) rank order your top three choices for a Research Advisor, (2) discuss the possibility of joining your first choice laboratory with its advisor, (3) use the corresponding form to list your choices and upload the form on Canvas for approval by the Director of Graduate Studies. Final laboratory assignments will be made by the Department after consultation with faculty.

Ideally, students will identify and join a research lab by the end of the Fall semester and be assigned to a lab by December 15. **In rare cases where a suitable match is not identified, Research Advisor selection can be made after a fourth rotation in the Spring. A final decision is expected to be made by March 15. Students who are unable to find an advisor may be subject to dismissal from the program.**

## Supervisory Committee Formation

### Supervisory Committee Roles

The Supervisory Committee complements the student's Research Advisor in terms of directing the student's research and professional development. The Supervisory Committee members are an invaluable source of independent advice, support and, if there is a need, participate in student-advisor conflict resolution. All committee members are present at the oral examinations and the final Ph.D. defense, and provide evaluation of the student's progress. Together with the Research Advisor, the Supervisory Committee constitutes the body that makes all decisions regarding the student progress towards obtaining his/her degree.

### Committee Selection

A student placed in Category I is required to assemble a Supervisory Committee in consultation with their Research Advisor. The Ph.D. Supervisory Committee consists of the Research Advisor, two faculty members from the student's primary research area, one faculty member from outside the student's primary research area, and one faculty member from outside the Department. For the purposes of assigning committees, faculty affiliations by research area are listed in Appendix II.

The student must fill out the Supervisory Committee selection form, listing up to five faculty members in their primary research area and three faculty members from outside the primary research area in order of preference. The student must provide a one-two sentence justification for each faculty member listed, explaining why they should be included on the Supervisory Committee. The student must also indicate his/her choice of the temporary committee chair for the Oral Exam. The form must be submitted on Canvas no later than September 1 at the beginning of the 2<sup>nd</sup> year. The Director of Graduate Studies will make the final selection of committee members. Under unusual circumstances, an exception allowing more than one outside Department member on the committee may be made. Such a request must be approved by the Research Advisor and submitted in writing to the Graduate Coordinator.

### Required Meetings and Communication

The student will meet with the Supervisory Committee during the Oral (year 2) and Research Proposal Examinations (year 3), the Research Progress Meeting (year 4) and the Final Ph.D. Defense (year 5). The students are strongly encouraged to invite the members of their Supervisory Committee to their 2<sup>nd</sup> year seminar. All Supervisory Committee members (except for the Research Advisor) must be present for the entirety of the Oral Exam, and all committee members must be present for the entirety of the Research Proposal Exam and the final Ph.D. defense. The Research Progress Meeting may include a subset of at least three Supervisory Committee members.

## Mandatory Milestones

### Departmental Seminar

#### i. Scheduling the Seminar

The departmental seminar is to be completed by November 15 of the Fall semester of the 2<sup>nd</sup> year. Specific arrangements for the time and location of the seminar are to be made in coordination with the student's Research Advisor and seminar coordinator, as different venues are used in different research areas. The students are required to complete the scheduling of the seminar by September 1 of the Fall semester of the 2<sup>nd</sup> year and report the date to the Graduate Coordinator. The students are also required to register for the corresponding seminar class.

#### ii. Preparation for the Seminar

The seminar will be given on a topic approved by the student's Research Advisor who may communicate with the Supervisory Committee if needed. Although the exact contents of the seminar will be decided through the discussion between the student and the Research Advisor, it is recommended that at least 2/3 of the seminar should be dedicated to a review of the literature relevant to their research topic as well as a discussion of the challenges in the field. The seminar length is 30 minutes including five minutes for questions. The students are strongly encouraged to receive feedback regarding the seminar from their Research Advisor and their colleagues, which may be achieved by presenting practice talks.

#### iii. Evaluation of the Seminar

Evaluation of the seminar is done by the faculty members present at the seminar (a minimum of three evaluations are required). Therefore, it is important for the student to communicate with the Supervisory Committee in order to make sure that at least some members of the committee and the Research Advisor can attend the seminar.

The seminar quality is assessed using the following criteria:

1. Knowledge of the background material - scope, critical analysis, pedagogy
2. Knowledge and command of the current and future research
3. Questions - depth of knowledge, directness
4. Presentation – slide quality, organization, clarity, time management

Each of these criteria are scored by each attending faculty member using the following scale: 5 (Excellent), 4 (Very Good), 3 (Good), 2 (Fair), 1 (Poor). The faculty also provide comments on each of the criteria. These comments are transmitted to the student anonymously after the seminar, and the final score for the seminar is calculated by the Graduate Coordinator by averaging all faculty scores. These scores correspond to the following letter grades: A: 4.5-5.0; A-: 4.0-4.49; B+: 3.5-3.99; B: 3.0-3.49; B-: 2.5-2.99; C+: 2.0-2.49; C: 1.5-1.99; C-: 1.0-1.49. The grade of "B" or above is required to pass the seminar. In the case a student does not receive a passing grade, the student may lose the Good Standing status and the Supervisory Committee will discuss the course of further action, which may include presenting another seminar.

### Qualifying Examinations for Ph.D. Candidacy

Written and oral qualifying examinations are required of each student by the Graduate School prior to admission to Ph.D. candidacy. The written examination requirement is satisfied by admission to Category I. The oral qualifying examination consists of two parts, the Oral Exam and the Research Proposal Exam.

## Oral Exam

The Oral Exam is devoted to an examination of the students' general knowledge of chemistry, particularly in their primary research field. The exam also provides an opportunity for the members of the Supervisory Committee to assess the graduate student's progress in research. The Supervisory Committee will use the presented research background and the courses taken to examine the student's general knowledge of chemistry. Research progress will be evaluated based on preliminary results, experiments attempted (successful or failed), instruments constructed, etc.

### i. Scheduling the Oral Exam

No later than March 1 of the 2<sup>nd</sup> year, the student must contact all members of the Supervisory Committee to schedule a specific date for the examination. The Research Advisor is not present during the Exam. The student must input the date of the Oral Exam in the corresponding Canvas assignment. The oral exam must be completed by May 1 of the Spring semester of the 2<sup>nd</sup> year. It is strongly recommended that students send reminders to the Supervisory Committee as the date of the Oral Exam approaches.

**Students who fail to schedule and take their Oral Exam on time (unless extenuating circumstances exist) will no longer be considered to be in good standing by the Department. Specifically, they will be ineligible for financial support by the Department, including tuition benefits or any kind of full or part-time teaching appointment. Students may also be subject to dismissal from the program.**

### ii. Preparation for the Oral Exam

The students should assess their preparedness for the Oral Exam and discuss with their Research Advisor how much time should be spent in preparation, including writing the Oral Exam document and composing and practicing their presentation. The amount of the preparation time will depend on individual situations and Research Advisor guidance but should generally not exceed one month, during which time the students are expected to continue executing their teaching and/or research duties.

A written document (up to 10 pages) is required in the format of an NSF-style proposal including an introduction, background, current goals, and preliminary results sections which summarizes the student's progress in research. Detailed specifications for the written document are given in Appendix III. The written document must be submitted electronically via Canvas. **Documents sent directly to the Supervisory Committee will not be accepted. The student must alert the Supervisory Committee once the document has been submitted on Canvas.**

The submission deadline is March 1 of the 2<sup>nd</sup> year in the program. This deadline is independent of the date of the scheduled oral exam. If the exam is scheduled for a date earlier than March 15, the written document must be submitted at least two weeks prior to the exam. **Changes to the timeline are allowed with written permission from the Research Advisor and approval by all members of the Supervisory Committee, and have to be communicated to the Graduate Coordinator. Failure to submit the written document in a timely manner will result in immediate cancelation of the Oral Exam.**

### iii. Evaluation of the Written Document

Each Supervisory Committee member will review the written document. The following criteria will be considered in their evaluation:

1. Does the document include all of the required parts?

2. Does the document provide a comprehensive introduction, background, current goals, and preliminary results sections?
3. Are sections, paragraphs, and sentences clearly written and free of ambiguity? Are proper grammar, punctuation, spelling, and capitalization used? Are literature sources appropriately and correctly cited?
4. Is the document formatted correctly? Are the figures, illustration, tables and schemes used by the student legible, clearly annotated, and appropriately described in the text? To what extent do the figures/schemes used by the student help to effectively communicate the key points of the document?

The Supervisory Committee members will use the following rubric when rating the written document:

- **5 (Excellent)** - Outstanding document in all respects
- **4 (Very Good)** - High quality document in nearly all respects
- **3 (Good)** - A quality document
- **2 (Fair)** - Document lacking in one or more critical aspects; key issues need to be addressed
- **1 (Poor)** - Document has serious deficiencies

The scores from all four Supervisory Committee members will be summed by the temporary Chair before the start of the exam. A score of 17-20 means the document is exemplary and the student has passed the written portion of the Oral Exam. A score of 13-16 means revisions are required and 9-12 means major revisions are required. If revisions are required, the Supervisory Committee will communicate the details which need to be addressed and the time allotted for corrections at the time of the Oral Examination. A score of 4-8 means the document has numerous and serious deficiencies and must be completely rewritten within a time specified by the Supervisory Committee. In this case, the Oral Exam will be postponed until a rewritten document is evaluated by the Supervisory Committee and receives the total score of 9 or above.

#### iv. Format of the Oral Exam

The length of the Oral Exam is approximately one and a half hours. The student should prepare an oral presentation of the material described in the written document. The presentation should span no more than 30 minutes, and should encompass in a clear, concise, logical and balanced fashion: (a) an introduction to the current research with necessary background and (b) a description of research progress to date.

#### v. Evaluation of the Oral Exam

The Supervisory Committee will evaluate the Oral Exam by considering the following criteria.

Is the student:

1. in possession of the general knowledge of chemistry, particularly in his/her primary research field, sufficient to proceed towards a Ph.D.?
2. sufficiently acquainted with the relevant literature?
3. able to discuss her/his research in a comprehensive and knowledgeable manner, with a sound understanding of the scientific methods and equipment that are used in carrying out this research?
4. capable of answering questions at a technical level sufficient to proceed towards a Ph.D.?
5. making adequate progress on the chosen research problem?

The Supervisory Committee members will use the following rubric when evaluating the Oral presentation:

- **5 (Excellent)** - all of the above questions can be answered in a strongly affirmative manner
- **4 (Very Good)** - most of the above questions can be answered in a strongly affirmative manner
- **3 (Good)** - most of the above questions can be answered in an affirmative manner
- **2 (Fair)** - the student showed deficiencies related to several of the above questions
- **1 (Poor)** - the student showed deficiencies related to most of the above questions

At the conclusion of the presentation and questions, the student will leave the room and the Supervisory Committee will determine the outcome of the Oral Exam. The Committee will discuss the scores received by the student for the written document and the oral portion of the exam and will sum them up. The possible outcomes of the Oral Exam are as follows:

1. **Pass** (combined score of 31-40)  
The student's writing knowledge and progress have been determined to be excellent or very good.
2. **Conditional Pass** (combined score of 21-30)  
The student's writing, knowledge and progress are largely good. However, the Committee has found that certain deficiencies must be addressed. The Committee recommends that the student do further work. Such work may include (a) additional coursework to remedy weakness in their background, or (b) a rewrite of the manuscript portion of the Oral Exam. The student is not required to retake the Oral Exam.
3. **Not Pass** (combined score of 17-20)  
The student's writing, knowledge and progress are fair but not satisfactory. The Committee recommends the student do further work and repeat the exam a final time. The procedures will be the same as the first meeting. The action taken at this second (and final) meeting will be to (i) pass the student with respect to his/her research progress and knowledge, or to (ii) fail the student, thereby terminating the student's eligibility for the doctoral program. This second exam must be completed prior to a date determined by the examination committee, and will ordinarily be within 6 months of the first.
4. **Fail** (combined score of 13-16)  
The student has not demonstrated satisfactory research progress or knowledge and cannot be recommended for admission to Ph.D. candidacy.

After the Supervisory Committee deliberations, the student will be called back and will be informed of the exam's outcome. Within a week of the exam the Supervisory Committee Chair will provide the student with the anonymous individual scores, comments, suggestions, and criticisms that are deemed appropriate. In the case of a Conditional Pass, the Supervisory Committee Chair will provide detailed instructions regarding the requirements and the timeline to fulfill the conditions required for completing the exam.

### Research Proposal Exam

A successful Ph.D. level chemist must be able to formulate, communicate, and defend original research ideas. Thus, in the second part of the oral qualifying examination the students are required to develop and defend an original Research Proposal on their dissertation research.



The Research Proposal is a written document that describes an original research plan. Although the student's research plan is most often based on the PI's research program, the proposal should include some aspects that are novel, such as new ideas, new methods, new analyses, application to a type of problem not previously studied, incorporation of techniques not presently used by the group, etc. The proposal should clearly articulate its novelty.

While the student is encouraged to discuss all aspects of the proposal with colleagues and professors, developing and defending the ideas contained within her/his proposal is the sole responsibility of the student. The use of other people's ideas without citation, regardless of whether they are published or not, is plagiarism and will result in disciplinary action up to and including dismissal from the program.

While the students will propose their own ideas regarding their dissertation research and will defend them, it is understood that in the course of their future interactions with the Research Advisor and the future funding situation the actual research aims may change. This will be discussed during the 4<sup>th</sup> year Research Progress Meeting and any justifiable change to the specific aims will be accepted by the Supervisory Committee.

#### i. Scheduling the Proposal Exam

No later than September 1 of the 3<sup>rd</sup> year, the student must contact all members of the Supervisory Committee, including the student's Research Advisor, to schedule a specific date for the examination. The chair for the Proposal Exam is the student's Research Advisor. The student must input the date of the Proposal Exam in the corresponding Canvas assignment. The Proposal Exam must be completed by November 15 of the 3<sup>rd</sup> year. It is strongly recommended that students send reminders to the Supervisory Committee as the date of the Proposal Exam approaches.

**Students who fail to schedule and take their Proposal Exam on time (unless extenuating circumstances exist) will no longer be considered to be in good standing by the Department. Specifically, they will be ineligible for financial support by the Department, including tuition benefits or any kind of full or part-time teaching appointment. Students may also be subject to dismissal from the program.**

#### ii. Approval of the Proposed Specific Aims

No later than September 1 of the 3<sup>rd</sup> year, the students must submit the Specific Aims of their proposal through Canvas and alert the Supervisory Committee that the document has been deposited. This deadline is independent of the date of the scheduled proposal exam. If a student plans on taking the Proposal Exam earlier than the dates specified above, the student must submit the Specific Aims at least one month before the exam.

The Specific Aims (up to 1 page) are described in Appendix IV. The document has to be submitted electronically via Canvas. **Documents sent directly to the Supervisory Committee will not be accepted.**

The Chair of the Supervisory Committee will summarize the Committee's recommendations and within one week of the Specific Aims' deposition will provide the student with approval and/or instructions, comments and advice. Students are required to receive the approval before proceeding to prepare the full written proposal.

### iii. Preparation of the Written Proposal

The written document (up to 10 pages) must include student-generated specific aims, preliminary results, research plan, pitfalls and alternative strategies, future work, long-term vision for the project, and timeline. A detailed description of the written Research Proposal is given in Appendix IV. The proposal must be submitted through Canvas. **Documents sent directly to the Supervisory Committee will not be accepted. The student must alert the Supervisory Committee once the document has been submitted on Canvas.**

The submission deadline is October 15 of the student's 3<sup>rd</sup> year. This deadline is independent of the date of the scheduled proposal exam. If a student plans on taking the Proposal Exam earlier than the date specified above, the student must submit the proposal at least two weeks prior to the scheduled defense date. **Changes to the timeline are allowed with written permission from the Research Advisor and approval by all members of the Supervisory Committee, and have to be communicated to the Graduate Coordinator.**

### iv. Evaluation of the Written Proposal

Each Supervisory Committee member will review the written Research Proposal. The following criteria will be considered in their evaluation:

1. What is the potential for the proposed work to advance knowledge and understanding within its own field or across different fields?
2. To what extent does the proposed work suggest and explore creative, original, or potentially transformative concepts?
3. To what extent does the research plan have clear goals and objectives? Does the introductory material logically lead to the research problem to be addressed? Are the basis and rationale for the experimental/computational/theoretical approach clear?
4. Is the plan for carrying out the proposed work well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success and ways to address potential challenges?
5. To what extent are the methods appropriate to the research questions/problems being addressed? Does the student exhibit a sufficient grasp of the methodology to be used and how it will contribute to the research plan?
6. Will this research plan produce an acceptable Ph.D. dissertation?
7. Are sections, paragraphs, and sentences clearly written and free of ambiguity? Is proper grammar, punctuation, spelling, and capitalization used? Are literature sources appropriately and correctly cited?
8. Is the document formatted correctly? Are the figures, illustration, tables and schemes used by the student legible, clearly annotated, and appropriately described in the text? To what extent do the figures/schemes used by the student help to effectively communicate the key points of the document?

The Supervisory Committee members with the exception of the Research Advisor will use the following rubric to evaluate the written Proposal:

- **5 (Excellent)** - Outstanding proposal in all respects
- **4 (Very Good)** - High quality proposal in nearly all respects
- **3 (Good)** - A quality proposal

- **2 (Fair)** - Proposal lacking in one or more critical aspects; key issues need to be addressed
- **1 (Poor)** - Proposal has serious deficiencies

The scores from the four Supervisory Committee members (except for the student's Research Advisor) will be summed before the start of the exam. A score of 17-20 means the document is exemplary and the student has passed the written portion of the Proposal Exam. A score of, 13-16 means revisions are required and, 9-12 means major revisions are required, with the student receiving a conditional pass. If revisions are required, the Supervisory Committee will communicate the details what need to be addressed and the time allotted for corrections at the time of the Proposal Examination. A score of 4-8 means the document has numerous and serious deficiencies and must be completely rewritten within a time specified by the Supervisory Committee. In this case, the Proposal Exam will be postponed until a rewritten document is evaluated by the Supervisory Committee and receives the total score of 9 or above.

#### v. Format of the Proposal Exam

The length of the exam is approximately one and a half hours, including extensive questioning by the Committee. The student should prepare a 30-40-minute presentation which should be 20-25 slides in total. The presentation should focus on the most significant parts of her/his proposal. The student should limit the introduction and background slides and focus the presentation on the hypothesis, method(s), and research plan.

#### vi. Evaluation of the Proposal Exam

The Supervisory Committee will evaluate the Oral Exam by considering the following criteria.

Did the student:

1. demonstrate sufficient knowledge of the relevant literature and its critical analysis?
2. present creative, original, or potentially transformative ideas?
3. present a well-reasoned and well-organized research plan including a sound rationale, mechanisms to assess success and ways to address potential challenges?
4. discuss his/her proposed work and answer questions at a level sufficient to proceed towards a Ph.D.?

The Supervisory Committee members (except for the student's Research Advisor) will use the following rubric when evaluating the Research Proposal presentation:

- **5 (Excellent)** - all of the above questions can be answered in a strongly affirmative manner
- **4 (Very Good)** - most of the above questions can be answered in a strongly affirmative manner
- **3 (Good)** - most of the above questions can be answered in an affirmative manner
- **2 (Fair)** – the student showed deficiencies related to several of the above questions
- **1 (Poor)** - the student showed deficiencies related to most of the above questions

At the conclusion of the presentation and questions, the student will leave the room and the Supervisory Committee will determine the outcome of the Proposal Exam. The Committee will discuss the scores received by the student for the written proposal and the oral proposal defense and will sum them up. The possible outcomes of the Proposal Exam are as follows:

1. **Pass (combined score of 31-40)**

The student's proposal has been determined to be sufficient; the Committee will recommend that this student be admitted to Ph.D. candidacy.

2. **Conditional Pass (combined score of 21-30)**

The student's proposal is largely satisfactory. However, the Committee has found that certain deficiencies must first be addressed prior to admission to Ph.D. candidacy. The Committee recommends that the student rewrite the Proposal or its portions. The student is not required to retake the Proposal Exam.

3. **Not Pass (combined score of 17-20)**

The student's proposal is fair but not satisfactory for admission to Ph.D. candidacy. The Committee recommends the student repeat the Proposal Exam a final time. The procedures will be the same as the first meeting. The action taken at this second (and final) meeting will be to (i) pass the student with respect to his/her proposal, or to (ii) fail the student, thereby terminating the student's eligibility for the doctoral program. This second exam must be completed prior to a date determined by the examination committee, and will ordinarily be within 6 months of the first.

4. **Fail (combined score of 13-16)**

The student has not presented a satisfactory proposal and cannot be recommended for admission to Ph.D. candidacy.

After the Supervisory Committee deliberations, the student will be called back and will be informed of the exam's outcome. Within a week of the exam the Supervisory Committee Chair will provide the student with the anonymous individual scores, comments, suggestions, and criticisms that are deemed appropriate. In the case of a Conditional Pass, the Supervisory Committee Chair will provide detailed instructions regarding the requirements and the timeline to fulfill the conditions required for completing the exam.

### Advancement to Candidacy

The entire faculty will evaluate the results of the qualifying examinations with respect to admission to Ph.D. candidacy based on the recommendations from the Supervisory Committee and the Research Advisor. A grade of "Pass" on both parts of the Oral Qualifying Exam normally results in a recommendation for admission to candidacy, but the opinion of a student's Research Advisor on his/her apparent ability to do Ph.D. research is also taken into consideration. Students earning "Fail" on either exam are not eligible for Ph.D. candidacy, and will be reclassified in Category IIb. In addition, students are not eligible for placement in Ph.D. candidacy until the Research Ethics course has been taken (credit/noncredit) and the seminar has been successfully presented.

### Fourth Year Research Progress Meeting

The goal of this meeting is to provide the Supervisory Committee with an update on the student's progress and to provide the student with relevant feedback and any help from the Supervisory Committee in progressing towards the PhD in the timely manner. No later than March 1 of the 4<sup>th</sup> year, the student must contact all members of the Supervisory Committee to schedule a specific date for the examination. This meeting is to be completed by May 1 of the 4<sup>th</sup> year.

A written research progress report (up to 3 pages, see Appendix V for guidelines) and preliminary dissertation outline (up to 2 pages, see Appendix VI for guidelines) are required. The documents must be submitted electronically via Canvas. **Documents sent directly to the Supervisory Committee will not be accepted. The student must alert the Supervisory Committee once the documents have been submitted on Canvas.**

The submission deadline is April 1 of the student's 4<sup>th</sup> year. This deadline is independent of the date of the scheduled meeting. If the meeting is scheduled earlier than the date specified above, the student must submit the documents at least one week prior to the meeting date. **Changes to the timeline are allowed with written permission from the Research Advisor and approval by all members of the Supervisory Committee, and have to be communicated to the Graduate Coordinator.**

The 1-hour meeting will include a 30-minute student presentation summarizing the details of the written progress report and should include a brief description of the student's post-graduation goals. At least three out of the five Supervisory Committee members must be present at the meeting.

At the conclusion of the presentation and questions, the student will leave the room and the Supervisory Committee will discuss the student's progress and the feedback that the student should receive. After the Supervisory Committee's deliberations, the student will be called back and will receive a brief verbal feedback. Within a week of the meeting the Supervisory Committee Chair will provide the student with the comments, suggestions, and criticisms that are deemed helpful.

Annual research progress meetings with the Supervisory Committee are required from the 4<sup>th</sup> year in the program until the dissertation defense.

#### Ph.D. Final Oral Examination

##### i. Scheduling the Ph.D. Final Oral Exam

No later than March 1 of the 5<sup>th</sup> year, the student must meet with the Research Advisor to discuss if the student is ready to prepare the Ph.D. thesis and to present the thesis research in the Final Oral Exam. If the student and the Research Advisor mutually agree that the thesis and the defense can be completed by the end of the summer semester of the 5<sup>th</sup> year, they must inform **in writing** the rest of the Supervisory Committee, the Director of Graduate Studies, and the Graduate Coordinator of their decision. The Final Oral Exam can be scheduled at that time or later, as long as the Final Oral Exam is completed by the end of the summer semester of the 5<sup>th</sup> year.

If the student and the Research Advisor mutually agree that the Final Oral Exam should not be scheduled by the end of the summer semester of the 5<sup>th</sup> year, or if there is a disagreement between the student and the Research Advisor regarding the timeline of the Ph.D. defense, a meeting with the Supervisory Committee is required. This meeting is to be completed by May 1 of the 5<sup>th</sup> year. At least three out of the five Supervisory Committee members must be present at the meeting. A preliminary dissertation outline (up to 2 pages, see Appendix VI for guidelines) is required for the meeting. The document can be submitted via e-mail to the Supervisory Committee.

During the meeting, the student's progress will be discussed and a plan of action from the student and the Research Advisor must be presented. This plan must be approved by the majority of the Supervisory Committee members and then forwarded to the Director of Graduate Studies and to the Graduate Coordinator for inclusion in the student's permanent file. In the case of a disagreement regarding the student's progress towards completion of the Ph.D. and/or the timeline towards the Ph.D. defense, the student, the Research Advisor and/or the Supervisory Committee may decide to invite the Director of Graduate Studies to participate in the discussion.

##### ii. Preparation of the Ph.D. Thesis

The thesis has to be formatted following the instructions provided by the Graduate School Thesis Office: <https://gradschool.utah.edu/thesis>.

The thesis must be received by the Research Advisor at least **3 weeks** before the examination. The Research Advisor must inform the student and the Supervisory Committee **in writing** that he/she approves of the thesis to be submitted to the Supervisory Committee and to be presented at the Final Oral Exam. If the Research Advisor does not approve of the thesis, the defense needs to be rescheduled to allow sufficient time for the student to correct the deficiencies. If the Research Advisor concludes that the thesis shows substantial deficiencies that cannot be corrected within four weeks, a meeting with the Supervisory Committee is required to determine the timeframe and extent of additional work needed to complete the thesis.

The thesis must be received by the Supervisory Committee at least **2 weeks** before the exam. The thesis has to be submitted electronically via Canvas. **Documents sent directly to the Supervisory Committee will not be accepted. The student must alert the Supervisory Committee once the document has been submitted on Canvas.** In addition, some Supervisory Committee members might prefer to receive a printed copy of the thesis. The student must communicate with each Supervisory Committee member to find out if a printed copy is desired.

### iii. Format of the Ph.D. Final Oral Examination

This exam will cover the thesis research of the candidate. The first part of the exam is open to the public and is normally a seminar presentation of approximately 50 minutes in length, after which the public will be excused, and the student's Supervisory Committee will conduct a closed-door oral examination of the Ph.D. candidate's thesis research.

### iv. Evaluation of the Final Oral Exam and Ph.D. Thesis

At the conclusion of the exam, the student will leave the room and the Supervisory Committee will evaluate the student's thesis research and thesis presentation. The Supervisory Committee will then vote (a simple majority vote) on a pass/fail for the Ph.D. Final Oral Exam and will arrive at a plan regarding the Ph.D. thesis completion. After the Supervisory Committee's deliberations, the student will be informed of the outcome of the vote and will be given verbal feedback regarding the Ph.D. thesis. The outcome of the exam will be recorded in the PhD Final Oral Exam Evaluation Form. **The students are responsible for providing the form to the Supervisory Committee at the beginning of the exam.**

In the case of successful Ph.D. defense, within a week of the Exam, the Supervisory Committee Chair will provide the student **in writing** with the Supervisory Committee's comments, suggestions, and requests that the student will need to take into consideration when preparing the final version of the Ph.D. thesis, as well as the timeline of the thesis completion.

In the case of failed Ph.D. defense, the Supervisory Committee will develop and approve a plan of action. This plan must be approved by the majority of the Supervisory Committee members and then forwarded to the Director of Graduate Studies and to the Graduate Coordinator for inclusion in the student's permanent file.

### v. Ph.D. Thesis Submission

The final Ph.D. thesis submission process is governed by the Graduate School. The details of the process can be found here: <https://content.gradschool.utah.edu/thesis/thesis-submission-procedure/>. This process includes obtaining approval from the members of the Supervisory Committee, the Research Advisor and the Department Chair. The student should direct any questions or concerns regarding these approvals to the Director of Graduate Studies.

## Time Limit to Degree

### Departmental

Dissertation defense is expected by the end of the summer semester of the 5<sup>th</sup> year. If no defense is scheduled, a meeting with the Supervisory Committee is required in which student progress will be discussed and a plan of action from the student and the Research Advisor will be presented. This plan must be approved by the Supervisory Committee and then forwarded to the Director of Graduate Studies and to the Graduate Coordinator for inclusion in the student's permanent file. If satisfactory progress is not demonstrated, the student will be placed on academic probation. If the dissertation defense is not completed by the end of the summer semester of the 6<sup>th</sup> year, the Supervisory Committee in consultation with the Director of Graduate Studies will decide if any further extensions, corrective measures or dismissal from the program is warranted.

### University

Graduate School policy for Doctorate Degrees time limit can be found here:

<https://gradschool.utah.edu/graduate-catalog/degree-requirements>

## Academic Requirements and Policies

### Minimum GPA

The graduate student is required to maintain a 3.0 or higher GPA in course work listed on the Program of Study for master's and doctorate degrees. A grade below C- is not accepted by the University toward a graduate degree. Department of Chemistry has additional grade restrictions that are explained in the Program Coursework section of this Handbook.

### Continuous Registration

Students must be enrolled in the fall and spring semesters for a minimum of 3 credit hours in chemistry courses. The appropriate course for those engaged only in research is "Thesis Research", CHEM 7970; or for those only writing a thesis, "Faculty Consultation", CHEM 7980. (Please note: for those with special certification needs, e.g. to prevent the beginning of undergraduate loan payments, it may be necessary to register for more than 3 hours per semester). For detailed instructions related to TA and RA course registration the students must consult with the Graduate Coordinator. Graduate School's continuous registration policy can be found here: <https://gradschool.utah.edu/graduate-catalog/registration>):

### Leave of Absence

Students who wish to discontinue their studies for one or more semesters (other than summer term) must complete a Request for Leave of Absence Form found here: <https://registrar.utah.edu/handbook/leave.php>. The form must be approved and signed by the Director of Graduate Studies and Department Chair and then forwarded to the Registrar's Office for processing.

Requests for unpaid leaves of absence may be granted for up to one year for circumstances related to:

- a serious health condition of the student or family member,
- care for a newborn or newly adopted child,
- a call to serve in military service, or
- other compelling reasons that the student's department believes is in the best interests of both the student and the University.

The form requesting a leave of absence for a current semester must be completed and received in The Office of the Registrar by the last day of classes of that semester. Leaves of absence are not granted retroactively. Students must officially withdraw from classes in any semester for which a leave is granted; failure to formally withdraw results in the reporting of E or EU grades for all classes. For more information about official withdrawal, see: <https://registrar.utah.edu/handbook/leave.php>

The period during which a leave of absence is granted does not count toward the period allowed to complete the degree. Leaves are granted for a maximum of one year at a time, and may be renewed by submitting a new form to The Office of the Registrar. The leave of absence is void if a student registers for classes in a semester for which a leave was granted. Official language from the Graduate School website can be found here: <https://gradschool.utah.edu/graduate-catalog/registration>



Short leaves due to family or other emergencies may not require filling out the Leave of Absence Form and should be arranged directly with the Research Advisor and/or the Director of Graduate Studies.

### Parental Leave Policy

The Chemistry Department provides up to twelve (12) weeks of paid Parental Leave to Ph.D. graduate students in good standing, provided that they have not yet defended their Ph.D. dissertation. The student must return to his/her work at the end of the Parental Leave benefit period unless exempted by the Chair of the Chemistry Department.

Parental Leave is available to the student who will serve as the principle caregiver of her or his own newborn child or a partner's newborn child or of a newly adopted child (under six years of age, or a child with special needs under the age of eighteen) during the time for which leave is sought. This policy does not apply to birth parents who do not anticipate becoming the legal parent of the child following birth. If both parents/partners are graduate students in the Department of Chemistry, only one is eligible for parental leave. An eligible graduate student is guaranteed parental leave no more than twice. Any subsequent requests for leave in conjunction with additional instances of birth or adoption will be subject to the approval of the Chair of the Department of Chemistry. Exceptions to the above eligibility criteria must be approved by the Chair of the Department of Chemistry.

Ordinarily, the twelve-week period will begin with the birth date of the child but adjustment may be made to accommodate any issues that arise before the birth of a child, based on student's request and justification. Except for extraordinary circumstances, no extension to the Parental Leave will be granted. Should additional medical complications arise that require longer term medical care, student should seek a non-paid leave of absence from the graduate program through the Graduate School.

Upon approval of a parental leave of absence request, the eligible graduate student will be granted a paid parental leave of absence for a maximum of 12 weeks, starting on the date requested. Graduate students will receive their normal stipend during the duration of the leave. The graduate student will be released from professional duties during the period of parental leave. A graduate student who is granted parental leave will not be expected to maintain scholarly productivity during their leave.

Graduate students interested in applying for Parental Leave should complete the Parental Leave Application form and submit it to the Graduate Coordinator no fewer than three months prior to the expected arrival of the child. The student requesting leave is also required to notify his/her Research Advisor either prior to or as soon as the application is submitted. The parental leave request has to be approved by the Director of Graduate Studies and the Chair of the Department of Chemistry. Any changes to the timeline of the student's graduate studies that may result from the parental leave must be approved by the Research Advisor and the Director of Graduate Studies.

Students who experience a medical condition associated with their pregnancy and need accommodations recommended by their medical provider should contact the University's Title IX Coordinator, who will work with the student, cognizant faculty, and administration to determine what accommodations are reasonable and effective.

*University policy prohibits discrimination against sex/gender which includes pregnant and parenting students and employees. State and federal laws, including Title IX of the Education Act,*

*also prohibit discrimination based upon sex, including pregnancy and pregnancy-related conditions. If you believe you have been subject to discrimination, including having been denied an accommodation for a pregnancy or pregnancy-related condition, please discuss this with the Director of Graduate Studies and/or the Deputy Title IX Coordinator for your college. You may file a complaint with the OEO/AA. <https://oeo.utah.edu/>*

#### Applying for Graduation

Students must apply for graduation the semester prior to expected finish. This can be done online: <https://registrar.utah.edu/handbook/graduategraduation.php>

#### Check-out Procedure

Upon completion of study here and before leaving the University of Utah campus, the student is responsible for turning in all keys issued in their name. As stated on the key request (signed at the time the keys were issued): "I will return this key when my need or employment terminates." The keys must be returned to the Main Office (2020 HEB), not to the Research Advisor. The student must also return the "Contact Information" form to the Graduate Coordinator in the Graduate Office to provide information such as forwarding address and future affiliation.

## Changing Research Groups and Dismissal Policies & Procedures

The following guidelines have been jointly approved by the Faculty and the Graduate Education Committee of the Department of Chemistry for the rare occasions when it becomes necessary to terminate a graduate student/faculty advisor research relationship or dismiss a graduate student from the program. Either the graduate student or the faculty advisor may terminate a student/advisor research relationship because of dissatisfaction. The following guidelines describe these departmental procedures. The student's rights and responsibilities in the case of dismissal are set forth in Policy 6-400, Section IV of the Regulations Library.

### Changing Research Advisor & Supervisory Committee Members

When a student seeks new research environment, a transfer to another research group might be desired. The most important part of this process is open communication between all parties involved. It is strongly advised that a student considering transfer to another group meets with the Director of Graduate Studies to discuss the situation, to receive advice in this important decision and to formulate the plan of action. Depending on the situation, the student may need to communicate with the current Research Advisor, members of the Supervisory Committee and potential new Research Advisor.

Once the plan of action is finalized and the decision to transfer is made, the student is obligated to petition in writing to the Director of Graduate Studies and to obtain his/her permission in writing. The student is obligated to give the current Research Advisor a 30-day written notice outlining the reasons for leaving the group. During the 30 days, any research must be brought to a point where it could be easily passed on to a new person. All notebooks and data must be returned to the Research Advisor before the student joins another faculty member's group. Students should be aware that it is impossible to make TA appointments in mid-semester and should plan accordingly.

After transferring to a new group, the student might also need to reconstitute the Supervisory Committee, e.g. if they have switched primary research areas. If the student has already completed the Qualifying Examination, the student must prepare a brief (3-5 page) summary outlining the new thesis project within five months of joining the new research group. Based on this preliminary information, the Supervisory Committee may decide to call for a brief oral presentation of the new project by the student. An oral presentation would be considered normal for a student that switches primary research areas or makes a substantial change in their research direction. Failure to obtain written approval from the Supervisory Committee within six months of switching Research Advisors will result in loss of good standing for the student and may result in dismissal from the program.

For students who, for whatever reason, have no Research Advisor (such as if a faculty member leaves the University or the student cannot find a new Research Advisor), the Director of Graduate Studies will appoint a temporary Research Advisor who, together with the Supervisory Committee members, will review the student's progress and make recommendations for their path to graduation or termination from the program.

### Dismissal by Faculty

If a Research Advisor is dissatisfied with the performance of a student, for example in terms of research effort, lab safety, data handling, research ethics or working environment, the advisor will make every effort at an early stage of the dissatisfaction to communicate in writing to the student

the concerns about the deficiencies in the student's performance. If the deficiencies persist, the Research Advisor may place the student on probation by identifying to the student in writing the unsatisfactory aspects of the student's performance and the measures needed to bring their performance to an acceptable level. Students are allowed a reasonable time (at least 30 calendar days) to correct the deficiencies during the probationary period. A copy of the letter outlining the deficiencies in their performance will be sent to the Director of Graduate Studies and the Graduate Coordinator. If the deficiencies are corrected in the probationary period, the Research Advisor will notify the student in writing that the probation is removed. A copy of the letter will be sent to the Director of Graduate Studies and the Graduate Coordinator.

If the deficiencies persist at the end of the formal probationary period, it is the prerogative of the Research Advisor to terminate the student/advisor research relationship. The procedure will be:

1. To notify the student in writing, giving reasons for the dismissal, indicating a formal termination date at least 15 days after the date of the letter. A copy of the letter will be sent to the Director of Graduate Studies and the Graduate Coordinator.
2. If the student is being paid as an RA, the student will be kept on the payroll for 15 days after the date of the notification letter to allow time to establish a new Research Advisor relationship, unless a new Research Advisor puts the student on a payroll before the end of the 15 days.
3. If the student is being paid as a TA, the Department will continue the current TA support until the end of the termination semester, contingent on the TA duties being carried out as required.
4. If the student fails to find a new Research Advisor, the student may be dismissed from the program.

It is the student's obligation to turn over all data and notebooks arranged in a manner that will allow the Research Advisor to continue the work. If these materials are not turned over by the termination date, any pay from a new Research Advisor or the Department may be held in escrow until the above obligation is met.

### Formal Dismissal

While most students succeed in our program, there are situations where graduation is not possible and a student may be dismissed from the program. These may include: (1) failure to pass all required courses (grade of B or better); (2) GPA (either cumulatively or in a particular semester) of less than 3.0; (3) failure to find a Research Advisor; (4) failure to pass a milestone exam; (5) behavioral, academic or scientific misconduct; (6) failure to make timely progress toward completion of the PhD as determined by the student's Supervisory Committee.

The Director of Graduate Studies and the Graduate Education Committee monitor the progress students make towards the completion of their Ph.D. program and facilitate the process of changing research groups or being dismissed by faculty. In the unusual case when a student fails to make satisfactory progress toward the timely completion of a graduate degree and that student's Supervisory Committee requires help in resolving the situation, the Director of Graduate Studies in consultation with the Research Advisor, Supervisory Committee, Graduate Education Committee and Department Chair may initiate the dismissal of the student from the program. A student and all the above parties will be given timely and regular written feedback regarding the academic deficiencies that may lead to a decision for dismissal. Dismissal of a student from the program will be carried out in compliance with University of Utah Policy 6-400.

## Voluntarily Leaving the Program

A student who decides to leave the graduate program must inform the Director of Graduate Studies and give the Research Advisor a 30-day written notice. During the 30 days, any research must be brought to a point where it could be easily passed on to a new person. All notebooks and data must be returned to the Research Advisor before the student leaves the program. If these materials are not turned over by the exit date, any pay from the Research Advisor or the Department may be held in escrow until the above obligation is met.

Students should be aware of there are several consequences of leaving the program early and they should contact the Graduate Coordinator as early as possible if they are considering leaving the graduate program. The timing of a student's departure from the program impacts whether tuition must be reimbursed and eligibility for a degree. Students adding and/or dropping courses after the semester's published add/drop deadlines are responsible for any and all charges incurred, including withdrawals. Tuition benefit will not pay for withdrawn credit hours, and if registration falls below required credit hours at any time during the semester, a student becomes ineligible for the tuition benefit and will be billed the full tuition for that semester.

In addition, the students will not earn and receive a Master's degree if the Graduate School and Department of Chemistry requirements have not been met when they leave the graduate program. Students are advised to discuss degree requirements with the Graduate Coordinator and the Director of Graduate Studies. The student should recognize that they might be required to re-apply should they wish to continue in the program and work on another advanced degree. If a student qualifies for a Master's degree, they should follow the instructions provided in the section titled Master of Science Degree.

Students being supported as TAs should also be aware that it is very difficult to find TA replacements mid-semester and should be considerate of the negative effect on instruction their early departure may have.

## Master of Science Degree

In cases when a student needs or decides to leave the program early, they may qualify for a Master's degree. For either the coursework or thesis M.S. degrees, Category I or II placement on the basis of course performance is required. A minimum of 30 semester credit hours is required for the M.S. Degree (thesis and coursework) in Chemistry. At least 12 hours of these will be required graduate chemistry courses, satisfactory completion of which will fulfill the Graduate School Comprehensive Examination requirement. An M.S. Supervisory Committee composed of three Chemistry faculty is then chosen. The Graduate Education Committee must approve the committee. The student will need to visit the Graduate Coordinator in order to obtain detailed instructions about the procedure. The student should consult the University of Utah Graduate School website (<http://gradschool.utah.edu/current-students/graduation-overview-for-masters-candidates/>) for more details.

### Coursework Master's Degree

For the coursework M.S. Degree, at least 10 hours of research credits (CHEM 6900) and 20 credit hours of coursework in graduate level chemistry courses or graduate courses in a closely allied field of study (subject to approval by the student's supervisory committee) are required. The final examination for the coursework M.S. is a written exam in the student's area of emphasis that will be administered by the faculty. Upon approval by the Research Advisor, students may substitute the final examination by a written report on his/her research. This report must be presented the Research Advisor and the Supervisory Committee for evaluation and approval.

### Thesis Master's Degree

For a thesis M.S. Degree, at least 10 hours of research credits (CHEM 6970) and 20 credit hours of coursework in graduate level chemistry courses or graduate courses in a closely allied field of study, subject to approval by the student's supervisory committee, are required. In order to obtain a Thesis Master's Degree, students must write a master's thesis and then successfully defend the contents of the thesis in an oral examination proctored by the students Supervisory Committee. The written thesis must be submitted to the members of the Supervisory Committee at least 14 days before the oral examination. The final oral examination covers the thesis research of the candidate. The first part of the exam is open to the public and is normally a brief presentation of the thesis research after which the student's Supervisory Committee will carry out further questioning. A pass/fail vote by the Committee will follow.

### Time Limit to Degree

Graduate School policy for Master's Degrees: <https://gradschool.utah.edu/graduate-catalog/degree-requirements>. Students in the M.S. program are limited to 2 years (4 semesters) of Tuition Benefit.

## Research Safety, Training & Policies

### Occupational Safety and Training

A. Initial Training. Prior to commencing work in any lab, graduate students must complete the following safety training:

- a) Attendance and participation in the Chemistry Department Safety Course (includes fire extinguisher training, health training and OEHS Chemical Hygiene Training). This training is held annually in August. If attendance is not possible, one must view the online safety videos available through EHS.
- b) Reading of the entire Department of Chemistry Chemical Hygiene Plan.
- c) Lab-specific training indicated by the supervisor including review of the lab specific chemical hygiene plan and relevant standard operating procedures (SOPs).

B. Refresher Training. At least once a year each research group must have a safety refresher meeting that covers topics pertinent to the lab. This can take the form of a game, discussion on near misses or “what if” scenarios, etc. It is recommended that research groups additionally discuss safety at their group meetings.

C. Documentation of Training. All training must be documented. Documentation must include a description (date, title, who gave the training, date, and printed names of those who attended. A signature of each attendee is also required to certify training was completed. A training log template is available on the Canvas Safety Site in the Forms folder.

Graduate students are required to complete the “Departmental Chemical Hygiene Plan Completion Form” found at <https://chem.utah.edu/safety/chemical-hygiene-plan.php> and in the Canvas Safety Site forms folder once they have read the Departmental Chemical Hygiene plan and prior to working in the lab. Note that students must sign the form, scan it and upload into the Departmental Chemical Hygiene Plan Completion Form Assignment on the Canvas Safety Site. Lab specific training, including refresher trainings, must be documented and maintained by Supervisors and Safety Officers on Canvas.

Department of Chemistry Safety Committee information can be found at <https://chem.utah.edu/safety/safety.php>

University-wide information can be found here: <https://oehs.utah.edu>

### Radiation Safety

If laboratory or other research includes radiation, find safety and training resources here: <https://rso.utah.edu>

### Reporting Safety Issues

Contact information for key EHS personnel, emergency contact information, and Department of Chemistry safety committee is available at <https://chem.utah.edu/safety/safety.php>

Students are encouraged to report near misses and safety issues at <https://oehs.utah.edu/resource-center/forms/hazard-report>

### Building Access

For Card Reader Access and Keys in Chemistry, request forms can be obtained and dropped off are in 2020 HEB. Emails are sent when keys are ready to be picked-up at 2020 HEB (approximately, one week). All enquiries regarding mailboxes, copy machines, printers, etc. should be addressed to the Main Office of the Chemistry Department.



## Student & Faculty Code of Conduct

### Code of Conduct

The Department of Chemistry is committed to fostering excellence in our community of scholars and leaders. We recognize that diverse and inclusive teams are most likely to produce creative and impactful scholarship and are eager to ensure that each member of our academic community is respected and valued for their unique contributions. This Code of Conduct upholds the Graduate School's commitment to conduct graduate and postdoctoral education according to the highest ethical and professional standard in compliance with all applicable University, state, and federal regulations.

The Department of Chemistry is committed to providing a safe, harassment-free and discrimination-free environment for everyone. Harassment includes offensive comments or denigrating jokes related to nationality, gender, sexual orientation, disability, age, physical appearance, body size, race, religion, or veteran's status, sexual images in public spaces, deliberate intimidation, stalking, following, harassing photography or recordings, inappropriate physical contact, unwelcome sexual attention, and harassment through social media.

All University faculty, staff, and students are expected to comply with the applicable anti-harassment, anti-discrimination, and scientific and professional ethics laws and policies in effect at the University of Utah and at the institutions where they may be visiting.

Visitors, including participants at any University or Department of Chemistry sponsored events, are expected to comply with these same standards, as well as to policies at their place of employment. In addition to any applicable reporting requirements at their home site, visitors are encouraged to report violations here as above.

### Code of Student Rights and Responsibilities

This code is defined by the Policy 6-400 of the University of Utah: <https://regulations.utah.edu/academics/6-400.php>. "The purposes of the Code of Student Rights and Responsibilities are to set forth the specific authority and responsibility of the University to maintain social discipline, to establish guidelines that facilitate a just and civil campus community, and to outline the educational process for determining student and student organization responsibility for alleged violations of University regulations. University policies have been designed to protect individuals and the campus community and create an environment conducive to achieving the academic mission of the institution. The University encourages informal resolution of problems, and students are urged to discuss their concerns with the involved faculty member, department chair, dean of the college or dean of students. Informal resolution of problems by mutual consent of all parties is highly desired and is appropriate at any time.

In cases where a more formal resolution of problems is needed, distinct administrative procedures and time lines have been established for proceedings under the Standards of Behavior (Section III), the Standards of Academic Performance (Section IV), the Standards of Academic Conduct (Section V) and the Standards of Professional Conduct (Section VI). Certain conduct by students may fall within more than one section of the Student Code. When this is the case, an appropriate University administrator shall determine which section of the code is the appropriate section under which to proceed."

Members of the University of Utah community who wish to report a violation of this Code of Conduct are encouraged to speak to or contact the appropriate administrator or Dean, including the Department Chair or Director of Graduate Studies, the Dean of the Graduate School and/or Associate/Assistant Deans of the Graduate School, or the University's Title IX coordinator.

### University of Utah Honor Code

Academic dishonesty in all its forms is proscribed including, but without being limited to, cheating on tests, plagiarism, and collusion.

1. Cheating on tests includes but is not limited to:
  - copying from another student's test paper;
  - using materials during a test not authorized by the person giving the test;
  - collaborating with any other person during a test without authority;
  - knowingly obtaining, using, buying, selling, transporting, or soliciting in whole or in part the contents of an unadministered test;
  - bribing any other person to obtain an unadministered test or information about an unadministered test;
  - substituting for another student or permitting any other person to substitute for oneself, to take a test;
  - altering a returned examination for subsequent re-evaluation and regrading;
  - failure to return an examination that the instructor has required to be returned;
  - removal of an examination from the classroom or office that the instructor has required not to be removed.
2. "Plagiarism" means the appropriation of any other person's work and the unacknowledged incorporation of that work in one's own work offered for credit. "Plagiarism" also includes the republication of your own work without citing the location where your work was originally published.
3. "Collusion" means the unauthorized collaboration with any other person in preparing work offered for credit.

Academic dishonesty and/or misconduct will not be tolerated. Students that are found to be academically dishonest will be subject to disciplinary action up to and including dismissal from the program. Actions for academic misconduct shall follow the process set forth in Policy 6-400, Section V of the regulations Library.

### Research Misconduct

Misconduct in science is defined as fabrication, falsification, or plagiarism, in proposing, performing, or reporting research. Misconduct in science does not include errors in the recording, selection, or analysis of data; differences in opinions involving the interpretation of data; or misconduct unrelated to the research process.

Scientific misconduct will not be tolerated. Students that are found to have carried out scientific misconduct will be subject to disciplinary action up to and including dismissal from the program. Actions for research misconduct shall follow the process set forth in Policy 7-001 the Regulations Library: <https://regulations.utah.edu/research/7-001.php>

## Informal Dispute Resolution

Students are encouraged to refer to the Director of Graduate Studies for conflict resolution in cases when a conflict cannot be resolved directly with the Research Advisor or if a conflict is outside the scope of student/advisor relationship. The Chair of the Department may also be involved in informal conflict resolution. Students are also welcome to make an appointment with one of the Graduate School deans to voice complaints or concerns (can be requested through [info@gradschool.utah.edu](mailto:info@gradschool.utah.edu) or by calling 801.585.5529). In addition, students can receive help from the University Ombudsman's Office, which provides dispute resolution, resources, and the potential for mediation. More information: <https://academic-affairs.utah.edu/office-for-faculty/facultyombudsman>.

## Formal Dispute Resolution

Students wanting to resolve academic disputes formally should use the Academic Appeal process described in the Policy 6-400 of University procedures for students:

<https://regulations.utah.edu/academics/6-400.php>

Student can report behavior and sexual misconduct to the Dean of Students:

<https://deanofstudents.utah.edu/>

## Title IX

Information on Title IX can be found here: <https://sexualassault.utah.edu/reporting/title-ix-on-campus-reporting>. Contact information for the Title IX Coordinator for the University can be found here: <https://oeo.utah.edu/contact-us>.

## Student Safety

Your safety is our top priority. In an emergency, dial 911 or seek a nearby emergency phone (throughout campus). Report any crimes or suspicious people to 801-585-COPS; this number will get you to a dispatch officer at the **University of Utah Department of Public Safety (DPS)**; [dps.utah.edu](https://dps.utah.edu)). If at any time, you would like to be escorted by a security officer to or from areas on campus, DPS will help - just give a call.

The University of Utah seeks to provide a safe and healthy experience for students, employees, and others who make use of campus facilities. In support of this goal, the University has established confidential resources and support services to assist students who may have been affected by harassment, abusive relationships, or sexual misconduct. A detailed listing of University Resources for campus safety can be found at:

<https://registrar.utah.edu/handbook/campussafety.php>

Your well-being is key to your personal safety. If you are in crisis, call **Crisis Line** (24/7): 801-587-3000; <https://healthcare.utah.edu/uni/programs/crisis-diversion.php>; help is close. Crisis Prevention – SafeUT Smartphone App: <https://www.uofuhealth.org/safeut>

**Suicide Prevention Hotline** – In Salt Lake City call 24/7: 801-261-1442; Utah: <http://www.suicide.org/hotlines/utah-suicide-hotlines.html>

The University has additional excellent resources to promote emotional and physical wellness, including the Counseling Center (<https://counselingcenter.utah.edu>), the Wellness Center (<https://wellness.utah.edu>), and the Women’s Resource Center (<https://womenscenter.utah.edu>). Counselors and advocates in these centers can help guide you to other resources to address a range of issues, including substance abuse and addiction.

**University Police:** <https://dps.utah.edu>

Phone: 911 or 801.585.2677

**University Counseling Center:** <https://counselingcenter.utah.edu>

Room 246, Student Services Building (SSB)

Phone: 801.581.6826

**Sexual Assault Victim Advocacy:** <https://advocate.wellness.utah.edu>

Room 328, Student Services Building (SSB)

Phone: 801.581.7779

**Student Health Center:** <https://studenthealth.utah.edu/services>

Madsen Health Center, 555 Foothill Drive

Phone: 801.581.6431

**Women’s Resource Center:** <https://womenscenter.utah.edu>

Room 411, Olpin Union Building

**The Office of the Dean of Students:** <http://deanofstudents.utah.edu>

Room 270, Olpin Union Building

## Student Resources

### Departmental Resources

#### ChemSAC

Chemistry Student Advisory Committee is a graduate student-specific organization providing resources, activities, and community building opportunities. ChemSAC connects all graduate students in different groups and research areas, works to create a collaborative environment in the department and to improve the graduate program experience. ChemSAC can be contacted at: [chemsac.uofu@gmail.com](mailto:chemsac.uofu@gmail.com). More information can be found at <https://chem.utah.edu/graduate/chemsac.php>

#### Curie Club

Curie Club was founded to inspire historically under-represented individuals to pursue careers in science and reach the top of their field, and to help all scientists balance the competing challenges of family, the pursuit of scientific discovery, and the battle for research funding. The Curie Club offers professional development lectures and workshops as well as peer- and alumni-mentorship activities, led by women and open to everyone. Find out more at:

<https://chem.utah.edu/community/curie-club.php>

#### Student mentors

Many senior graduate students in the Chemistry Department volunteer to serve as mentors to the incoming graduate students. This mentorship is informal and is intended to help the incoming students with issues or questions related to the Chemistry graduate program. The Graduate Education Committee in coordination with ChemSAC and Curie Club maintains the contact information of the student mentors and provides this information upon request.

### Departmental Awards

**Walling Award:** The Cheves Walling Award (\$1,000) recognizes a graduate student in Chemistry, for excellence in graduate work as exemplified by their doctoral dissertation.

**William E. Jack Award:** The William E. Jack Life Science Graduate Research Award (\$1,000) is awarded to the graduate student with the best thesis in biological chemistry, broadly defined.

**Nomination and selection process** for the Cheves Walling and the William E. Jack is as follows. The deadline for all materials is **April 1**. Nominees should have successfully defended their dissertations within one year preceding this April 1 submission date. Students who have not defended their dissertations by the submission date will be eligible for consideration the following year. Nominees need not be currently enrolled students in the Department of Chemistry. Required materials are: (1) a nomination letter from the Research Advisor, describing in detail the significance of the student's research accomplishments. (2) One supporting letter from another faculty member who is familiar with the research. Good choices are Ph.D. committee members, knowledgeable members of the student's division, or even experts in the field of study from outside the department. (3) A copy of the student's current CV, and (4) an electronic version of the student's dissertation. All materials should be submitted to the Graduate Coordinator. All materials submitted are confidential. The awardees are selected by the Graduate Education Committee.

**Curie Club Awards** support the success of women and of all students who are committed to advancing gender equality in science.

A \$250 monetary award will be given to a graduate student in Chemistry for outstanding research. Nominations are submitted by the student's Research Advisor. Applicants must be currently

enrolled in the Department of Chemistry Graduate Program or have graduated within the past academic year. Applications should contain two letters of nomination (one from the Research Advisor and one supporting letter) and one first author paper which exemplifies the research activities of the individual. The deadline for all materials is **April 1**. All materials should be submitted to the Graduate Coordinator. All materials submitted are confidential. The awardees are selected by the Graduate Education Committee.

**Curie Club Graduate Teaching Award, sponsored by Anthony W. Czarnik, Craig & Linda Lee:** Two \$100 monetary awards will be given to graduate students in Chemistry for outstanding teaching. The deadline for all materials is **April 1**. A letter of nomination can be submitted by the student's teaching supervisor and other Chemistry faculty. Applicants must be currently enrolled in the Department of Chemistry Graduate Program or have graduated within the past academic year. The letter should be submitted to the Graduate Coordinator. All letters submitted are confidential. The awardees are selected by the Undergraduate Education Committee.

**Gary Keck and Joel Harris Graduate Fellowships:** Two fellowships will be given, one to a graduate student in organic chemistry broadly defined (Gary Keck Graduate Fellowship) and one to a graduate student in analytical chemistry broadly defined (Joel Harris Graduate Fellowship) to fund their salary during the summer semester. Nominations are submitted by the student's Research Advisor. Nominees must have completed their candidacy. Nominations should include the student's CV, a brief statement of the student's summer research plans, and two letters of recommendation, one from the Research Advisor and one supporting letter, which should describe the student's research accomplishments. The deadline for all materials is **April 1**. All materials should be submitted to the Graduate Coordinator. All materials submitted are confidential. The awardees are selected by the Graduate Education Committee.

**The Dow Chemical - First Year Award:** This award is based on the highest GPA for the fall semester of the 1<sup>st</sup> year in the Chemistry graduate program. The awardees are identified by the Graduate Education Committee. No nomination is required.

## Graduate School Resources

### Events

Event & Workshop Calendar: <https://gradschool.utah.edu/events-calendar>

Events & Workshops Description: <https://gradschool.utah.edu/upcoming-events>

### Administrative & Records

Graduate Records Office: <https://gradschool.utah.edu/graduate-catalog/graduate-records-office>

Electronic Graduate Record File: <https://gradschool.utah.edu/current-students/electronic-graduate-record-file-tutorial>

### Advocacy

Graduate School Diversity Office: <https://gradschool.utah.edu/diversity>

Graduate School Dean: [dean@gradschool.utah.edu](mailto:dean@gradschool.utah.edu)

### Training & Workshop Programs

International Teaching Assistant Program (ITAP): <https://gradschool.utah.edu/ita>

Three Minute Thesis Training & Competition: <https://gradschool.utah.edu/3MT>

Past Workshops & Trainings: <https://gradschool.utah.edu/resource-library/workshops-videos>

Research Communication: <https://gradschool.utah.edu/science-communication>

### Writing & Manuscript Editing

Thesis Office: <https://gradschool.utah.edu/thesis>

Grammarly: <https://gradschool.utah.edu/grammarly>

### Fellowships and Awards

A list of the graduate school awards can be found at <http://gradschool.utah.edu/tpb>. Many of Union Scholarships/Awards may be applicable to graduate students: <https://union.utah.edu/union-scholarships>.

Graduate Fellowship Opportunities: <https://gradschool.utah.edu/tbp/graduate-fellowship-opportunities>

Graduate Student Travel Assistance Award: <https://gradschool.utah.edu/current-students/graduate-student-travel-assistance-award>

Early Career Professional Development Program: <https://gradschool.utah.edu/current-students/graduate-student-travel-assistance-award>

Thesis & Dissertation Awards: <https://gradschool.utah.edu/current-students/awards>

A list of external fellowships is available at <https://gradschool.utah.edu/tbp/external-opportunities>, and students also have access to Pivot, a new tool for finding foundation funding. <https://osp.utah.edu/news/pivot.php>

### Student Travel Assistance

There are awards offered through the Graduate School - the Graduate Student Travel Assistance Award (GSTAA) and the Early Career Professional Development Program (ECPDP). More information on these awards is here: <https://gradschool.utah.edu/current-students/graduate-student-travel-assistance-award>.

## University Resources

### University ID Card

University card information: <https://ucard.utah.edu>

### TRAX Pass

UTA University pass: <https://commuterservices.utah.edu/mass-transit>

TRAX Schedules & Maps: <https://www.rideuta.com/Rider-Tools/Schedules-and-Maps>

### Wireless Connections

Onboard to Utah wireless: [https://onboard.utah.edu/enroll/uofu/prod\\_3/process](https://onboard.utah.edu/enroll/uofu/prod_3/process)

### Software

Grammarly Access: <https://gradschool.utah.edu/grammarly>

New Student Guide to Digital Resources:

[https://it.utah.edu/help/it\\_guides/new\\_student\\_guide.php](https://it.utah.edu/help/it_guides/new_student_guide.php)

### Hardware

University Bookstore: <https://www.campusstore.utah.edu/utah/home>

Surplus & Salvage: <https://fbs.admin.utah.edu/surplus/>

### Paychecks & Direct Deposit

HR Paycheck Information: <https://www.hr.utah.edu/payroll/paycheck.php>

### Housing

Graduate Student Housing Resources & Options: <https://housingoptions.utah.edu/graduate-housing/>

### Meals & Food

Utah Meal Plans: <https://housing.utah.edu/dining>

### Arts & Entertainment

Arts Pass: <https://www.finearts.utah.edu/arts-pass>

### Graduate Writing Center & Graduate Student Reading Room

More information: <https://writingcenter.utah.edu/grad-student-services.php>. The Graduate Writing Center is located in the Marriott Library in the Graduate Student Reading Room. To access the Reading Room, students must fill out a Graduate Resources Access Form, found at <https://lib.utah.edu/services/education/gradstudents.php>. eTutoring for Graduate Writing is also available. Students can sign up for this service at <https://writingcenter.utah.edu/graduate-services/e-tutoring.php>

### University Libraries

In addition to the research offerings, the Marriott Library has events and programs specifically for graduate students. Check <https://lib.utah.edu/services/education/gradstudents.php> for schedules and more information.

### Professional Development

Career & Professional Development Center Graduate Student Career Coaching:

<https://utah.craniumcafe.com/group/graduate-student-career-coaching>

Graduate Student Teaching Training from Center for Teaching & Learning Excellence:

[https://ctle.utah.edu/events/ctle\\_events.php](https://ctle.utah.edu/events/ctle_events.php)



Higher Education Teaching Specialist Program: <https://ctle.utah.edu/hets>

Student Health, Wellness, & Recreation

Student Health Center: <https://studenthealth.utah.edu>

United Healthcare: <https://www.uhcsr.com/school-page>

EMI Health: <https://emihealth.com/groupplans/refid/uvoluntary>

University Counseling Center (including Mindfulness Center): <https://counselingcenter.utah.edu>

Center for Student Wellness: <https://wellness.utah.edu>

Campus Recreation Services: <https://campusrec.utah.edu>

Leadership & Dispute Resources

Dean of Students Office: <https://deanofstudents.utah.edu>

Faculty Ombudsman: <https://academic-affairs.utah.edu/office-for-faculty/facultyombudsman>

Graduate School: <https://gradschool.utah.edu/contact-us>

Support Groups & Services

Center for Disability & Access: <https://disability.utah.edu>

Office of Equal Opportunity, Affirmative Action, and Title IX: <https://oeo.utah.edu>

Office for Equity & Diversity: <https://diversity.utah.edu>

International Student & Scholar Services: <https://ic.utah.edu>

LGBT Resource Center: <https://lgbt.utah.edu>

Veteran's Support Center: <https://veteranscenter.utah.edu>

Women's Resource Center: <https://womenscenter.utah.edu>

Resources Available to International Students

The primary campus contact for international students is the office of International Student and Scholar Services (ISSS), <https://issss.utah.edu/>. In particular, the ISSS handles issues related to international student status in the US, and can provide further information on F-1 and J-1 visas. The Graduate Coordinator serves as a liaison to the ISSS. Even short-term international travel can pose risks to a student's ability to re-enter the US and therefore to continue in the graduate program. The ISSS can help identify potential difficulties and advisability of travel.

Financial Resources

Personal Money Management Center

<https://personal-money-management.utah.edu>

Pivot

<https://osp.utah.edu/news/pivot.php>

Feed-U Pantry

<https://union.utah.edu/resources-spaces/feed-u-pantry/hours-about-us>

## Appendix I: Core Chemistry Courses

Courses offered in the current year are found at <https://www.utah.edu/students/catalog.php>

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### ANALYTICAL CHEMISTRY

CHEM 6810	Nanoscience	CHEM 7590	Advance Topics
CHEM 7700	Transport and Chemical Analysis	CHEM 7750	Information Processing
CHEM 7710	Advanced Analytical and Chemical Measurements	CHEM 7760	Instrumentation Electronics
CHEM 7720	Separations	CHEM 7770	Analytical Spectroscopy & Optics
CHEM 7730	Electrochemistry	CHEM 7780	Surface Chemistry
CHEM 7790	Lab on a Chip		

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### BIOLOGICAL CHEMISTRY

CHEM 6740	Bioanalytical Chemistry	CHEM 7430	Chem Biol Prot Nuc Acids
CHEM 7150	Bioinorganic Chemistry	CHEM 7470	Nucleic Acid Chemistry
CHEM 7450	Biophysical Chemistry	CHEM 7480	Physical Principles of Biomolecular Systems
CHEM 7460	Protein Chemistry	CHEM 7490	Metabolism

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### INORGANIC CHEMISTRY

CHEM 7100	Principles of Inorganic Chemistry	CHEM 7150	Bioinorganic Chemistry
CHEM 7110	Inorganic Mechanisms	CHEM 7160	Organometallic Chemistry I
CHEM 7120	Physical Inorganic Chemistry	CHEM 7170	Homogeneous Catalysis
CHEM 7130	Solid State Chemistry		

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### ORGANIC CHEMISTRY

CHEM 7200	Contemporary Organic Synthesis I	CHEM 7270	Organic Spectroscopy I
CHEM 7210	Contemporary Organic Synthesis II	CHEM 7280	Organic Spectroscopy II
CHEM 7240	Physical Organic Chemistry I	CHEM 7290	Organic Chem. of Materials
CHEM 7250	Physical Organic Chemistry II	CHEM 7300	Polymers Chemistry

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### PHYSICAL CHEMISTRY

CHEM 7000	Introduction to Quantum Mechanics I	CHEM 7070	Chemical Kinetics
CHEM 7010	Introduction to Quantum Mechanics II	CHEM 7080	Chemical Dynamics
CHEM 7020	Introduction to Spectroscopy I	CHEM 7500	Angular Momentum Theory
CHEM 7030	Introduction to Spectroscopy II	CHEM 7520	Computational Chemistry Lab
CHEM 7040	Statistical Thermodynamics	CHEM 7530	Molecular Simulations
CHEM 7050	Classical Thermodynamics		
CHEM 7060	Statistical Mechanics		

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### MATERIALS CHEMISTRY

Materials students are required to take at least two of the following Materials courses:

CHEM 6810	Nanoscience	CHEM 7300	Polymers Chemistry
CHEM 7130	Solid State Chemistry	CHEM 7590	Materials for Energy Applications
CHEM 7290	Organic Chemistry of Materials	CHEM 7640	Materials for Energy

Materials students are required to take at least four of the courses from the track of their choice:

#### Inorganic Materials

CHEM 7100	Principles of Inorganic Chemistry	CHEM 7200	Contemporary Organic Synthesis I
CHEM 7120	Physical Inorganic Chemistry	CHEM 7240	Physical Organic Chemistry I
CHEM 7130	Solid State Chemistry	CHEM 7270	Organic Spectroscopy I

#### Organic, Biological and Hybrid Materials

CHEM 7240	Physical Organic Chemistry I	CHEM 7430	Chem Biol Prot Nuc Acids
CHEM 7450	Biophysical Chemistry	CHEM 6740	Bioanalytical Chemistry
CHEM 7460	Protein Chemistry	PHCEU 7230	Nanomedicine
CHEM 7470	Nucleic Acid Chemistry	CHEM 7310	Polymers Physics

Physical Properties and Analytical Methods for Materials

CHEM 6740	Bioanalytical Chemistry	CHEM 7700	Transport and Chemical Analysis
CHEM 7020	Introduction to Spectroscopy I	CHEM 7720	Separations
CHEM 7030	Introduction to Spectroscopy II	CHEM 7730	Electrochemistry
CHEM 7040	Statistical Thermodynamics	CHEM 7750	Information Processing
CHEM 7050	Classical Thermodynamics	CHEM 7770	Analytical Spectroscopy & Optics
CHEM 7520	Computational Chemistry Lab	CHEM 7780	Surface Chemistry
CHEM 7530	Molecular Simulations		

The remaining two courses are electives that can be chosen from the list of courses above under any primary research area.

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Note 1: The introductory course, CHEM 6510 (Advanced Biological Chemistry), is not acceptable as a core course for students interested in Biological Chemistry. It may be used as an elective or breadth course for students in other primary research areas, provided they have not previously taken a biochemistry course.

Note 2: It is the experience of the Physical Chemistry faculty that in addition to the eight core courses, most physical chemistry students need to take two additional half-semester courses in physical chemistry to be well-prepared as physical chemists. Therefore, the students are strongly encouraged who identify themselves as physical chemists to take a total of 10 graduate courses in their first year, with the two additional courses selected from the physical offerings. If a student has selected a Research Advisor, the latter will provide recommendations regarding the course selection; otherwise, the course selection should be approved by the Physical Chemistry member of the Graduate Education Committee.

## Appendix II: List of Faculty Members by Research Area

Analytical	Biological	Inorganic	Materials	Organic	Physical
Anderson	Bandarian	Burrows	Anderson	Bandarian	Anderson
Armentrout	Buck-Koehntop	Ernst	Bischak	Burrows	Armentrout
Nagy	Burrows	Kieber-Emmons	Conboy	Hammond	Bischak
Conboy	Conboy	Louie	Grünwald	Looper	Buck-Koehntop
Harris	Hammond	Miller	Harris	Louie	Grünwald
Minteer	Kieber-Emmons	Richmond	Louie	Miller	Kieber-Emmons
Shumaker-Parry	Looper	Roberts	Miller	Puri	Molinero
White	Minteer	Saouma	Minteer	Rainier	Morse
Zharov	Puri	Sigman	Molinero	Roberts	Noriega
	Rainier	Stang	Noriega	Saouma	Shumaker-Parry
	Roberts	Tang	Saouma	Sigman	Steele
	Stang	Whittaker-Brooks	Shumaker-Parry	Stang	Tang
	Swanson	Zharov	Tang	Tang	Swanson
			White	Zharov	Whittaker-Brooks
			Whittaker-Brooks		
			Zharov		

## Appendix III: Oral Exam Written Document Guidelines

When writing the document, you must strictly adhere to the following guidelines. The written document can be a maximum of 10 pages in length including figures but excluding references. All figures must be embedded in the document and of the appropriate size. For the sake of consistency, your summary must be single-spaced and must be written in one of five fonts (Arial, Times New Roman, Helvetica, Palatino, or Georgia) using 11 point or larger type. The margins must be 1” on all sides. **Written documents that do not conform to these specifications will not be accepted.** The Supervisory Committee chair must approve any modifications to this format.

The following must be included.

### Cover sheet: (1 page, not included in total page count)

- Title (55 characters or less): Provide a concise descriptive title of your research.
- Name: Your full name, the name of your Research Advisor, and the names of each member of your Advisory Committee.
- Date, Time, and Place of the Oral Exam.

### Introduction: (1-2 pages)

- Begin your document with an introduction to your research in which you discuss the main goal(s) of your research, making sure to place the work within the context of previous studies.
- Include a discussion of the relevance of the research.
- You should end the introduction with a brief summary of the expected outcome(s) of the research.

### Goals and/or Specific Aims (0.5-1 page)

- Specific aims and/or goals of your current research. Each specific aim should be stated in a single sentence.

### Background: (3-4 pages)

- Describe the relevant background information that is related to your research. This section must connect your research to previous work. When writing this section, assume that the reader is familiar with the field, but not an expert.
- The *Background* section must include the following:
- An introduction to the problem that you are investigating.
- A description of the previous methods or approaches used to address this or related scientific problems.

### Preliminary Results & Discussion (2-3 pages)

- Describe your current research progress to date. ***The inclusion of extensive experimental or theoretical data is not a requirement for the Oral Exam, nor is the prior publication of a research article. Preliminary data, observations, and discussion are sufficient.***
- The *Preliminary Results & Discussion* must include the following:
- A brief description of the procedures used for the collection, analysis, and interpretation of your data.
- A discussion and interpretation of the results to date.
- A discussion of your results within the context of previous studies.
- Tentative conclusions and potential future directions.

References (not included in total page count)

- References must include: complete author list, title, journal name, volume, inclusive page numbers, and year.
- The format must be compatible with that used in a major journal in your research area (for example, ACS style (+ title), as used in the Journal of the American Chemical Society, or APS style (+ title), as used in the Journal of Chemical Physics).

## Appendix IV: Written Research Proposal Guidelines

When writing your Proposal, it is essential that you organize your ideas and express them clearly using correct spelling, terminology, grammar, straightforward sentence construction, and properly developed paragraphs. Writing guides are available from the American Chemical Society, <https://pubs.acs.org/doi/book/10.1021/acsguide>. The writing guide by Strunk and White (<http://www.bartleby.com/141/>) is a good general reference. It is important to remember that even the most creative ideas will be discounted if a proposal is poorly written. **Written documents that do not conform to these specifications will not be accepted.** The Supervisory Committee Chair must approve any modifications to this format.

Research ideas and the resulting proposals generally fall into one of two categories: “hypothesis-driven” or “goal-oriented”. The former are focused on research that is directed by a hypothesis regarding the outcome or expected results from a scientific problem. The latter are focused on research that is focused on attaining a particular goal. Included within this definition is the development or application of new methods or techniques to address a scientific problem. It should be noted that many very successful proposals contain aspects of both categories.

When writing the proposal, you must strictly adhere to the following guidelines. The written document can be a maximum of 10 pages in length including figures but excluding references and cover page. All figures must be embedded in the document and of the appropriate size. For the sake of consistency, all proposals must be single-spaced and must be written in one of five fonts (Arial, Times New Roman, Helvetica, Palatino, or Georgia) using 11 point or larger type. The margins must be 1” on all sides.

### Proposal Outline

#### Cover sheet (1 page, not included in total page count)

- Title (55 characters or less): Provide a concise descriptive title for your proposal.
- Name: Your full name, the name of your Research Advisor, and the names of each member of your Advisory Committee.
- Date, Time, and Place of the proposal exam (if established).

#### Introduction and Background (~1 page)

- Begin your document with a very brief introduction to the research topic. This is expected to include a description of the problem that you are trying to solve or the hypothesis that you are interested in testing along with a summary of the methods that you are going to use to solve the problem.
- Provide some background focusing on importance, challenges and unsolved problems.

#### Specific Aims or Goals (~1 page)

- Specific Aims are your research goals. It is best if you limit your proposal to 2-3 specific aims. Each specific aim should be stated in a single sentence and should be designed to directly test your hypothesis or to achieve your overall goal.
- End this page with a summary of both the expected outcome and the significance of the proposed studies. *This section must include a brief description of what is significant and innovative about your proposed research (you should note that successful proposals do not necessarily need to have a high degree of innovation but should be of high significance).*

#### Research Plan (~4 pages)

- Description of the design of your research program by giving a brief plan that lists the procedures and steps that you will use to accomplish each Specific Aim of the project.
- A description of all procedures that will be used for the collection, analysis, and interpretation of data.
- A description of the procedures and methods that you will use and/or develop to accomplish your goals and their advantages. To do this you will need to compare your procedures and methods to those previously used, discussing the similarities and differences.
- A time-line for the proposed experiments. You should be practical in terms of how much work you propose. The goals of the proposal must be achievable by you within a 2-3-year timeframe.
- A description of any hazardous procedures or materials and the precautions that will be exercised.

#### Challenges and Alternative Approaches (~1 page)

- List anticipated difficulties and limitations of the procedures and/or methods you propose. In cases where the difficulties are likely to be a hindrance to achieving your goals, alternative approaches must be given.
- It is possible to include challenges and alternative approaches with each specific aim in research plan.

#### Preliminary Results (~1-2 pages)

- Description of your research progress to date.
- A brief description of the procedures used for the collection, analysis, and interpretation of your data.
- A discussion and interpretation of the results to date.
- A discussion of your results within the context of previous studies.
- Tentative conclusions and potential future directions.
- It is possible to include preliminary results with each specific aim in Research Plan.

#### Summary and Conclusions (~1 page)

- Summarize your research plan.
- Include a summary of the expected results.
- Address the significance of the expected results.

#### References (not included in total page count)

- References must include: complete author list, title, journal name, volume, inclusive page numbers, and year.
- The format must be compatible with that used in a major journal in your research area (for example, ACS style (+ title), as used in the Journal of the American Chemical Society, or APS style (+ title), as used in the Journal of Chemical Physics).

### **Formulating and Testing a Hypothesis and Achieving a Goal**

Your hypothesis or goal should advance the current understanding of the state of the art in your chosen area and it must provide important information about the problem in which you are interested. You must demonstrate a sound framework for fulfilling these requirements by providing informed and logical arguments in the *Background* section of the proposal.



## Hypothesis-Driven Proposal

For proposals that are “hypothesis-driven”, you should formulate a hypothesis that you believe is the most likely answer to the question. In order to identify the most likely answer you must identify and weigh a number of possible answers to your question. Evaluation of the relative quality of the answers requires sophisticated interpretation of previous work, evaluation of the relative weights of current conflicting observations, extension by analogy to other systems, and a good deal of intuition. The synthesis of these components into a logical argument must also be convincingly and concisely presented in the *Background* section.

Undoubtedly, in formulating your hypothesis you will need to make certain assumptions about your problem. It is essential that you recognize these assumptions. A valuable exercise is to rank your assumptions based on how critical they are to your hypothesis and to list, in two columns, arguments that support and contest your interpretation. Spend time acquiring information about the most important assumptions and always be extremely critical. Quite frequently, entire scientific disciplines encounter roadblocks due to collective acceptance of improper assumptions. For example, until the 1950’s proteins were thought to be the carrier of genetic information, not DNA. The entire field of genetics had assumed that DNA, a simple polymer of only four central building blocks, could never encode the genetic diversity necessary to produce complex organisms. Recognition of DNA as the transmitter of genetic information was hailed as a scientific breakthrough and is central to the entire field of genetics and molecular biology. Major advances (“scientific breakthroughs”) often occur when someone successfully challenges a universally believed assumption that turns out to be invalid.

## Goal-Oriented Proposal

Examples of goal-oriented proposals include, but are not limited to, the synthesis of a molecule of some biological relevance, the design of a new material, the development of an analytical method, and the development of a new catalyst system. As with hypothesis-driven proposals, goal-oriented proposals must be focused on solving a problem or problems.<sup>2</sup> It is imperative that you avoid the pitfall of identifying a method or a goal without having a particular problem to solve. Equally important is that your approach or method has at least one advantage over other approaches or methods to the same problem. To ensure that you meet this requirement you will need to identify and evaluate as many possible solutions to your problem as possible and then to critically compare your approach with all of the others. So that the reader of your proposal can follow your line of thought, you must present a convincing argument for your particular approach in the *Background* section of the proposal.

## Specific Aims

Successfully defending your research plan requires a solid set of goals. As stated above, these goals are your specific aims. While it is possible to formulate many aims to test a hypothesis, to answer a question, or to develop a method the most successful proposals are generally focused on the very “best” aims. The “best” aims target the most important aspect of the problem in which you are interested. Keep in mind that the reader of your proposal may have a different opinion as to the “best” aims to pursue. It is your job to convince the reader that your approach is, at the very least, reasonable.

Specific aims should be presented in order of decreasing importance. Earlier aims should be more extensively developed than later aims in the *Research Plan* section. By extensively describing

early aims, the reader develops trust in your abilities and requires less information to believe your arguments and abilities in the later aims. Likewise, if the early aims are poorly described or developed, the reader will have less patience to read about subsequent aims.

### **Editing and Proofreading**

A superior proposal is a tightly edited document. Very few individuals can write a suitable proposal without going through numerous revisions to sharpen the organization, remove redundant words or phrases, clear up ambiguities, and correct misspelled words and grammatical errors. Do not assume that you belong to that privileged group! Good editing is a time-consuming and difficult job. You are advised to seek outside help from your peers at all stages (early and late) of the writing and editing process.

### **Common Mistakes**

You can avoid having to revise, retake, or fail your oral defense if you avoid the following common mistakes:

- No Significance or Goals that are Too Narrow: “This work will be of little or no real interest or significance.”
- Too Broad or Unrealistic Goals: “I will cure cancer.”
- Fishing Expedition: “I will perform lots of experiments and see what they produce.”
- Technique in Search of a Problem: “I have a great experimental method but I don’t know what to do with it.”

### **Talk to Your Supervisory Committee**

Communicate with your Supervisory Committee in advance of your proposal defense if there is concern about the scientific approach, style, or expected level of oral presentation and written detail.

## Appendix V: Research Progress Report Guidelines

When writing the document, you must strictly adhere to the following guidelines. The written document can be a maximum of 3 pages in length including figures but excluding references. All figures must be embedded in the document and of the appropriate size. For the sake of consistency, your summary must be single-spaced and must be written in one of five fonts (Arial, Times New Roman, Helvetica, Palatino, or Georgia) using 11 point or larger type. The margins must be 1" on all sides.

### Cover sheet (1 page, not included in total page count)

- Title (55 characters or less): Provide a concise descriptive title for your dissertation.
- Name: Your full name, the name of your Research Advisor, and the names of each member of your Advisory Committee.
- Date, Time, and Place of the meeting (if established).

### Introduction (~0.5 page)

- Include a description of the problem that you are trying to solve or the hypothesis that you are interested in testing along with a summary of the methods that you are using to solve the problem.

### Specific Aims or Goals (~0.5 page)

- State each specific aim in a single sentence.

### Results (~1-1.5 pages)

- Description of your research progress to date.
- A brief description of the procedures used for the collection, analysis, and interpretation of your data.
- A discussion and interpretation of the results to date.
- Relate preliminary results with each Specific Aim.

### Summary and Conclusions (~0.5 page)

- Summarize your research.
- Include a summary of the expected results and a timeline.

### References (not included in total page count)

- References to your published, submitted and in-preparation papers
- References must include: complete author list, title, journal name, volume, inclusive page numbers, and year.
- The format must be compatible with that used in a major journal in your research area (for example, ACS style (+ title), as used in the Journal of the American Chemical Society, or APS style (+ title), as used in the Journal of Chemical Physics).

## Appendix VI: Preliminary Dissertation Outline Guidelines

When preparing the document, you must strictly adhere to the following guidelines. The outline can be a maximum of 2 pages in length. For the sake of consistency, your summary must be single-spaced and must be written in one of five fonts (Arial, Times New Roman, Helvetica, Palatino, or Georgia) using 11 point or larger type. The margins must be 1” on all sides.

### Cover sheet (1 page, not included in total page count)

- Title (55 characters or less): Provide a concise descriptive title for your dissertation.
- Name: Your full name, the name of your Research Advisor, and the names of each member of your Advisory Committee.
- Expected defense month and year.

### Outline

- Provide the list of dissertation chapters and subchapters.
- For each subchapter provide status (e. g., finished, in progress), corresponding publications, if any, what is left to accomplish and timeline.

## Appendix VII: List of Important Forms and Documents

All forms that will be used during the graduate student's academic program can be found at <https://chem.utah.edu/graduate/resources.php>. These forms can be downloaded, filled out and signed electronically. These forms are:

1. Course Approval
2. Rotation Selection
3. Research Advisor Selection
4. Supervisory Committee Selection
5. Seminar Evaluation
6. Organic Seminar Evaluation
7. Oral Exam Evaluation
8. Proposal Exam Evaluation
9. Research Progress Meeting Summary
10. PhD Final Oral Exam Evaluation

The following forms and documents must be uploaded on Canvas in time for the corresponding milestone deadlines:

1. Course Approval
2. Rotation Selection
3. Research Advisor Selection
4. Supervisory Committee Selection
5. Oral exam written document
6. Research proposal specific aims
7. Written research proposal
8. Written Research Progress Report
9. Preliminary Dissertation Outline
10. Dissertation final draft