

# **GRADUATE HANDBOOK**

Department of Physics & Astronomy

University of Utah

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# **1** Welcome from the Director of Graduate Studies

Welcome to our Graduate Program in Physics & Astronomy! A graduate degree from our program provides a strong foundation for a rewarding career in physics, astronomy, and a myriad diverse fields of industry and finance to which physicists and astronomers contribute. Our graduate degree program will give you the opportunity to achieve this goal. We offer doctoral degrees in Physics, and give the option to follow tracks in Astronomy and Astrophysics, Biophysics, and Physics Education Research. Although ours is primarily a doctoral program, we offer Master's degrees as well, including a physics-instrumentation degree. As you work towards your degree, you will choose a research specialization, a choice that can define your career. We offer a wide range of subject areas, including astronomy & astrophysics, biophysics, condensed matter physics, and high-energy particle physics. In addition, some of us work in multidisciplinary specializations, for example, in nanoscience and medical physics. A current list of our specializations, with links to the names faculty working in those areas can be found at

#### www.physics.utah.edu/research/.

An important part of your graduate experience will be related to how you are financially supported in graduate school. It is typical for your tuition to be covered under the University's Tuition Benefits Program, which is available to you if you serve as a Teaching Assistant (TA) or work as a Research Assistant (RA), or receive another approved graduate student position as determined by the Tuition Benefit Program. While there are time limitations, you will find that the benefits offered by the University enable you to keep focused on progress towards your degree, meanwhile providing allowance for day-to-day expenses, including health insurance.

This handbook contains information on the graduate experience in the Department of Physics & Astronomy. It covers departmental rules, including the degree requirements — which courses to take, and what exams you'll need to pass — as well as policy regarding teaching and research assistantships, tuition, and a little bit of information about life as a graduate student. Throughout this document, you will find links to resources, which we compile towards end of this handbook (Section 5). To start off, visit the graduate school at

#### www.gradschool.utah.edu

which points to the ultimate authority on policy concerning all of the University of Utah's graduate programs. Please peruse it for the wealth it contains. Then, explore this handbook. We hope that it helps make your graduate experience here in our own department rich and rewarding.

Carsten Rott
 Director of Graduate Studies (DoGS)
 Department of Physics & Astronomy (P&A)

Graduate Committee: Doug Bergman Bryce Nelson Carsten Rott, chair Pearl Sandick Zheng Zheng

# 2 Overview

This document describes the policies and procedures of the Physics & Astronomy Graduate Program. The guidelines described herein are to be followed by all graduate students and faculty in the department.

# 2.1 Department Mission

The University of Utah Department of Physics & Astronomy is committed to pursuing key science questions within an inclusive academic community; to training and diversifying the next generation of researchers, educators, and technology workforce leaders; and to inspiring an appreciation for knowledge in students and the wider community.

In pursuit of this mission, the department supports the highest levels of research and teaching among its faculty members. We strive to enable the success of undergraduate and graduate students by creating an academically excellent, efficient, and comfortable learning environment. Our goal is that organizations and individuals in the local and global community will benefit from our research and accomplishments.

# 2.2 People and Committees

**Graduate Coordinator.** The P&A Graduate Coordinator runs the graduate program on a day-to-day basis and helps with the necessary 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.

**Director of Graduate Studies (DoGS).** The P&A Director of Graduate Studies oversees the graduate program with the Graduate Committee (see below). The DoGS also is a resource for questions about the program, our policies, and procedures.

**Graduate Committee.** This departmental committee, consisting of P&A faculty and headed by the DoGS, is responsible for overseeing the graduate program. The committee regularly reviews progress of all students in the graduate program, identifying means to support students in reaching academic goals. If the committee identifies a student who is not meeting milestones, the Graduate Committee is responsible for considering exceptions, funding, and/or continued registration in the program.

**Assigned Advisory Committee.** Each incoming graduate student is assigned a three-person advisory committee of P&A faculty, to advise on class selection, tuition issues, and finding a research advisor.

**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 to the three-person committee and/or the Supervisory Committee.

**Supervisory Committee.** After a doctoral student chooses a research advisor, a supervisory committee consisting of five faculty supports and monitors student progress, approves the Program of Study, and administers the qualifying exam and thesis defense.

**Department Chair.** The Department Chair is responsible for all departmental functions, including the operation of the graduate program. Along with the DoGS, the P&A Chair can help with any issues that might arise during students' graduate experience. The Chair is the person to contact for academic appeals (e.g., grade disputes; see Student Code), and can connect students with other resources on campus.

**Associate Chair.** The Associate Chair oversees department operations associated with the educational mission. For example, the P&A Associate Chair oversees TA assignments and course scheduling.

**TA Orientation Committee.** A department committee responsible for the TA Orientation that all incoming graduate students attend, as well as workshops/discussions throughout the academic year to support TAs.

**Mentor TA(s).** Experienced TAs who facilitate the TA Orientation and support TAs throughout the academic year through teaching discussions, workshops, and peer observations. Mentor TA(s) report to the chair of the TA Orientation Committee.

Graduate Student Advisory Committee (GSAC). The GSAC, composed of current P&A graduate students,

- participates in the evaluation of faculty for retention, promotion, and tenure, including interviewing candidates and writing a report for the file;
- serves as a liaison between students, and department leadership; and
- ◊ coordinates social activities and informal peer mentorship for graduate students.

More information about GSAC and its activities is at

www.physics.utah.edu/graduate-programs/graduate-student-advisory-committee/

The current personnel and composition of all departmental committees can be found at:

www.physics.utah.edu/secure/internal/

## 2.3 Student Rights and Responsibilities

Students enrolled in the P&A graduate program are expected to refer to and abide by the University of Utah Code of Student Rights and Responsibilities (Policy 6-400),

#### regulations.utah.edu/academics/6-400.php

In addition to the practical rights and responsibilities that may be familiar from undergraduate education, graduate students will encounter additional rigors as professionals-in-training as well as in their roles as Teaching Assistants. The department strives to define these expectations and metrics for success as clearly as possible, however, we recognize that there are some unquantifiable aspects of Ph.D.-readiness; time management, financial solvency, and emotional resiliency are examples of skills that will serve a student well in overcoming the challenges and rigors of graduate school. We encourage students to take advantage of available institutional and departmental resources, including early opportunities for mentorship, for support in navigating all aspects of graduate studies.

## 2.4 Information for International Students

The primary administrative campus contact for international students is the office of International Student and Scholar Services (ISSS),

#### internationalcenter.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 and I-20 extensions. The Graduate Coordinator serves as a liaison

to the ISSS. I-20 status should be discussed with a student's Assigned Advisory Committee or Supervisory Committee on Advising Day (see Sec. 3.2.3).

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. Students considering international travel, including for visa renewals, should consult with ISSS, their advisor, and the Graduate Coordinator.

The University provides many other resources to assist international students navigating school and life in a new country. Of particular note are the Office of the Dean of Students and the University Counseling Center. Section 5 provides further details.

# 2.5 Establishing Residency

For students who are US citizens, permanent residents, or people seeking asylum, there are benefits to establishing residency in the State of Utah. Please see this link for more information:

#### admissions.utah.edu/apply/residency/faq.php

Note that it is expected that graduate students establish residency after completing 40 credit hours at the University of Utah.

# 2.6 Academic Benchmarks and General Requirements

The following benchmarks help gauge student progress through our graduate program. Note that some of the requirements below apply to students admitted after July 1, 2018. Students admitted before that date must fulfill the requirements in place at the time of their admission. (For example, the Common Exam is not listed below as it is a requirement for all graduate students admitted prior to July 1, 2018 but not thereafter.) Failure to comply with benchmark deadlines may be cause for dismissal from the program. Here and elsewhere, *semester* refers to either the Fall or Spring semester, and these two semesters constitute an academic year. (Summers are typically spent performing thesis research.)

**Comprehensive Exam.** The Comprehensive Exam consists of a classical mechanics/electrodynamics section and a quantum mechanics section based on the material that is taught in the Electrodynamics I (PHYS 7110) and Quantum Theory I (PHYS 7220) courses, respectively. The Comprehensive Exams are administered by committee and designed to be completed at the end of the first fall semester, as described in section Section 3.4.1.

**Research Advisor.** Students must select a research advisor by the end of their first year and report their selection on the Spring Advising Day form. In most cases, this faculty member will serve as a research mentor throughout a student's degree program. Changes in advisor are always possible (Section 3.2.2); however, changes may adversely affect timeline requirements, particularly if made at later stages.

**The Supervisory Committee.** Once an area of specialization and a research advisor have been determined, a student forms a Supervisory Committee; see Section 3.2.1. The Supervisory Committee (except for the "external" member) must be formed by the end of spring semester of the second year.

**The Qualifying Exam.** The Qualifying Exam determines whether a student is ready to embark on doctoral research. See Section 3.4.2 for more details. The deadline for taking the Qualifying Exam is the end of the fifth semester. This exam also fulfills the final exam requirement for a M.S. degree (milestone or terminal). Graduate School policy requires that students are enrolled in classes during the semester that the Qualifying Exam is taken.

**Program of Study.** The Program of Study is a list of courses that a student must take to earn a graduate degree; see Section 3.3.2. The deadline for the Program of Study requirement is the end of the sixth semester. Graduate School policy requires that students are enrolled in classes during the semester that the Program of Study is completed.

**M.S. Thesis or Final Exam.** In order to obtain a Master's degree, a Master's thesis or final exam (in the form of a presentation on the student's research project) is required. The Qualifying Exam can satisfy the final exam requirement for Ph.D. students who would like to earn a M.S. degree on their way to earning a Ph.D. This is referred to as a milestone Master's Degree. The milestone Master's Degree is only available for students working towards their Ph.D. Students not continuing on to their Ph.D. must complete the M.S. thesis or final exam (in the form of a presentation on their project).

**Ph.D. Thesis Defense.** The thesis defense is a public talk followed by a oral exam administered by the Supervisory Committee in private. See Section 3.4.3. It is expected that the thesis defense will be completed by the end of the sixth year.

**Submission of thesis to the Graduate School.** After the thesis defense, and with appropriate signatures on the Final Reading Form, a student must submit the thesis to the Graduate School's Thesis Office,

#### gradschool.utah.edu/thesis/

Students should be aware that recent improvements to the thesis review have made it possible to graduate in the semester of defense, assuming adherence to Thesis Handbook regulations. Look for opportunities to attend Thesis Office Resource presentations and Thesis Formatting Workshops early in the process. Speaking to a thesis editor about pre-reviewing the first chapter you write can save significant time later.

# 2.7 Important Dates

In addition to the deadlines described in Section 2.6, notable dates for P&A graduate students include

- **Teaching Assistant (TA) Training**. This week-long workshop for new graduate students takes place during the week before the start of the Fall semester. Additional training is sometimes required for international TAs.
- Graduate Student Advising Days. Each Fall and Spring semester, an Advising Day is held on Reading Day, the day after semester classes end. On this day, all students check in with their respective Assigned Advisory Committee or Supervisory Committee, complete a form documenting their progress, and file this form with the Graduate Coordinator; see Section 3.2.3. (Advising Days are not substitutes for regular meetings between a student and advisor to discuss research progress.) University academic schedules, which list Reading Day, are posted here:

registrar.utah.edu/academic-calendars/

# 3 Graduate Study

In the following, the operation of the graduate program, including financial support, advising, and general degree requirements are described.

# 3.1 Benefits and Funding for Graduate Study

#### 3.1.1 Assistantships and Fellowships

The department offers assistantships that provide eligible students with a stipend for living expenses: Teaching Assistantships (hereafter TAs; the same guidelines apply to GTs) and Research Assistantships (hereafter RAs; the same guidelines apply to GAs). External fellowships are also available. Here is an overview:

**Teaching Assistantships.** TAs are assigned duties in support of our educational mission. Specific assignments may include leading discussion sections, assisting in classroom labs, grading, or providing other support to the course instructor, as outlined in the TA Responsibilities and Expectations document, which can be found at

www.physics.utah.edu/secure/internal/

For international students: The University requires International TAs from non-English speaking countries to pass an English proficiency exam. If a student does not pass it on arrival, then he or she will take a 3-credit hour English class in the first semester or two or until the test is passed. In this transitional period, the student will receive a stipend and will have duties such as grading, which do not require spoken English.

**Research Assistantships.** RAs work on research projects as determined by the Principal Investigator (PI) on the research grant that provides the support.

**Fellowships.** Fellowship funding is available from the Graduate School, federal agencies and private sponsors; recipients are formally designated as Graduate Assistants (GA) or Graduate Fellows (GF), depending on funding details. Award fellowships carry significant prestige, as well as other benefits not provided to TAs and RAs. See

gradschool.utah.edu/funding/fellowships-scholarships-awards/ financialaid.utah.edu

for more information on fellowship opportunities.

To be eligible for any of the assistantships described above, a student must be in good academic standing (maintain a 3.0 cumulative GPA and be on time in compliance with academic benchmarks; see Section 3.6.1). The department will support admitted Ph.D.-seeking students as specified in their offer letters, so long as the student is making progress and remains in good academic standing; this support may come in the form of department funds, PI grants, or Tuition Benefit support.

#### 3.1.2 TA and RA appointments

**TA positions.** The Fall and Spring TA appointments are 4.5 months in duration; a full Summer TA appointment is 3 months in duration. The actual academic semesters are shorter; but, in some instances, organizational meetings may take place prior to the start of classes, and there may be grading duties that can be fulfilled only after final exams are over.

"Full" TA appointments are formally 20 hours per week (0.5 FTE). In practice, regular TA duties should amount to no more than 18 hours per week on average. The work load for positions with lower effort (e.g., "half-TA", 0.25 FTE) is prorated.

During the semester, TA duties take highest priority following academic obligations. No one, including research advisors, can impose requirements that keep TAs from fulfilling TA obligations. If a TA assignment has a scheduled time (e.g., for discussion/lab section, help lab or office hours), it is the TA's responsibility to arrive on time and remain on site for the full duration of the scheduled time. If there is a grading component, it must be completed in a timely fashion, according to the needs of the course instructor and the reasonable expectation of students. If a TA is unable to fulfill duties for reasons of sickness or emergency (or other excused absences, as per university class attendance policy), he or she must notify the course instructor as soon as possible.

**RA positions.** RA assignments span an academic semester or a summer. Duties of an RA assignment are determined by agreement with the PI of the RA funding, typically the research advisor. Ideally, duties are aligned with thesis research.

A "full" RA appointment is formally 20 hours per week (0.5 FTE). Students may also be registered for research or thesis credits, which come with an additional workload expectation, nominally three hours of effort for each registered credit hour. It is typical that student on "full" RA will work approximately 40 hours per week. It should be emphasized that for students supported on RAs, the goal is scholarly productivity, as agreed to by student and research advisor with the supervisory committee, rather than a target number of hours spent in the lab.

To accommodate periods of intense activity (as well as periods of downtime like vacation during semesters), the 20 hours per week limit may be interpreted, by mutual agreement between the student and PI who is administering the funds for the RA, as an average weekly commitment during each fiscal quarter. For example, if in a given fiscal quarter, a student wishes to return home for a week, a student and PI may agree that the 20 hour commitment represented by this week-long absence may be distributed over the rest of the quarter. PIs must make reasonable accommodations in such cases.

Students and PIs should work to clarify expectations of RA responsibilities should they become unclear. If confusion persists, students should consult with their committee, the DoGS, Graduate Coordinator, Ombuds Liaisons, or Department Chair.

Documented failure to perform in either TA or RA roles may serve as grounds for termination of the position and funding. TAs may receive periodic evaluations of performance, will be notified of any deficiencies, and will be monitored for improvement in job fulfillment. The Department follows University Policy 6-309 for the termination of an educational trainee position. Employment of a graduate student beyond a 0.5 FTE appointment in the course of GA, TA, or RA positions can severely impact the academic progress of the student. It is therefore policy of the department of Physics and Astronomy to not provide for employment of graduate students supported through GA, TA, or RA positions beyond an overall maximum employment of 0.5 FTE. This includes hourly or split GA/TA/RA positions.

#### 3.1.3 Tuition and tuition benefits

Tuition costs for graduate students can be found at

#### fbs.admin.utah.edu/income/tuition/general-graduate/.

For most graduate students who are supported either by TAs, RAs, or by fellowships, tuition costs are covered through the university's Tuition Benefits Program (TBP). There are important eligibility requirements and university rules, some of which are:

 Tuition benefits from the Graduate School are limited to 8 (Fall and Spring) semesters for students who enter the University of Utah graduate program with previous graduate degree (e.g. a M.S. degree);

- ♦ Tuition benefits from the Graduate School are limited to 10 semesters for students who enter the University of Utah graduate program with a Bachelor's degree only;
- ◊ Tuition benefits from the Graduate School are limited to 12 semesters for students who enter the University of Utah graduate program with a Bachelor's degree only and serve as TAs for 4 of the semesters for which they receive tuition benefits.
- In order to be eligible for the tuition benefit through the Graduate School students must be supported as a Graduate Teaching Assistant (TA, job code 9416), Graduate Research Assistant (RA, job code 9314), Graduate Assistant (GA, job code 9330), or as an external Graduate Fellow (GF). Students may register for up to 24 credit hours over the academic year, and students must be registered for 9–12 credits each of Fall and Spring. Summer credit hours registration, between 3–6 hours, is possible with PI or departmental approval. Students considering summer registration are advised to consult with the Graduate Coordinator or the DoGS. Other restrictions apply:

gradschool.utah.edu/tbp/tuition-benefit-program-guidelines/

- Students who are in good standing (see Section 3.6.1), and are making documented progress toward completing their degree may request a tuition benefit extension. The Graduate Coordinator will contact students whose benefits are ending. TBP extension requests are made to the P&A Graduate Committee.
- For students who have exhausted their traditional tuition benefits, the student's advisor may be able to assist with the minimum tuition costs required to stay enrolled for thesis work. If the advisor is only partially able (or unable) to fund this expense, the student and advisor may request consideration for departmental funding through the Graduate Committee. Such funding is not guaranteed. Requests should be made in writing, submitted jointly by student and advisor, and should include a graduation plan. The Graduate Committee will review such requests to determine merit and eligibility based on academic standing and satisfactory progress toward completion, and will make a recommendation to the Department Chair, who has final budgetary approval.

#### 3.1.4 Differential tuition, course fees, and enrollment fees

Course fees, including the university's "differential tuition", are not covered by the Graduate School's tuition benefits program. However, if a course is part of a student's Program of Study and approved by the research advisor, the student can contact the DoGS requesting that the research advisor or the department cover course-related fees. This request must be made in writing, with documented support from the advisor, prior to the start of the semester for which the fees apply. The department will cover the International Student Fee, which is assessed every fall and spring semester.

#### 3.1.5 Travel funds

A student may apply to the Graduate School for funds to support a professional/scientific conference:

#### gradschool.utah.edu/diversity/conference-travel/

The department will provide matching funds, if needed, up to the same amount as provided by the Graduate School. Each graduate student is eligible to receive matching departmental travel funds only once. To apply for the department match, a student must first complete the Travel Funding Request Form and submit it to the Graduate Coordinator. Applications to the Graduate School funds are done online through the link:

gradschool.utah.edu/funding/travel-assistance/

#### 3.1.6 Health insurance

The University of Utah offers a health-insurance plan for all students. The Graduate School will cover 80% of the group health insurance cost for students with tuition benefits. The department may cover the remaining 20% of the insurance cost if the department budget allows. For more information, see

#### gradschool.utah.edu/tbp/insurance-information/

Plans are also available for their spouses and their dependent children under age 26:

#### www.studenthealth.utah.edu/services/

The department does not provide funding for dependent premiums.

#### 3.1.7 Parental leave

If a supported graduate student or a supported student's spouse or eligible partner (as defined by Human Resources) either

- gives birth to a child and becomes the child's legal guardian, or
- ♦ adopts a child under six years of age,

then the graduate student (any gender) may request a parental leave of absence with modified duties for one semester for care-giving leave during a semester within 12 months of the child's arrival. During the leave, the student will receive 4.5 months of support from the department at the standard TA rate.

Care-giving leave means that the student provides the majority of child contact hours during the student's regular academic working hours for a period of at least 15 weeks. Typically, only one semester of leave is granted per child even if there are two graduate students in the Department who could claim parental leave for the child. In most cases, this benefit is granted at most *twice* for any supported graduate student.

During the leave of absence, the student has modified assigned duties. Typically, there is no teaching requirement during the period of absence. Students may still conduct research and take classes, including reading classes, but are not necessarily expected to work at the same pace for research projects. Students must take at least 3 credits during this semester to maintain their full-time status. Tuition benefits may be used, if the student wishes to continue taking classes, as described in Section 3.1.3. Otherwise a student may take 3 credit-hours without using tuition benefits. The department will cover the tuition cost in this case, as well as the Graduate School's contribution for health insurance premiums for the leave semester. If a student desires, the deadlines to meet various departmental requirements (such as passing the qualifying exam, thesis defense deadline, etc.) can be extended by one semester upon request.

Requests for parental leave should be submitted to the Graduate Coordinator and are reviewed by the Chair, Associate Chair, and Director of Graduate Studies. A request for a parental leave of absence with modified duties should normally be made no fewer than *three months* prior to the expected arrival of the child. It is necessary to make this request in advance so that the particular arrangements of the leave can be planned. The request should specify what duties and/or research the student is planning on performing.

Students who experience a medical condition associated with pregnancy, and need accommodations recommended by their medical provider, should contact the University's Title IX Coordinator, who then works with the student, cognizant faculty, and administration to determine what accommodations are reasonable and effective. For more complicated situations, the Department tries to proceed in a way similar to the rules for parental leave with modified duties for faculty, as described at

regulations.utah.edu/academics/6-315.php

#### 3.1.8 Students voluntarily leaving the program

Students 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. Reimbursement for tuition is delineated in the description of the Tuition Benefit Plan on the Graduate School website (retrieved August 5, 2018):

"IMPORTANT: 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 nine credit hours at any time during the semester, a student becomes ineligible for TBP participation and will be billed the full tuition for that semester."

Students will not earn and receive a Master's or Ph.D. degree if the Graduate School and Department of Physics and Astronomy requirements have not been met when they leave the graduate program. Students are advised to discuss degree requirements with the Graduate Coordinator by requesting a special interview before they consider leaving the graduate program. Options such as leave of absence (see Section 3.6.2) or change of degree could be considered. The student should recognize that they would be required to re-apply should they wish to continue in the program and work on another advanced degree.

# 3.2 Student Advising

Students work initially with an Assigned Advisory Committee before forming a Supervisory Committee. In the following, it is discussed how these two distinct committees are formed and how they operate as well as other advising related questions.

#### 3.2.1 Research advisors and advising committees

**Assigned Advisory Committee.** The Graduate Committee will assign to each incoming graduate student a 3-member advisory committee prior to the beginning of the first semester. Each committee member must be a tenure-line P&A faculty member.

**Research Advisor.** It is the responsibility of each student to identify and select a research advisor who agrees to serve as a mentor on a Masters-level research project or doctoral thesis project. In many cases, the research advisor is also the PI of funds that provide RA support. The research advisor must be chosen by the end of the first year (second semester). It is generally expected that this person will serve as research mentor for the remainder of the student's degree program. However, in early stages (especially the first or second year), there is considerable flexibility for changing advisors. See Section 3.2.2.

**Supervisory Committee.** Before the end of the second year (fourth semester), students should select all members of a Supervisory Committee except the "external member" in consultation with their Research Advisor. The Supervisory Committee replaces the Assigned Advisory Committee to oversee their graduate program, providing approvals and administering exams (e.g., the Qualifying Exam and thesis defense). With the help of the Research Advisor, the student chooses committee members according to these criteria:

- ♦ The committee must have 5 members for a Ph.D., 3 for a M.S. degree.
- ◇ The designated committee chair must be a tenure-line faculty member in the Department of Physics and Astronomy. In most cases, the committee chair will also be the Research Advisor. However, it is possible for the Research Advisor to be from another academic department, in which case the committee chair must be from the Department of Physics and Astronomy; these cases must be approved by the Graduate Committee and the Dean of the Graduate School.
- ♦ A majority of the committee must be tenure-line P&A faculty.
- One faculty member, the "external member," must be from another department or from another institution (e.g., another university or a national laboratory). A committee member from outside the University of Utah requires approval of the Graduate Committee and the Dean of Graduate School. An external committee member must be added before the qualifying exam.
- ♦ The P&A members must span theory and experiment, and different research fields.

To avoid confusion with the last item, here are some examples: If the advisor is a condensed matter theorist, a good choice for a "different research field" would be observational astronomy and vice versa. If the advisor is from an experimental condensed matter physics field, a good choice would be a high-energy theorist or cosmologist.

The student must obtain verbal or written agreement from each member of the proposed Supervisory Committee and then submit the list of committee member names to the Graduate Coordinator to formalize the committee:

https://www.physics.utah.edu/graduate-programs/gradforms/

#### 3.2.2 Changing advisors and committees

Each student must select a research advisor within the first year, based on research specialization and mutual agreement. Until the Supervisory Committee is formed, this arrangement is recorded only at the department level, and may be dissolved unilaterally by either the student or the advisor, provided that there is written notification to the Graduate Coordinator. In this circumstance, it is the student's responsibility to identify and select another research advisor.

Once chosen, the Supervisory Committee is a formal entity, its membership is recorded by the Graduate School, and the committee's composition can be changed only by the resignation of committee members or upon request by the graduate student with approval of the majority of the Supervisory Committee and the Supervisory Committee chair. Committee additions must be requested by the graduate student and approved by the advisor. Any change of the Supervisory Committee must also be approved by the DoGS. In cases where the Supervisory Committee is dissolved (for example in the circumstances described below), it is the responsibility of the student to form a new Supervisory Committee within one semester or before the end of the second year, whichever is later. Since all graduate students must have access to advising, in the last resort the DoGS will assign a Supervisory Committee for students who are beyond the second year. The chair of such a committee is not necessarily a research advisor.

Occasionally, it may be necessary for a student to change advisors after the Supervisory Committee is formed. If the student and the advisor agree upon such a change, both parties should notify the Graduate Coordinator, who then assists with formalities. The Supervisory Committee is then dissolved, and the student must subsequently form a new committee after identifying a new research advisor. The same timeline for reforming the Supervisory Committee as above applies in this case as well.

In absence of such an agreement between student and advisor, the student should follow the same procedure by notifying the Graduate Coordinator, who then assists with formalities. In addition, the student must notify the advisor in writing, giving a time frame (15 days or more) for termination and a plan for turning over data, equipment, etc., and (if appropriate) for training other students in the advisor's research group to take over the research. The advisor is not obligated to pay the student any RA salary if RA responsibilities (as outlined in Section 3.1.2) are no longer being performed.

If conflicts between student and advisor arise, resources are available to help resolve the conflict; see Section 5.5. A faculty member can resign from his or her advisorship in cases of a student violating the Student Code. A faculty member can also resign from his or her advisorship in cases of unsatisfactory student performance; however, the following steps must be followed for this to happen:

- ♦ The advisor should notify the student in writing (with the DoGS on CC) with examples of unsatisfactory performance, a list of specific goals to help the student improve, and a timeframe of at least 30 days in which to achieve these goals.
- If the student fails to meet these goals, then the advisor should provide the student with written notice to terminate the research relationship (with the DoGS on CC), giving the reasons for termination and the date of termination, which must be at least 15 days after delivery of the notice.
- If the student is funded as an RA by the advisor, then the RA funding may be terminated no earlier than the date specified by the termination notice. Other sources of funding may be available to the student, but must be arranged through the DoGS and the Chair.
- The student is obligated to turn over to the advisor all material (notebooks, equipment, data) related to the advisor's research.

All correspondence related to Supervisory Committee changes must be copied to the Graduate Coordinator. Students should be aware of potential tuition benefit implications if RA support is terminated, especially if this happens mid-semester. Appeals to decisions made in the course of such processes should be made to the Department Chair. Appeals to the Chair's decisions should be made to the Office of the Associate Dean for Student Affairs in the College of Science for independent review.

#### 3.2.3 Advising committee roles

**Course selection.** Initially, the Assigned Advisory Committee will help guide a student into the appropriate core courses given the student's background. The Supervisory Committee will determine which electives will be helpful once the area of specialization is decided.

**Exams.** The Ph.D. Qualifying Exam and the Thesis Defense are administered by the Supervisory Committee. For students seeking a Master's degree, either the 3-person Assigned Advisory Committee or (if formed) the Supervisory Committee can administer the Master's Final Examination. See Section 3.4.

**Program of Study.** The student's Supervisory Committee determines which courses are required for graduation. A meeting devoted specifically to this task is strongly recommended. The student and committee members must carefully formulate this list, which will ultimately constitute the official Program of Study. See Section 3.3.2 for more details.

#### Advising Checkpoints: Graduate Advising Day.

Meetings with at least a majority of either the Assigned Advisory Committee or a student's Supervisory Committee, including the research advisor, must take place at least twice per year (once in each of the two academic semesters). Advising Day, held on Reading Day at the end of Fall and Spring Semesters, is set aside for this purpose. Either the student or a committee member may request a longer, follow-up meeting, if time during the Advising Day "checkpoint" meeting is insufficient.

- ◇ During a checkpoint meeting, both the student and the research advisor *must* have the opportunity to meet privately with the committee members without the other present. If any conflicts are identified, the committee may refer either party to other resources, including the DoGS and the Ombuds committee. Any record of information discussed in the absence of either the student or the advisor will be considered private and will be disclosed only on a "need to know" basis. Students should be aware that faculty are required to report instances of discrimination, harassment and sexual misconduct.
- ♦ Each meeting must be documented by one of the committee members. For the checkpoint meetings on Advising Day, a form is provided by the Graduate Coordinator, which has an agenda of items to be covered. These forms must be completed and submitted to the Graduate Coordinator. Other forms may be needed to be filled out and returned as well.
- ♦ Students in Year 6 and beyond must provide a written Time Limit Extension Contract to the Supervisory Committee members two weeks before the Spring checkpoint meeting. This document specifies what benchmarks must be met, along with a time frame, in order for funding to continue. This document must also be filed with the Graduate School at the end of Year 7 for the student to remain registered.
- ♦ Graduate Advising Day meetings are not substitutes for regular meetings between a student and advisor (and, as appropriate, Supervisory Committee) to discuss research progress.
- ♦ The DoGS reviews all forms from these meetings and presents a summary to the faculty at a meeting immediately following Reading Day. The faculty review all cases wherein students are not in good academic standing or when other issues are known.

**Annual Research Advising Sessions.** Students in the fourth year and beyond are required to have annual meetings with the Supervisory Committee to assess research progress. The Advising Day checkpoint meetings provide some time for the discussion of research progress. These meetings can therefore satisfy the annual research advising requirement. However, it may be that any member of the Supervisory Committee or the student themselves feels that a further meeting should take place. A separate meeting will then be setup between the student and the Supervisory Committee. An indication for this meeting will be a part of the Advising Day checklist.

# 3.3 Course Work

#### 3.3.1 Minimum course requirements

Each degree program has a minimum number of credit hours. For the M.S. degree, it is 30 credit hours, of which 20 must be in coursework, and 6 in Special Reading Topics (PHYS 6950) or Thesis Research (PHYS 6970). Note that students pursuing a non-thesis Master's cannot use Thesis Research credits toward their 30 credit hour requirement.

The University is less strict for the Ph.D.: 14 Thesis Research credit hours (PHYS 7970) are required. However the Department of Physics and Astronomy's degree programs have additional requirements, see Section 4 for details.

#### 3.3.2 Program of Study requirement

The Program of Study is a formal Graduate School requirement. It is a list of courses required for graduation. It includes the core curriculum, together with some electives. The Program of Study is determined by the student in consultation with the Supervisory Committee, and must be formally approved by the Supervisory Committee and the DoGS.

The Graduate School's Program of Study requirement is not complete until the formal approval has been granted *and* all courses in the Program of Study have been completed with the appropriate grades as described in Section 3.3.5.

The Program of Study requirement must be completed by the end of the sixth semester. Graduate School policy requires that students are enrolled in classes during the semester that the Program of Study is completed.

The Program of Study process includes two steps:

- 1. Complete a Program of Study PDF that corresponds to the study track. Every member of the Supervisory Committee must sign the form. This informs the Graduate Coordinator which courses are approved for registration by the student's Supervisory Committee.
- 2. The official Program of Study is finalized in the Grad Student Tracking system, overseen by the Graduate School. The Graduate Coordinator submits the Program of Study for Supervisory Committee and Graduate School apprroval once each course in the Program of Study has been completed.

#### 3.3.3 Transferring course credits

Graduate students may transfer course credits from other institutions, but are not encouraged to do so. Transfer of up to 6 credit hours is allowed and these credits will count toward the 30 credit hours required for the M.S. degree. For a Ph.D., it may be better to waive course requirements than to transfer credits, because of the Graduate School's tuition benefit program.

If a student transfers into the program (e.g., with a newly-hired advisor), the Graduate Coordinator, the DoGS and the Graduate Committee will help to minimize the impact in terms of course requirements.

#### 3.3.4 Waiving required courses

Successful completion of a course at another university that is equivalent to one of our own may be grounds for waiving a course requirement. Requests for waivers of required courses must be submitted to the Graduate Committee. The request should at a minimum include the course syllabus and the textbook used. In the case where there was no textbook for a course, an indication of course content is required. Waivers are not guaranteed.

#### 3.3.5 Grading policy

The Department of Physics & Astronomy has adopted the following grading policy: Only a class with a course number above 5000 can count for graduate credit; to get credit for a class, a Master's student must earn a B- or better, and a Ph.D. student must earn a B or better. A more detailed summary of grades is as follows:

- A Very good, expected for M.S. and Ph.D.
- A- Good, acceptable for M.S. and Ph.D.
- B+ Acceptable for M.S. and passable for Ph.D.
- B Passable at M.S. level, marginally passable at Ph.D. level
- B- Marginally passable for M.S., unacceptable at Ph.D. level

C Unacceptable for graduate work in the Department of Physics & Astronomy

A student who receives an unacceptable grade in a course will have to retake that course if it is part of the Program of Study. Under special circumstances (depending on the student's in-class performance), and with Supervisory Committee approval, the student may take an equivalent final exam in lieu of retaking a required course. Students are given only two opportunities to pass required courses at the levels indicated above. A second failure of a required course will result in dismissal from the program.

A student who disagrees with a grade may appeal the grade and request to have coursework reevaluated and thus, the grade to be reviewed. The appeal will have to made to the course instructor. If so desired, a student may appeal further, by first consulting with the DoGS, then the Department Chair, and then the College of Science. For more information, see Section IV-B of the Code of Student Rights and Responsibilities:

regulations.utah.edu/academics/6-400.php

# 3.4 Exams

#### 3.4.1 Written Comprehensive Examination ("The Comprehensive Exam")

The Comprehensive Exam consists of a classical mechanics/electrodynamics section and a quantum mechanics section based on the material that is taught in the Electrodynamics I (PHYS 7110) and Quantum Theory I (PHYS 7220) courses, respectively. These classes will not have traditional final exams. The final exam period for the class will be used as part of the Comprehensive Exam. Instructors may use the exam taken during the final exam period to contribute to the grade in that class. Each section of the Comprehensive Exam is an in-class, written test.

The Comprehensive Exam is written and administered by the Comprehensive Exam Committee. The committee includes the instructors for each of the two courses, as well as three more members. One of the additional three members is the committee chair, who oversees the writing and administration of the exam. The committee is also responsible for ensuring that students are aware of the topics covered on the exam (e.g., by listing the topics on the Comprehensive Exam Canvas site). The role of the course instructors is to ensure that the content of the exam is consistent with the content of the course.

To pass the Comprehensive Exam, students must pass both sections of the Exam. The criteria for passing the two sections are determined by the Comprehensive Exam Committee.

If a student does not pass one or both sections of the Comprehensive Exam on the first attempt, a second attempt at the unpassed section(s) can be taken at the end of the following fall semester. It is suggested that these students retake the relevant course(s), even if they earned a B or higher, though this should be discussed with their advisory committee. A student will have at most two opportunities to pass each section of the Comprehensive Exam, and must pass both sections prior to or during their second year in the Ph.D. program. If a student does not pass both sections of the Comprehensive Exam prior to or during their second year, they will be dismissed from the Ph.D. program.

Students who do not pass the Comprehensive Exam should immediately meet with their Assigned Advisory Committee to establish a path towards a second attempt and/or preparations for the next step in their career. Students who exit the program at this stage could consider completing a terminal Master's degree or taking courses during the spring (final) semester to support their career development.

Note: The Graduate School refers to the exam requirement for Master's degrees as the "comprehensive exam." This is not to be confused with the departmental comprehensive exam described above.

Disability Accommodations. Students who receive test-taking accommodations through the Center for

Disability & Access (CDA) will receive those accommodations for the Comprehensive Exam. Students should work directly with CDA to request accommodations:

#### disability.utah.edu.

**Exam preparation and mentoring.** In addition to the coursework associated with the Comprehensive Exam, students may prepare by studying past exams. Further information and resources are provided through a Canvas course specifically created for those who are going to take the exam. The Canvas course will be accessible upon matriculation. Old exams can also be found on the department web page:

#### www.physics.utah.edu/graduate-programs/

Furthermore, students who need to retake the exam may request departmental support for a tutor to work one-on-one or in small groups on exam preparation during the semester of reexamination. A tutor can be a more senior graduate student or postdoc or a professional external to the department. Students should work with the Graduate Coordinator to submit a proposal for departmental support.

#### 3.4.2 Oral Qualifying Examination

The goal of the Qualifying Exam is to assess a student's readiness to pursue Ph.D.-level research. Students may take the Qualifying Exam any time after forming a Supervisory Committee but no later than the end of their fifth semester. It is the student who is responsible for scheduling the Qualifying Exam. Graduate School policy requires that students are enrolled in classes during the semester that the Qualifying Exam is taken.

The student should prepare a presentation whose duration is determined in discussions with their Supervisory Committee. The planned duration should not exceed 45 minutes but could be significantly shorter. The first part of the talk should be a public level talk, giving broad context on the student's work and its motivation. The second part of the talk can focus on

- 1. Scientific results from already existing research;
- 2. A detailed literature review of papers assigned by their Supervisory Committee;
- 3. A thesis proposal detailing the physics to be studied and the tools needed to get there;
- 4. Or a combination of all the items mentioned above.

A graduate student should discuss these options with their Supervisory Committee well in advance of the exam date. During the talk, the student should expect frequent interruptions for clarifications and additional questions; the exam may take up to two hours. The primary assessment of the exam will be made based on the student demonstrating broad and deep understanding of the science in their talk. Questions from the committee will typically draw on knowledge from the student's coursework, but should be tied to the topic of the talk; the Qualifying Exam is not meant to be a broad test of general Physics & Astronomy knowledge. However, questions outside the topic of their presentation may also be asked as long as the committee will focus these questions on topics the student has taken graduate coursework in.

A written component may also be required as part of the exam. Standards for this component may be determined within the individual research group or decided by the Supervisory Committee prior to the exam. Examples include a draft of a thesis introduction chapter prior to the Qualifying Exam, or a draft of a submittable paper. All components of the exam need to be completed and passed by the end of the fifth semester.

For the exam, the student will prepare a presentation on the topic they plan to do their thesis research in. The first half of the talk should be a public level talk giving broad context on their work and why it

is interesting; this portion should be understandable to all members of the committee (even the external one). The student should also be ready to answer detailed questions connecting their coursework to this background information. The second half should present scientific results from a first project within this topic. The student should expect frequent interruptions for clarifications and additional questions during the talk.

The primary assessment of the exam will be made based on the quality of the presentation and ability to answer the questions asked by the committee.

Students may (i) pass, (ii) conditionally pass, or (iii) fail the Qualifying Exam. The committee will decide on additional requirements (in the case of a conditional pass) or whether a second attempt is granted (in the case of a fail). The committee has the discretion to refuse to grant a second attempt at passing the Qualifying Exam (in such a case, the student may appeal to the Graduate Committee). All work associated with conditional passes must be finished by the end of the sixth semester. Second attempts in the case of a failed Qualifying Exam, including any additional requirements (in case the second attempt was passed conditionally) must be successfully completed by the end of the sixth semester.

Failure to pass the Qualifying Exam (or, in cases of conditional passes, to complete the additional work) by the end of the sixth semester is cause for dismissal from the Ph.D. program.

Note: the Qualifying Exam may also serve as the Graduate School's exam requirement for a non-thesis M.S. degree. If a student is dismissed from the Ph.D. program because the Qualifying Exam has not been completed by the end of the sixth semester, a completion of the exam past the deadline can still serve as fulfillment of the requirement for a non-thesis M.S. degree examination.

For students in the Astronomy & Astrophysics Track (section 4.3), there is a specified format for the Qualifying Exam: The lengths of the exam presentation should be approximately 45 minutes (roughly 30 slides). After the qualifying exam, the student should submit a written document to their committee, before reading day at the end of the 5th semester. This written document ideally will be a substantial paper draft (i.e., at least the introduction, methods & first results, with publication quality figures); a minimum 5-page thesis introduction, thesis proposal or other possibilities can also be substituted as decided by the committee. Students passing the oral exam before the written component is given to the committee will receive a conditional pass, with full passage dependent on turning in the written requirement.

#### 3.4.3 Thesis defense

Students pursuing a thesis degree (M.S. or Ph.D.) must pass a final oral examination, the thesis defense, based on a written dissertation. The defense typically consists of a public lecture, followed by a closed-door oral examination by the Supervisory Committee. It is expected that the thesis defense be passed by the end of the sixth year.

The Graduate School requires that students submit a final draft of their written dissertation to the chair of the Supervisory Committee at least three weeks in advance of the defense. Students must submit the written dissertation to the remaining committee members and the Graduate Coordinator at least two weeks in advance of the defense. During this time, committee members may provide the student with comments on the dissertation, and the dissertation may be updated as appropriate.

Two weeks in advance of the intended defense (and preferably earlier), the student must begin working with the Graduate Coordinator to schedule and announce the defense.

# 3.5 Timeline for Graduate Degrees

This section provides an overview of the first three years of graduate study. Based on research interest, there are several recommended tracks. (These tracks are internal designations, and are not transcripted.) Further details are given in Section 4).

#### 3.5.1 Ph.D. timeline and tracks

Table 1 summarizes the contents of this Section for students in Physics, Astronomy, and Biophysics tracks. In it, abbreviations FRO and PDC stand for "Faculty Research Overview" and "Professional Development Course".

- ◊ Upon joining the Department. All incoming graduate students are assigned an Assigned Advisory Committee to oversee progress during the Fall and Spring semesters of their first year. (See Section 3.2 for details.)
- ♦ 1st semester. All graduate students take the same three courses during their first semester:

Classical Mechanics/E&M I (PHYS 7110) (4 credit hours),

Quantum Theory I (PHYS 7220) (4 credit hours),

Faculty Research Overview (FRO) (PHYS 7820) (1 credit hour).

These three courses add up to 9 credit hours. (International students may be required to take an additional 3-credit course in English language skills.) The final exams of Classical Mechanics/E&M I and Quantum Theory I courses form the Comprehensive Exams; see Section 3.4.1.

- ◊ 2nd semester & 1st summer. In their second semester, students specialize into four separate tracks, each with two or three additional required courses:
  - Physics track: all students take Quantum Theory II (PHYS 7230), E&M II (PHYS 7120), and Stat. Mech. (PHYS 7310).
  - Biophysics track: all students take Stat. Mech. (PHYS 7310) and Physics in Biology (PHYS 6310).
  - Astronomy & Astrophysics track: two required courses, Research Methods (ASTR 6410) and Radiative Processes (ASTR 7130), are taken. If only one of these course is offered, students should take at least one other Astronomy elective course along with the offered course at the advice of their advisory committee and/or astronomy faculty members.
  - Physics or Astronomy Education Research track: Students take either Stat. Mech. (Phys 7310) or Radiative Processes (ASTR 7130) and the RTPE course (PHYS 7140) or another course in the PER track (e.g. PHYS 7623 or PHYS 7230)

A research advisor must be selected, and summer research should be pursued. It is expected that all first-year graduate students will apply for and participate in the Swigart Research Summer Fellowship. Details are typically announced the preceding March.

◇ 3rd, 4th, and 5th semesters. Students who pass their first year coursework take electives in their second year (3rd and 4th semester). These electives should be approved by their advisory committee prior to taking them. Typically students take at least 3 additional electives. During the 3rd semester, all students take the 1-credit-hour Professional Development Course (PDC; PHYS 7830).

During the 2nd year, students should continue working on research. Students are encouraged to formulate their Ph.D. Supervisory Committee by their 3rd semester (or earlier), and are required to do so by the end of their 4th semester. Students should begin thinking about preparations for their Ph.D. Qualifying Exam, which can be taken as early as their 4th semester and is required by the end of their 5th semester.



Please refer to the full text of the 2022-23 Graduate Handbook for details

# Table 1: Typical Ph.D. Timelines

Ph	vsins	Track
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Time	Fall Semester	Spring Semester
		PHYS 7230 – QM II,
	PHYS 7110 – CM/E&M I,	PHYS 7310 – Stat mech,
Voor 1	PHYS 7220 – QM I,	[PHYS 7120 – E&M II],
rear r	PHYS 7820 – FRO,	[Advisory comm. updated],
	[Comprehensive Exam taken]	[Summer research]
		[Select Research Advisor]
	Elective/re-take 7110,	Elective/re-take 7230,
Voor 2	Elective/re-take 7220,	Elective/re-take 7310,
ieal 2	PHYS 7830 – PDC,	[Supervisory Comm. formed],
	[Research]	[Research]
Voor 2	[The Qualifying Exam],	[Additional Qualifying Exam Requirements],
real 5	[Research]	[Research]
Years 4,5,6	[Research]	[Y6: Thesis defense; earlier is fine]

# Astronomy & Astrophysics Track

Time	Fall Semester	Spring Semester
Year 1	PHYS 7110 – CM/E&M I, PHYS 7220 – QM I, PHYS 7820 – FRO, [Comprehensive Exam taken]	Take two of: PHYS 7130 – Radiative Processes, Astr 6410 – Research Methods, Astro elective, [Advisory comm. updated], [Summer research] [Select Research Advisor]
Year 2	Elective/re-take 7110, Elective/re-take 7220, PHYS 7830 – PDC, [Research]	Elective/re-take 7130, Elective/re-take 6410, [Supervisory Comm. formed], [Research]
Year 3	[The Qualifying Exam], [Research]	[Additional Qualifying Exam Requirements], [Research]
Years 4,5,6	[Research]	[Y6: Thesis defense; earlier is fine]

# Biophysics Track

Time	Fall Semester	Spring Semester
Year 1	PHYS 7110 – CM/E&M I, PHYS 7220 – QM I, PHYS 7820 – FRO, [Comprehensive Exam taken]	PHYS 6310 – Physics in Biology, PHYS 7310 – Stat mech, [Advisory comm. updated], [Summer research], [Select Research Advisor]
Year 2	Elective/re-take 7110, Elective/re-take 7220, PHYS 7830 – PDC, [Research]	Elective/re-take 6310, Elective/re-take 7310, [Supervisory Comm. formed], [Research]
Year 3	[The Qualifying Exam], [Research]	[Additional Qualifying Exam Requirements], [Research]
Years 4,5,6	[Research]	[Y6: Thesis defense; earlier is fine]

Time	Fall Semester	Spring Semester
Year 1	PHYS 7110 – CM/E&M I, PHYS 7220 – QM I, PHYS 7820 – FRO, [Comprehensive Exam taken]	PHYS 7310/7130 – Stat mech / Radiative Processes, PHYS 7XXX – Physics Education Research, [Advisory comm. updated], [Summer research], [Select Research Advisor]
Year 2	Elective/re-take 7110, Elective/re-take 7220, PHYS 7830 – PDC, [Research]	Elective/re-take 7310, [Elective], [Supervisory Comm. formed], [Research]
Year 3	[The Qualifying Exam], [Research]	[Additional Qualifying Exam Requirements], [Research]
Years 4,5,6	[Research]	[Y6: Thesis defense; earlier is fine]

#### Table 1: Typical Ph.D. Timelines (Continued)

Physics/Astronomy Education Research Track

Students should take research credits or M.S. Special Reading Topics (at least 6 credits before their 5th semester); this will also enable them to fulfill the M.S. requirements (30 credits total, at least 20 from classes). Terminal masters degrees can be conferred on students who have passed a sufficient number of courses with a B- or higher, or who do not pass their comp exams in two attempts and meet the terminal-M.S. requirements of the Graduate School. Ph.D. research credits cannot be taken by students until they have formed their Supervisory Committee, completed their Program of Study requirement and passed their Qualifying Exam.

Students can also avail themselves of Special Readings Topics courses (PHYS 6950 and PHYS 7910) or Faculty Consultation courses (PHYS 6980 and PHYS 7980). Students can only sign up for Special Readings Topics three times in their career, for a maximum of 6 credits. Faculty Consultations can be used as much as desired but the credits can't be counted towards the Program of Study requirement. Students pursuing a milestone Master's should enroll in M.S. Special Reading Topics.

♦ By the end of the 6th year. Thesis defense. Defense dates past the sixth year are acceptable only with approval of the Supervisory Committee, the DoGS, and the graduate school after filing a Time Limit Exemption request.

The timelines for the Department of Physics and Astronomy's Ph.D. programs are given in Table 1.

#### 3.5.2 M.S. timeline

All M.S. programs follow tracks similar to the first two years of the Ph.D. program. Course selections may differ, depending on the program (e.g., M.S. Physics or the Master's in Instrumentation Physics) and the directives of the student's supervisory committee. The Ph.D. Qualifying Exam may serve as the student's M.S. Final Examination. Students receiving a Master's degree are expected to complete all degree requirements by the end of the third academic year, although programs are set up so that students can complete these requirements within two years. Requests for an extension beyond the third year must be made to the Graduate Committee.

# 3.6 Evaluation of Student Progress

#### 3.6.1 Good academic standing

Students are expected to make steady progress towards their degree, as indicated by these benchmarks:

- ♦ Maintain a cumulative GPA of 3.0 or above.
- ♦ Pass Ph.D. Program of Study courses with a B.
- ♦ Satisfy Written Comprehensive Exam requirements by the end of the third semester.
- ♦ Form the Supervisory Committee by the end of the second year (earlier is better).
- ♦ Pass the Oral Qualifying Exam by the end of the Fall semester of the third year.
- ♦ Complete required coursework for the Ph.D. (and file a Program of Study) by the end of the third year.
- ♦ Achieve satisfactory advances in research, as judged by the research advisor and the Supervisory Committee.
- ◊ Timely fulfillment of other obligations (e.g., the submission of Graduation Plan and Time Limit Extension contract) as required by the department and the Graduate School.

Satisfying these benchmarks defines a student in good standing. Students who fall out of good academic standing typically have one semester to remedy the situation before being dismissed from the graduate program.

#### 3.6.2 Leave of absence

#### registrar.utah.edu/handbook/leave.php

#### 3.6.3 Academic probation

The Graduate School requires that students maintain a 3.0 cumulative GPA to be eligible for tuition benefits. Failure to maintain this cumulative GPA will result in a student falling out of good academic standing in the department and in formally being placed on Academic Probation by the Graduate School. Neither the Graduate School nor the department will offer tuition benefits to students who are on Academic Probation, nor will the cost of classes be covered that may be retaken.

#### 3.6.4 Dismissal

Dismissal from a program of the Department of Physics and Astronomy may result from a serious violation of the Student Code and/or failure to maintain good academic standing with no feasible plan to return to that status. Examples of situations where dismissal may occur include not maintaining a 3.0 GPA, not passing the Comprehensive Exam within the first two academic years, and not passing the Qualifying Exam within the first three years.

Students will be informed in writing by the Graduate Committee of academic deficiencies that cause the student to fall out of good academic standing and will be given an opportunity during the following semester to remedy the deficiencies and achieve the required benchmark. Should it then become necessary, the Graduate Committee will also provide written notification to the student that they have not remedied the deficiencies and will be dismissed from the program at the end of the academic year in which this situation occurs. If the academic deficiency is a second failure of the Comprehensive Exam or the Qualifying Exam (both of which are typically given at the end of the fall semester), students who are otherwise in good academic standing are given the option to finish the requirements for a M.S. degree and/or take courses that may help them for their career beyond graduate School in the spring semester. Eligibility for TA or RA support during this time is determined by the Graduate Committee in consultation with the research advisor (if applicable). Dismissal from the program shall result in termination of graduate student funding.

#### 3.6.5 Appeals

Students who fail to meet a required benchmark may provide a written appeal to the Graduate Committee for an extension or waiver of a specific requirement. An appeal must include a plan to satisfy remaining requirements, but this alone is not sufficient to warrant extensions or waivers. It is within the discretion of the Graduate Committee whether or not to grant extensions or waivers and will be based upon the Committee's academic judgement concerning the student's ability to ultimately succeed in the program. In addition, there are University Policies governing appeals; see Section 6.400.IV.B in the Student Code.

# **4 Degree Requirements**

# 4.1 Overview of graduate degrees and research areas

In this section the degree offerings are discussed, starting with the traditional physics Ph.D. and including degrees with emphasis in specialized areas.

#### 4.1.1 Degrees offered by the Department of Physics & Astronomy

The department offers the following specialization tracks:

♦ Ph.D. Physics

Physics (standard) track Astronomy & Astrophysics track Biophysics track Physics Education Research track

♦ M.S. Physics

Physics (standard) track Instrumentation Physics (MSI Program) Computational Physics

The tracks listed above indicate specializations with unique departmental requirements, although the tracks all lead to either the M.S. or Ph.D. in Physics.

#### 4.1.2 Related degrees

- Professional Master of Science and Technology (PMST). A professional, non-thesis, interdisciplinary program that fuses graduate studies in science and mathematics with skills from other professional domains, such as business, communication, and management. PMST Program: http://pmst.utah. edu.
- Master of Science for Secondary School Teachers (MSSST). This degree is for professional development for teachers to develop content knowledge and new pedagogical techniques. MSSST Program: https://csme.utah.edu/mssst/.

#### 4.1.3 Graduate School requirements

Students pursuing a Ph.D. degree in Physics must satisfy Graduate School requirements, as well as the department-specific requirements given below. For the list of the Graduate School requirements, visit

gradschool.utah.edu/graduate-catalog/degree-requirements/

Departmental requirements are listed by degree track in Sections 4.2–4.5.

*Note:* To pass a course for credit toward a Ph.D. in P&A requires a grade of B or better. In addition, to receive graduate credit, the course number must be 5000 or above.

# 4.2 Ph.D. in Physics (Standard Track)

Students pursuing a Ph.D. degree working in the fields of Condensed Matter Theory, Condensed Matter Experiment, Particle Physics, and Cosmic Ray Research should seek entrance into, and then complete our standard Ph.D. program.

#### 4.2.1 Course and exam requirements

Students pursuing the standard Ph.D. degree should follow the Physics track in the first year at the department, and take the associated required coursework:

PHYS 7110 Classical Mechanics/E&M I PHYS 7120 E&M II PHYS 7220 Quantum Theory I PHYS 7230 Quantum Theory II PHYS 7310 Statistical Mechanics

(See also Section 3.5.1.) In addition, the Faculty Research Opportunity (FRO) class and Professional Development Class (PDC) are required, as well as 14 credit-hours of PHYS 7970, Thesis Research: Ph.D. The exam requirements include the Comprehensive Exams, The Qualifying Exam, and the Thesis Defense. See Section 3.4 for full details.

#### 4.2.2 Suggested electives

The suggested sequences of elective courses for each research direction in the standard emphasis are listed here. At least three electives are recommended for each research direction.

◊ Condensed matter theory

PHYS 5510 Intro to Solid State Physics PHYS 7640 Quantum Field Theory I PHYS 7650 Quantum Field Theory II PHYS 7740 Mathematical Methods of Physics PHYS 7550 Group theory

◊ Condensed Matter Experiment

PHYS 5510 Intro to Solid State Physics PHYS 5520 Electronic Processes in Semiconductors PHYS 6510 Physics of Semiconductors PHYS 6770 Optical Measurement Techniques and Instrumentation PHYS 6775 Optical Measurement Techniques and Instrumentation Laboratory (this course is a substitute of PHYS 6719 (graduate lab) and requires PHYS 6670 to be taken at the same time) PHYS 7740 Mathematical Methods of Physics Also: Group Theory (CHEM or PHYS), Micromachining (ENG).

◊ Particle physics

ASTR 6580 Cosmology PHYS 7640 Quantum Field Theory I PHYS 7650 Quantum Field Theory II PHYS 7720 General Relativity and Relativistic Astrophysics PHYS 7740 Mathematical Methods of Physics PHYS 7550 Group theory

◊ Cosmic Ray Research

ASTR 6015 Observational Methods and Data Analysis ASTR 6560 Stars and Stellar Populations ASTR 6570 Galaxies ASTR 6580 Cosmology ASTR 6590 High Energy Astrophysics PHYS 7640 Quantum Field Theory I PHYS 7650 Quantum Field Theory II PHYS 7720 General Relativity and Relativistic Astrophysics PHYS 7730 Statistical and Computation Methods in Physics & Astronomy

# 4.3 Ph.D. in Physics: Astronomy and Astrophysics Track

The University of Utah's Department of Physics transitioned into the Department of Physics & Astronomy in 2009 and since then, the Astronomy section has grown into a widely recognized program.

#### 4.3.1 Course and exam requirements

Students pursuing a Ph.D. degree in the astro track should take the following courses:

PHYS 7110 Classical Mechanics/E&M I PHYS 7220 Quantum Theory I ASTR 6410 Research Methods in Astronomy ASTR 7130 Radiative Processes

(See also Section 3.5.1.) In addition, the Faculty Research Opportunity (FRO) class and Professional Development Class (PDC) are required, as well as 14 credit-hours of PHYS 7970, Thesis Research: Ph.D. The exam requirements include the Comprehensive Exams, The Qualifying Exam, and the Thesis Defense. See Section 3.4 for full details.

#### 4.3.2 Suggested electives

Students must also take three of the following electives:

ASTR 6560 Stars and Stellar Populations ASTR 6570 Galaxies ASTR 6580 Cosmology ASTR 6590 High Energy Astrophysics PHYS 7310 Statistical Mechanics PHYS 7640 Quantum Field Theory I PHYS 7650 Quantum Field Theory II PHYS 7720 General Relativity and Relativistic Astrophysics ASTR 7730 Statistical and Computation Methods in Physics & Astronomy

# 4.4 Ph.D. in Physics: Biophysics Track

Students interested in a doctoral degree in the field of Biophysics will have opportunities in research, supported by elective courses within the department as well as offerings in Biology.

#### 4.4.1 Course and exam requirements

The Biophysics track Ph.D. degree requires the following core courses:

PHYS 7110 Classical Mechanics/E&M I PHYS 7220 Quantum Theory I PHYS 6310 Physics in Biology PHYS 7310 Statistical Mechanics

(See also Section 3.5.1.) In addition, the Faculty Research Opportunity (FRO) class and Professional Development Class (PDC) are required, as well as 14 credit-hours of PHYS 7970, Thesis Research: Ph.D. The exam requirements include the Comprehensive Exams, The Qualifying Exam, and the Thesis Defense. See Section 3.4 for full details.

#### 4.4.2 Suggested electives

PHYS 6210 Optics in Biology PHYS 6230 Molecular Motors PHYS 7730 Statistical and Computation Methods in Physics & Astronomy CHEM 6740 Bioanalytical Chemistry PH TX 7500 Macromolecular Therapeutics & Drug Delivery PATH 6410 Molecular Virology MBIOL 6480 Cell Biology I PATH 7310 Host Pathogen Interactions ONCSC 6500 Clinical & Molecular Cancer Biology

#### 4.4.3 Course and exam requirements

The core courses and exams are the same as for the standard physics track.

#### 4.4.4 Suggested electives

Possible electives depend on the particular Program of Study and are therefore discussed with the Supervisory Committee and the research advisor.

# 4.5 Ph.D. in Physics: Physics or Astronomy Education Research Track

The Department of Physics & Astronomy is involved in research and development activities in Physics Education Research (PER) or Astronomy Education Research (AER). A Ph.D. candidate interested in this area may obtain a dedicated Ph.D. in Physics: Physics or Astronomy Education Research degree.

#### 4.5.1 Course and exam requirements

The PER/AER track Ph.D. degree requires the following core courses:

PHYS 7110 Classical Mechanics/E&M I PHYS 7220 Quantum Theory I PHYS 7140 Research and Teaching in Physics Education PHYS 7310 Statistical Mechanics (PER) or PHYS 7130 Radiative Processes (AER)

(See also Section 3.5.1.) In addition, the Faculty Research Opportunity (FRO) class and Professional Development Class (PDC) are required, as well as 14 credit-hours of PHYS 7970, Thesis Research: Ph.D. The exam requirements include the Comprehensive Exams, The Qualifying Exam, and the Thesis Defense. See Section 3.4 for full details.

#### 4.5.2 Suggested Electives

Students must also take four courses as outlined below

- 1. Research Methodology and Education Courses (3 courses minimum):
  - At least one quantitative methods course from: EDPS 7010, EDPS 7020, SOC 6120, SOC 6130 or another advanced statistics or mathematics course
  - b. At least one qualitative methods course from: ECS 7870, ECS 7871, COM 7360, POLS 6004 or another advanced methodology course
  - c. At least one course related to equity, diversity, and inclusion:
     For example: PHYS 7623, GNDR 6500, SOC 6834, or another advanced equity, diversity, and inclusion course
- 2. At least one more advanced course in research methods or Physics/Astronomy

## 4.6 M.S. in Physics

The Master's Degree in Physics is demonstrates that a student has a solid foundation in graduate physics and has the ability to do research in physics or astronomy. Students work on a research project, and have the option to write a Master's Thesis describing the results.

#### 4.6.1 Course and exam requirements

A student seeking a Master's in Physics must choose a program track (Standard Physics, Astronomy & Astrophysics, Biophysics) and fulfill the course requirements of that track. Beyond the core course requirement, a total of 30 credit-hours must be earned, each with a grade of B- or better. At least 20 credit-hours must come from classes, and (if a thesis-based M.S. degree is sought) at least 6 credit-hours of Thesis Research (PHYS 6970 or PHYS 7970).

Elective courses must be in physics or a related discipline that may further a physics-related career, such as computational science, statistics or education courses. The courses must be approved by a Master's Supervisory Committee of 3 P&A faculty.

A Master's Final Examination or Thesis Defense is required as well. In cases where students opt not to write a thesis, they must work on and present a research project in an exam format equivalent to the Qualifying Exam (see Section 3.4.2).

# 4.7 M.S. in Instrumentation Physics

The Master of Science in Instrumentation (MSI) program is designed to qualify those with training in various scientific and engineering fields to understand, work with, and develop modern numerical methods, electronics, measurement system characterization, computer data acquisition/control, and the physical principles of the operation of various measurement transducers and sensors. The candidates are required to take part in an instrumentation project, which can be in a wide variety of research and industrial test areas. This program is a non-thesis degree track.

## 4.7.1 Course and exam requirements

A student must earn a total of 30 credit-hours. A grade of B- is required for credit toward the degree. At least 20 credit-hours must come from classes, including these required courses:

PHYS 6610 Electronics for Scientific Instrumentation 1 PHYS 6620 Data Acquisition for Scientific Instrumentation PHYS 6750 Applied Modern Optics I & II PHYS 6770 Optical Measurement Techniques & Instrumentation PHYS 6730 Computational Physics

Electives are chosen according to research area, and must be approved by a 3-person Master's Supervisory Committee, which includes a research advisor.

A Master's Final Examination is required, wherein a student present a research project in an exam format equivalent to the Qualifying Exam (see Section 3.4.2).

# 4.8 M.S. in Computational Physics

This program is intended to equip students with modern computational skills for use in solving problems in the physical sciences. It is typically a non-thesis degree program.

#### 4.8.1 Course and exam requirements

A student must earn a total of 30 credit-hours. A grade of B- is required for credit toward the degree. At least 20 credit-hours must come from classes. The student must take the core courses from any of the Ph.D. tracks, and PHYS 6720, Introduction to Computers in Physics.

Electives may be taken with the approval of your 3-person Master's Supervisory Committee, which includes the research advisor.

As with our other non-thesis programs, a Master's Final Examination is required: A student presents a research project in an exam format equivalent to the Qualifying Exam (see Section 3.4.2).

# **5 Resources**

Students will find several departmental and institutional resources available in support of the pursuit of world-class research and education.

# 5.1 List of Key University Resources

**Emergency.** University Police: https://safety.utah.edu Phone: 911 or 801-585-COPS / 801-585-2677. Call if you feel unsafe at all!

**Crisis (24/7).** UNI: https://healthcare.utah.edu/uni/programs/crisis-diversion.php Phone: 801-587-3000 for crisis intervention, emotional support, and mental health needs, any time.

Suicide prevention in Utah.: http://www.suicide.org/hotlines/utah-suicide-hotlines.html

**Crisis Prevision.** SafeUT smartphone app: https://safeut.org/ Free 24/7 access to counselors for crisis prevention and emotional support

**Counseling.** University Counseling Center: https://counselingcenter.utah.edu Location: Rm 426, Student Services Building (SSB) Phone: 801-581-6826

Sexual assault victim advocacy. Wellness Center: https://advocate.wellness.utah.edu Location: Rm 328, Student Services Building (SSB) Phone: 801-581-7779

**Medical help.** Student Health Center: https://studenthealth.utah.edu/services/ Location: Madsen Health Center, 555 Foothill Drive Phone: 801-581-6431

Wellness. Center for Student Wellness: https://wellness.utah.edu Location: Rm 2100, Eccles Student Life Center; There is a massage chair for you to use!

Support for women students & scholars. Women's Resource Center: https://womenscenter.utah.edu Location: Rm 411, Olpin Union

Disability and equal access. Center for Disability Services: https://disability.utah.edu

**Student support.** The Office of the Dean of Students: https://deanofstudents.utah.edu Location: Rm 270, Olpin Union, A great resource for all students.

**For International students.** ISSS: https://internationalcenter.utah.edu Location: Rm 410, Olpin Union

## 5.2 Safety and Wellness

Your safety is our top priority. In an emergency, dial 911 on your cell phone (there are no longer emergency phones 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; safety.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 801-587-3000; help is close. The university has other 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.

The University has an office to assist students in meeting basic need such as housing and child-care. They may be found at https://basicneeds.utah.edu/housing-and-childcare-resources.php.

Attending graduate school can be challenging. Talk with a counselor or a wellness advocate: No cry for help shall go unheard. Use all available resources to make your grad experience a great one. Attending graduate school can also be a wonderful and most rewarding experience of your life.

# 5.3 International Students

**Immigration and visa issues.** International students have a unique set of obligations that they have to follow in order to be allowed to stay in the U.S. The University's International Student and Scholar Services (ISSS, also known as the International Center; https://isss.utah.edu) is the key resource. If you are an international student, please check in with ISSS if you have any questions at all related to your visa and immigration status. Staying in compliance with your visa is essential. ISSS personnel are experts, ready to help. The department is on your side, too. If you need anything visa-related, like a letter of support or getting your advisor's signature or authorization on a visa application, then contact ISSS and the department Chair as soon as possible.

ISSS is a good resource for helping you make decisions about travel to and from the U.S. In the past, our students have had trouble because they traveled to their home country in the middle of a semester and were unable to return when expected. The ISSS can give you guidance on how to make course enrollment decisions related to the compliance with immigration requirements or when it comes to leaves-of-absence.

**International communities on campus.** If you are an international student, you are not alone in this situation at the University of Utah! There are organizations like the Chinese Students and Scholars Association (cssauu.utah.edu) that provide a network of support and social activities. The Department of Physics and Astronomy alone has had international students and scholars from countries of all continents (except Antarctica, although P&A students have conducted research there).

# 5.4 Disability and Equal Access

The University provides accommodations to enhance your educational development if you are a student with disabilities. The range of services is broad, and the Center for Disability & Access (CDA; disability.utah.edu) will help you to obtain equal access to programs and facilities as well as accommodations for test taking. Please contact the CDA directly for more information.

# 5.5 Conflict Resolution

The Department of Physics and Astronomy accommodates a professional community. Respect and support for one another are needed and expected, in order to meet the challenges of coursework, research, and instruction. In the following, resources are discussed that aim to help and protect students who experience misconduct. These resources aim to nurture respect and prevent conflict.

**Student Rights and Responsibilities.** The University of Utah's policies regarding your conduct as a graduate student are defined by the University of Utah's

Student Code: www.regulations.utah.edu/academics/6-400.html

The Department of Physics and Astronomy is a place of learning and others' pursuit of knowledge shall not be impeded. Failure to uphold the Student Code may result in dismissal from the university. The nature of any conflict may determine any response by the University and the Department.

**Physical threat.** First and foremost, be safe. If there is any physical threat to you, try to move yourself out of the situation and contact 911 or Campus Police (801-585-COPS).

**Sexual Harassment or discrimination.** In cases of sexual harassment or discrimination of any sort, contact the DoGS, the Chair, or the Office of the Dean of Students (ODOS; deanofstudents.utah.edu). The Office of Equal Opportunity (OEO; oeo.utah.edu) may also help.

**Interpersonal conflict.** If a conflict arises between two or more people, it may help to start with an open discussion to resolve the conflict. If that plan is not feasible, the DoGS, GSAC, Ombuds committee or the department Chair are the next best resources to try and resolve issues. The Graduate School or the Office of the Dean of Students may provide another level of support for conflict resolution.

Academic disputes and appeals. For academic disputes such as contested grades, accusations of cheating or questions of authorship on publications (this is not meant to be a complete list), the DoGS or the Chair can help. Grade-related academic appeals that cannot be resolved between a student and an instructor should be made to the Chair, then the Associate Dean of Student Affairs in the College of Science, following well-established university policy (Section IV-B of the Student Code).

Retaliation against individuals for engaging in protected activities, such as filing a discrimination complaint or participating in a discrimination complaint process, is prohibited under University Policy; see, for example, Policy 1-012. The resources listed above can assist in navigating the specifics of this policy.

# 5.6 Academic Resources

To help with the academic component of a graduate student's experience, the Department of Physics and Astronomy, the College of Science and the university provide a number of resources:

**Library resources.** There are excellent libraries on Campus which provide Graduate Students with access to databases and help for literature searches, among may other things. Most significantly, Marriott Library: lib.utah.edu.

**Computing.** The department has linux and PC computer servers for academic use. For more intensive computational work, students may be able to get an account with our Center for High-Performance Computing: CHPC/high-end computing: www.chpc.utah.edu

**Travel.** There are resources available for Graduate Students for travel to professional conferences. Organizations like the American Physical Society and the American Astronomical Society have travel awards. The Graduate School can also provide funds; follow this link for more info.

**TA/Instructor resources.** The Department of Physics and Astronomy offers training to incoming graduate students on their arrival prior to each Fall semester. Also, the Center for Teaching and Learning Excellence (CTLE; ctle.utah.edu) provides annual training seminar for grad students, postdocs and faculty:

CTLE's Annual Training Seminar: ctle.utah.edu/ats/

**Thesis support.** There are set rules for writing a thesis. The Graduate School's Thesis Office makes and enforces these rules! <a href="http://gradschool.utah.edu/thesis/">http://gradschool.utah.edu/thesis/</a>

**Dissertation bootcamp.** To get your thesis writing underway, or just to know that you are in good company as a thesis writer and want to connect with others in the same situation:

Thesis Boot Camp: gradschool.utah.edu/thesis/dissertation-writing-boot-camps/

#### 5.7 Career Services

The University provides excellent resources for students seeking professional development and post-graduation employment:

Career & Professional Development Center: careers.utah.edu

In addition, students can gain leadership experience within the department by participating in GSAC, being a peer mentor, and taking on the role of the mentor TA.

## 5.8 Parenting and Graduate School

If graduate students are parents or about to become parents, there are resources and benefits (see Section 3.1.7) in place. The department provides parental leave for funded grad students. The Department of Physics and Astronomy has two dedicated rooms for privacy to support student and faculty mothers who are breast-feeding infants. Please ask at the department main office for more information. The university also has resources to help with childcare (childcare.utah.edu).

## 5.9 Beyond the Department

The following list contains suggestions for activities, some with a professional benefit, and others just for fun:

- Join the American Physical Society or the American Astronomical Society as a student.
- Participate in a Graduate Student Advisory Committee (GSAC) activity
- Check out a play at the Pioneer Memorial Theater or see an event at Kingsbury Hall (tickets are discounted for students).
- Go to a Frontiers of Science lecture, sponsored by the College of Science.
- Go to the gym, hike or ski.
- Volunteer to judge at a grade school science fair.
- Do a gallery stroll downtown.
- Visit any of the spectacular National Parks or State Parks of Utah (https://www.visitutah.com/).

And finally, the university has lots of other things going on:

U of U events calendar: www.utah.edu/events/