



THE UNIVERSITY OF ARIZONA
COLLEGE OF SCIENCE

LUNAR & PLANETARY LABORATORY

Ph.D. in Planetary Sciences

Graduate Student Handbook

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DEPARTMENT LIFE, EQUITY, AND NON-DISCRIMINATION

The LPL community is committed to creating a working environment that is safe, welcoming, and inclusive for all. To help raise awareness, provide resources, and produce an accessible platform for these problems, we developed the [Department Life Committee \(DLC\)](#). The DLC exists as an important resource for anybody in the department who is experiencing problems at LPL, regardless of employment status or the nature of challenges. It is also a platform from which to gain access to UA and community resources, information, and training on how to be an ally, bystander intervention, and safespace training. Updates will be ongoing, as our awareness and actions to address these problems evolve. For more information on the DLC and its members, visit the [Department Life Committee \(DLC\)](#) web page.

A graduate student representative is elected annually by the graduate student body. The representative serves as an official liaison between the students and the faculty in the Department of Planetary Sciences.

Resources pertaining to parents, professional development and health and wellness are available from the [Graduate College](#). The University of Arizona is committed to implementing family-friendly practices and ensuring that information regarding employee and student resources is shared broadly and regularly. We are dedicated to promoting and strengthening family relationships. Many resources have been designed to help graduate students balance and manage family, work, and school.

- [Graduate Assistant/Associate Parental Leave](#)
- [Temporary Alternative Duty Assignments \(TADA\) for Teaching Assistants/Associates](#)
- [Extension of Time to Degree Policy](#)
- [Life & Work Connections](#) - Child and Elder Care Resources

All UA employees, student workers and Designated Campus Colleagues (DCC) are required to complete the online [Preventing Harassment and Discrimination training](#). The [Office of Institutional Equity](#) (OIE) makes the Preventing Harassment and Discrimination training available to complete in [EDGE Learning](#), the University's learning management platform. Complete step by step instructions for accessing and enrolling in trainings is available on the EDGE course page found here: [EDGE Learning Quick Start Guide](#).

Please contact OIE at equity-training@arizona.edu should you have any questions. A list of resources from the Office of Institutional Equity is available [online](#). Students are also encouraged to review the [Graduate College Summary of Grievance Types and Responsible Parties](#).

PROGRAM OF STUDY

The Department of Planetary Sciences offers multidisciplinary research leading to the Doctor of Philosophy degree with a major in Planetary Sciences. Areas of specialization include, but are not restricted to: the experimental, observational, and theoretical study of planetary atmospheres in the solar system and elsewhere; the surfaces and interiors of planets and planetary satellites; asteroid and cometary astronomy and physics; the study of meteorites and returned samples of extraterrestrial bodies; problems of plasma physics associated with cosmic rays; the solar wind and its interaction with solar system bodies; celestial dynamics; solar physics; and investigations of the formation of the solar system and other planetary systems.

Student support is most often provided in the form of a Graduate Assistantship/Associateship (GA). Students will be appointed as Graduate Research Assistants/Associates (GRA) or Graduate Teaching Assistant/Associates (GTA).

The Department of Planetary Sciences may appoint students as Graduate Assistants or Associates. Students are initially appointed as Graduate Assistants. Immediately upon passing the Oral Comprehensive Examinations, students are appointed as Graduate Associates; however, students are not advanced to candidacy until curricular requirements as described below have been met.

Graduate Assistant and Graduate Associate (GA) positions at the University of Arizona are designed to:

- Provide an employment opportunity to students as they pursue their degrees.
- Provide benefits to graduate students while they work to complete their graduate degrees. Benefits include: student health insurance; remission of non-resident tuition; all or partial (for less than .50 FTE) remission of in-state tuition. More information is available from the [Graduate College GA Manual](#).
- Provide support to colleges and departments on campus with teaching, research, and outreach.
- Provide hands on learning which allows the student to develop educational and professional skills.
- Allow the graduate student to gain an exceptional, varied, and valuable university experience.

GRA positions will provide students with research and compliance training and valuable subject area experience. Students will work with their supervisors to determine the scope of work and responsibilities for the individual appointment. GTA positions will provide students with pedagogical training and teaching experience. Students will work with the instructor of record for the assigned course to determine expectations, responsibilities, and scope of work. Students are encouraged to review the [Graduate Assistant and Associate Workload Policy](#).

In order to maintain the Graduate Assistant/Associate position and be eligible for possible reappointment in future semesters, graduate students must maintain [satisfactory academic progress](#) and/or progress to degree, maintain a cumulative GPA of 3.0 or higher, be a degree seeking student, and satisfactorily complete their assigned duties. Students should review the [Graduate College GA Manual](#) for more information.

The program of study includes coursework in planetary science and a minor field of study, written and oral comprehensive examinations, and a Ph.D. dissertation. All elements must be approved by the student's Ph.D. and minor committees, as appropriate, and must conform to Department of Planetary Sciences (PTYS) and University of Arizona Graduate College requirements.

Students are guided through their program of study by their Faculty Advisor and their Minor Advisor, who chair their Ph.D. Committee and Minor Committee, respectively. In addition, the Graduate Admissions and Advising Committee (GAAC) is available to assist students at any stage in their graduate careers. The Director of Graduate Studies (DGS), generally the Assistant Department Head, serves as Head of Academic Affairs. If there is no sitting DGS, decisions are made by the PTYS Department Head.

GradPath. [GradPath](#) is the Graduate College degree audit system that facilitates the tracking and monitoring of graduate student academic progress. GradPath allows the student, their program, and the Graduate College to see where a student is in their academic journey at a glance. Students are able to fill in and submit forms online through UAccess Student. These forms include the responsible conduct of research statement, the graduate plan of study, graduate committee where relevant, and so forth. Forms have some automatic checking built in that prevent common errors (e.g., typos in course numbers, illegible faculty names, etc.). There is also built-in logic to notify students when there is a problem with their forms, such as courses outside our time limit. Such messages include links to policy.

The automated workflow engine routes the electronic forms to everyone who needs to see or approve them - each approver is notified by email when a form is awaiting review and approval, with a link in the email to go straight to the form.

Doctoral Plan of Study

In conjunction with the Faculty Advisor, each student is responsible for developing a [Plan of Study](#) during their first year in residence, to be filed with the Graduate College no later than the student's third semester in residence. The Plan of Study identifies:

1. Courses the student intends to transfer from other institutions;
2. Courses already completed at the University of Arizona which the student intends to apply toward the graduate degree; and
3. Additional course work to be completed in order to fulfill degree requirements.

The Plan of Study must have the approval of the student's Faculty Advisor and Director of Graduate Studies before it is submitted to the Graduate College.

On the way to completing the Ph.D., students may choose to pursue coursework for a [Graduate Certificate](#) in related topics.

Master's Degree

Although the Department of Planetary Sciences does not admit students directly into a Master of Science (M.S.) program, students may still earn a M.S. degree in Planetary Sciences. There are two options available: (1) a “terminal” M.S. degree intended for students who, after being admitted, either decide not to pursue the Ph.D., or who do not pass Ph.D. comprehensive exam, and (2) a M.S. degree “en route” to earning the Ph.D.

For the terminal M.S., in addition to other curricular requirements, the student is required to write and defend a M.S. thesis. Degree requirements are outlined in the [M.S. Degree Requirement document](#).

To move to the terminal M.S. degree program, the student must petition the Graduate Admissions and Advising Committee (GAAC) and the DGS to initiate an M.S. degree program. With the approval of both the GAAC and the DGS, the student is eligible to work toward the M.S. degree. The student must at that time identify an M.S. thesis advisor and an M.S. committee and file a **Master's Plan of Study** (available from [GradPath](#)).

Students who have passed the Ph.D. comprehensive exam and have met the M.S. course requirements are eligible for the en route Master's degree. An M.S. thesis is not required for the en route M.S. To obtain an M.S. en route, the student must file a [Request for Change of Program](#) form. Please contact the department's Graduate Coordinator for assistance.

PTYS PH.D. DEGREE REQUIREMENTS

General requirements for University of Arizona Graduate Programs are described on the [UA Graduate College Policies & Procedures](#) web page. Below are listed specific requirements for doctoral degree from the Department of Planetary Sciences.

Time Limits for the Ph.D.

The Ph.D. must be completed within 5 years of passing the Oral Comprehensive Examination. The Oral Comprehensive Exam must be attempted **before the end of the sixth semester from initial enrollment**. In extraordinary cases exceptions may be granted following department approval and petition to the Graduate College.

Coursework Requirements

In coordination with the Faculty Advisor, the student is responsible for developing a [Plan of Study](#) in the first year, to be filed with the Graduate College no later than the **third semester**.

PTYS students are required to complete 63 units of graduate coursework (500-level and above) consisting of:

- **Twelve** units of core courses in Planetary Sciences. Students must choose at least 1 core courses (3 units) from the Physics group, 1 core course (3 units) from the Chemistry group, and 1 core course (3 units) from the Geology/Geophysics group.
 - Planetary Physics: PTYS 505A; PTYS 505B; PTYS 517; PTYS 553
 - Planetary Chemistry: PTYS 510A; PTYS 510B
 - Planetary Geology/Geophysics: PTYS 512; PTYS 554

Exceptionally well-prepared students may petition to waive the requirement to take a particular core course however, this waiver does not reduce total number of units required and students must still complete the required 63 units of graduate coursework. Waiver requests are reviewed and evaluated by the core course instructor in consultation with the GAAC. The student is required to demonstrate knowledge of the core course material (a written or oral examination or interview may be required). The core course instructor makes a recommendation to the GAAC regarding the waiver decision; the final decision is made by the GAAC.

- **Nine** units of coursework in the minor field of study (or as required by minor department).
- **Twelve** units of elective coursework (graded ABCDE) numbered PTYS 500 or above
- **Twelve** additional units of elective courses numbered 500 or above (including field trips, independent study, PTYS elective courses, seminars, and courses offered in other departments) as approved by the faculty advisor.
- **Eighteen** units of dissertation credit (PTYS 920; PTYS 910 thesis units may not be substituted for 920).

At least one half the units used on the Doctoral Plan of Study must be in courses in which regular grades (ABC) have been earned.

- The core course requirement must be satisfied before taking the Written Comprehensive Exam; students should plan enrollment accordingly.
- The minor must be completed before taking the Oral Comprehensive Examination; students should plan enrollment accordingly.
- Students may enroll in elective units as early as the first semester and may continue taking elective courses after passing the Comprehensive Examination for Advancement to Candidacy.

- PTYS will not permit enrollment in 920 units unless coursework on the approved Doctoral Plan of Study has been completed.

Transfer Credit. With approval from the Faculty Advisor, the GAAC, and the Assistant Department Head/Director of Graduate Studies (DGS), PTYS will accept up to 9 units of transfer credit. These transfer credits must have been earned with a grade no lower than “B” while enrolled in a Master’s or Ph.D. program in a relevant scientific discipline. To request an evaluation of potential transfer credit, the student should contact the Graduate Coordinator.

The student petitions the GAAC, which serves as the Minor Committee, to apply those units to the PTYS minor requirement or to the twelve additional elective units. The GAAC will review proposed transfer courses to determine whether they may be applied. Documentation of the relevance and extent of the student’s transfer work, which may include syllabi, sample assignments, textbooks used, etc., is required. Students should review the Graduate College requirements regarding [transfer credit and courses shared between degrees](#). Students must complete the [Evaluation of Transfer Credit form](#) in [GradPath](#) to determine eligibility of coursework. **This must be completed in the first semester.**

MINOR PROGRAM REQUIREMENTS

All PTYS Ph.D. students are required to complete a minor program of study. The minor program is chosen in consultation with the student’s Faculty Advisor. There are two options to fulfill the minor requirement: (1) students may minor in Planetary Sciences; or (2) students may minor in any subject in another department or approved program at the University of Arizona that is contained in the [PTYS-approved list of minors](#). Additions to the list can be approved by the GAAC.

If PTYS is chosen as the minor as well as the major, the minor requirement is fulfilled by 9 additional credits (ABC graded) consisting of at least 3 graduate-level courses. The minor credit requirement must be satisfied by applying actual courses from an area differing from their main specialization rather than Independent Study units.

Students choosing a minor in a different department must satisfy whatever minor course requirement(s) the other Department demands. In some cases, the minor requirements may include you having to take the Comprehensive Exam in that department. A list of popular non-PTYS minors is available on the [PTYS Graduate Minors](#) list.

A master’s degree in a relevant scientific discipline may satisfy the minor requirement if the courses are accepted for transfer credit. In this case the student petitions the GAAC, which serves as the Minor Committee. Documentation of the relevance and extent of the student’s master’s work is required.

Minor Advisor and Minor Committee

The Minor Committee consists of two or more members chosen from the student's minor department or program of study. The student and their Faculty Advisor recommend members of the Minor Committee on the Minor Program Approval form. These recommendations are reviewed and approved by the GAAC. The Minor Committee membership is final once the DGS approves the form in [GradPath](#) when the Plan of Study is submitted.

- The Minor Advisor and Minor Committee must be chosen by the end of the second semester.
- The Minor Advisor chairs the Minor Committee
- The Minor Advisor must be different from the Dissertation Advisor.
- Committee members other than University of Arizona faculty require approval of the Graduate College.

The [Minor Program Approval](#) form must be filed with the Department of Planetary Sciences Graduate Coordinator by the end of the second semester. The minor requirements must be completed before the Oral Comprehensive Exam.

- University of Arizona requirements for the Minor Program of Study are available from the [UA policies site](#).
- All minors, regardless of department, consist of at least nine units of 500 or higher-level courses.
- The minor course of study must be approved by the student's Minor Committee.
- The student may be required to take a Minor Exam, depending on area of study, requirements of departments outside PTYS, or the Minor Committee.
- Possible minor program options and information are on the [PTYS Graduate Minors](#) list.
- The student must maintain a GPA of 3.0 or better in their minor coursework to be considered in good academic standing.

OTHER CURRICULAR REQUIREMENTS

Teaching Assistantship

Students are required to serve as teaching assistants in a course offered by PTYS at a minimum one-quarter time level for a minimum of one semester. Students with relevant teaching experience outside the PTYS department may petition the GAAC to waive this requirement. Relevant experience may include previous teaching assistantships or mentoring/training groups of undergraduates. Experience will be considered/evaluated by the GAAC as part of the petition.

Graduate Teaching Assistants/Associates (GTAs) must complete any required training from the department, college, or university before they are eligible for employment. FERPA and TATO must be completed before serving as a GTA for the first time.

- 1. FERPA Training.** All students are protected by a federal privacy law called [FERPA](#) (The Federal Education Right Protection Act). Since TAs are dealing with student records in an official capacity they are bound by this law. The University of Arizona requires that all employees with access to student records complete an online training course. Students who fail to complete this course within two weeks of starting a GTA appointment will be ineligible to serve as a TA and the appointment may be terminated. FERPA training module is available [online](#).
- 2. TATO (TA Training online).** [Teaching Assistant/Associate Training Online \(TATO\)](#) is a collection of self-paced modules about teaching and learning made available via D2L. All students who wish to be appointed as Teaching Assistants/Associates (TAs) must complete the module and pass the test with a score of 95% or higher no later than two weeks after the start of classes. It is recommended that TAs review the information from all modules in TATO before the beginning of each semester. The department may require additional in-person training.

Completion of FERPA and TATO is monitored by the Graduate College. TAs who fail to complete either of these trainings may be ineligible for further employment and can be terminated.

Students who do not meet the [English Speaking Proficiency required by the Graduate College](#) will be required to complete an English Speaking Proficiency Evaluation (ESPE).

Graduate Student Colloquia

Students are required to deliver **two oral Graduate Student Colloquia (GSC) and one Graduate Student Poster presentation**; the audience will evaluate these presentations on a variety of items using a rubric created and approved by students and faculty.

- Presentations may be given in the second, third, or fourth semesters of study. Exceptions must be approved by the GAAC. Presentations may be given in oral and poster sessions at either LPLC (Lunar and Planetary Laboratory Conference) or the Spring GSC day.
- All three presentations must pertain to the student's graduate research at LPL. GSC are expected to be 12 minutes long with up to 5 minutes for questions.
- Audience evaluations will be relayed to the student and their faculty mentor. Students are required to discuss presentation feedback with their faculty mentor within one month of the presentation.

DOCTORAL ENROLLMENT REQUIREMENTS AND CONTINUOUS ENROLLMENT POLICY

Students should review the [UArizona enrollment requirements](#). Contact the Graduate Coordinator with any questions or concerns.

SATISFACTORY PROGRESS AND ACADEMIC STANDING BEFORE CANDIDACY

UArizona Graduate College Requirements

Ph.D. students are expected to satisfy [Graduate College rules on academic standing, progress and probation](#) and [satisfactory academic progress](#).

Note: If a grade change or completion of an Incomplete causes a prior semester's cumulative GPA to drop below 3.0, the student will retroactively be placed on probation and that semester will count as the student's first semester below 3.0.

Department of Planetary Sciences Requirements

Core Course GPA

In addition to the overall GPA requirement from the Graduate College, PTYS students must **maintain a GPA of 3.0 or better in the PTYS core courses** to be considered in good academic standing. If a student's core course GPA dips below 3.0 based on the last core course taken, student must enroll for an additional core course the following semester. If no untaken core course is available for that semester, the GAAC will select a comparable course. If follow-up course does not bring core course GPA to 3.0, student will be recommended for academic probation.

Advising

Students must have a [Faculty Advisor](#) designated in GradPath to maintain satisfactory academic progress. Students may change Faculty Advisors, but are required to have a Faculty Advisor in order to maintain [satisfactory academic progress](#). The DGS or GAAC may designate a temporary major Faculty Advisor for incoming students. By the end of the third semester, the student must choose a Ph.D. Dissertation Advisor (or Advisors if being jointly advised). Upon selection, the Faculty Advisor and the Dissertation Advisor are the same individual.

The expectation is that Faculty Advisors will be members of the PTYS faculty and meet both the [departmental](#) and [Graduate College requirements for committee service](#). The DGS may serve as a temporary, transitional advisor for no more than 3 months. If, after that period, student has not designated a Faculty Advisor, the DGS and GAAC will contact the Graduate College to recommend the student be placed on [academic probation](#).

Graduate student primary adviser absence policy

In case of parental leave, family leave, medical leave, or other prolonged absence of the Faculty Advisor, students should designate an alternative member of the faculty (e.g., Faculty Mentor, committee member, or other suitable member of the faculty) to act as their temporary faculty advisor. The temporary faculty advisor will provide basic administrative support normally expected of a faculty advisor and general mentorship to the student. The temporary faculty advisor is not expected to assume the responsibility of advising the student on specific research projects unless there is a prior agreement with the student and the primary Faculty Advisor to do so. Major examinations such as the written examination, oral examination, and thesis defense, are delayed until the primary Faculty Advisor is available. After consultation with the primary Faculty Advisor (if possible) and with the approval of the Department Head, however, the student may opt to complete examinations by the regular deadlines. In such cases, the temporary faculty advisor or other designee of the Department Head will replace the primary Faculty Advisor as the chair of the examination committee and other committee members will be assigned as necessary to meet the general requirements for examination committees.

Probation and Disqualification

Before advancing to candidacy (before passing the comprehensive examination), students who fail to meet the departmental and Graduate College requirements as described above (including overall GPA, Core Course GPA, and designating a Faculty Advisor) are not considered to be making satisfactory academic progress. After consultation with the student, the student's Faculty Advisor (or DGS if no Advisor is assigned) will notify, in writing, the student, the DGS or Advisor, the GAAC, and the Graduate Coordinator that the department is recommending that the Dean of the Graduate College place the student on [academic probation](#).

Students on probation are required to meet with their Faculty Advisor (or DGS if no Advisor is assigned), to discuss the steps necessary to remediate the problems that led to probation, and devise [a written action plan](#) to be submitted to the Graduate College.

Students who fail to make satisfactory progress for two consecutive semesters will be disqualified from their program. Disqualification results in the student being blocked from registration. The DGS may petition the Graduate College for a [one semester extension](#) if the faculty believe the student has a high probability of succeeding.

Disqualified students may apply for one of the following:

- [Non-degree status](#), which allows them to continue taking graduate courses as non-degree seeking students, OR
- [Academic Renewal](#), if they wish to apply to a different degree program.

- Apply for re-admission to the PTYS program as early as the semester after their disqualification if they achieve a cumulative GPA of at least 3.0 through additional graduate course work and satisfy the advisor requirement. A readmission request must be supported by the head of the major department and approved by the Dean of the Graduate College. There is no guarantee of readmission.

COMPREHENSIVE EXAMINATION FOR ADVANCEMENT TO CANDIDACY

Students should review the [UArizona Graduate College Policies and Procedures for the Comprehensive Examination for Advancement to Candidacy](#).

Before admission to candidacy for the doctoral degree, the student must pass a Comprehensive Examination; the Comprehensive Examination is considered a single examination, although it consists of written and oral parts. This examination is intended to test the student's comprehensive knowledge of the major and minor subjects of study, both in breadth across the general field of study and in depth within the area of specialization. The examination, therefore, should not take place until the student has completed all, or almost all, of their coursework. The student must be in good academic standing to sit for the comprehensive exam. The minor department controls the minor portion of the written examination and may waive it at their discretion.

Clock Stoppages

LPL recognizes that events outside the student's control can derail their progress and impact their ability to meet the written and oral exam timing requirements. Although expected to be rare, a student may petition the GAAC to delay these timing requirements. Such a petition should include a new timeline and a thorough explanation of why the milestones in question can be met in the future but not the present.

The GAAC should make a recommendation to the DGS based on this petition, their deliberations, and any other relevant information. The DGS may postpone deadlines for the Written and Oral Comprehensive Exams for up to one year. Further extensions require a new student petition to the GAAC.

Written Examination

The purpose of the LPL written exam is to test the student's knowledge of their particular field and ability to communicate their research in written format. The specific format, which is detailed below, is also chosen to prepare the student to carry out independent cutting-edge research during their doctoral career and beyond. The written exam is intended to be an integral part of the graduate program and to prepare the student for the oral portion of the exam where the planned dissertation research is thoroughly discussed.

The written exam is administered by the student's Written Exam Committee. To pass the exam, students will produce a written document that emulates a paper submittable

as an article to a refereed journal. This document should contain relevant sections including an abstract, introduction, samples, methods, results, discussion, conclusion, and references.

In the case of a research or instrument development paper, the document will:

- Describe the significance of the relevant research problem and-provide a summary of the relevant existing literature.
- Describe the new approach, data, or instrumentation the student is developing to make progress on the research problem or instrumentation, including assumptions, completeness, and limitations.
- Present the results of this analysis or the design, performance, and expected results from the new instrumentation.
- Discuss the implications of these findings for advancing knowledge in the field.

In the case of a literature review paper, the document will:

- Comprehensively describe the state of current knowledge of the student's topic
- Assess open questions and the means by which they could be addressed
- Detail any new methods/instruments/datasets that show promise in addressing these questions now or in the near future.

The length of the written document will be determined through discussion with the Faculty Advisor. The student may include as many figures, tables, or equations as they and the committee deem necessary. The minimum length required for the paper is 12 publication units where 1 PU = 500 words, 1 figure, or 1 table. As with regular publications, manuscripts longer than 25 publication units are discouraged Unless the need for a longer manuscript is clearly justified and explained, excess material should be put in a supplementary material document.

Written Comprehensive Examination Committee

The committee will be constituted by the student and their Faculty Advisor by the end of the 3rd semester.

- Committee will consist of at least four members: at least three core members plus a department-appointed standing member whose role is solely to ensure consistency in the assessments throughout the year. The standing member will not vote on the pass/fail for the written exam but they are expected to attend all committee meetings and review all the comments received by the student.
- The core/voting committee members must include the student's Faculty Advisor (who serves as chair) and at least two regular members of the PTYS/LPL Graduate Faculty (this includes faculty with either formal or courtesy joint appointments in PTYS/LPL).
- The written and oral exam committees do not have to be identical; however, the core/voting members of the written exam committee must also be part of the oral exam committee.

- If there are co-chairs of the Committee, one co-chair must be a regular member from the PTYS/LPL Graduate Faculty; the other co-chair can be either a regular or special member.
- Committee does not need to include a representative from the student's minor department.

Format and Procedures for the Written Examination

- By the end of the 3rd semester, the student must submit a two-page summary of the research topic, instrumentation project, or literature review to the committee. This submission should be formatted as a two-column conference abstract (e.g., for the Lunar and Planetary Science Conference) and include sections for introduction, methods, results, conclusions, and references. References may exceed the two-page limit. If the student has already published a paper based on their research at LPL at this stage, they can submit the published paper to the committee instead of a summary.
- The student will later submit their full written document to their committee who will provide written review comments in writing within one month if during the semester. The committee will review submissions received during periods spanning either the summer or winter breaks as soon as possible and provide review comments within the first month of the following semester at the latest. It is expected that the student will write the first draft of the document independently and work with their advisor and relevant collaborators so that the document submitted for the written exam is in a mature and complete state. The written exam document must include an author contribution statement that clearly specifies the contributions made by each author, consistent with current practices in refereed journals. The statement should identify the specific intellectual, analytical, or technical components for which the student is responsible, as well as any contributions by co-authors and collaborators. The student's role must be substantial and clearly distinguishable.
- The student will revise the written exam document and resubmit along with responses to each review comment (minor comments requiring small typographical changes can be grouped together with a single 'change made' response). After each submission the committee votes on whether the document qualifies a submittable paper (i.e., the student has passed) or whether further revisions are necessary. Students should typically expect at least one round of revisions. Students may be expected to make substantive changes on each iteration. The committee may decline to review new versions that contain only trivial edits if substantial changes were requested instead.
- The process is limited to two major revisions so that there are three opportunities to pass (including submission of the original document). If the committee determines that the document does not constitute a submittable paper after two revisions and major changes are still recommended by the committee, the student has failed the exam and is recommended for dismissal from the program.

- A written exam document is considered submittable if it meets the scholarly and structural standards of a manuscript that could reasonably be submitted to a refereed journal for peer review. This does not mean it would necessarily be accepted without further revision or that the project is fully completed, but that the manuscript is professional, complete, and coherent enough to merit serious consideration. A submittable manuscript is not a rough draft, class paper, or a slightly expanded proposal.
- The initial summary document and later complete versions with review comment responses will be submitted with coversheets available from the Graduate Coordinator.
- A document describing work that was largely completed while the student was not enrolled in the LPL graduate program and that was not performed as part of their graduate studies cannot be used for the written exam.

Timing Requirements

- Students must form their Written Exam Committee by the end of the 3rd semester when the initial two-page summary is due.
- Students will meet their committee for the first time before the end of the 4th semester.
- The first full draft must be submitted by the end of the 5th semester. There is no time limit for the student to respond to review comments. **However, students cannot take the Oral Comprehensive Exam before passing this written examination and the deadline for passing the oral exam is the end of the 6th semester.** Given that each review cycle may be time consuming, students are strongly encouraged to supply the first full written draft by the beginning of the 5th semester.

Oral Examination

Students should review the [UArizona Graduate College procedural rules for the Oral Comprehensive Examination](#).

Upon successful completion of the written portion of the comprehensive examination, the Oral Comprehensive Examination is conducted before the [examining committee of the faculty](#). The purpose of the exam is to assess the student's ability of the student to pursue independent research leading to a Ph.D. The Oral Comprehensive Exam in Planetary Sciences will concentrate on the student's research accomplishments and potential. The oral examination is the occasion when faculty committee members have both the opportunity and obligation to require the student to display a broad knowledge of the chosen field of study and sufficient depth of understanding in areas of specialization. Discussion of proposed dissertation research *is* included. The examining committee must attest that the student has demonstrated the professional level of knowledge expected of a junior academic colleague.

Requirements for the Oral Comprehensive Examination

- Candidates must attempt the Oral Comprehensive Examination before the end of their sixth semester. Failure to do this results in student being recommended for academic probation.
- Student must have completed all PTYS core courses and the minor requirements before taking the oral examination.
- Graduate Student Colloquium presentations must be completed before the student attempts the Oral Examination.
- [Minor Program Approval Form](#) must be completed before application to take the Oral Comprehensive Examination.

Oral Comprehensive Examination Committee

Students should review the Graduate College policies about [Graduate Faculty](#).

The student and their Faculty Advisor recommend members of the Oral Comprehensive Examination Committee that can examine the student on the major and minor fields to confirm competency in those areas. These recommendations are reviewed by the GAAC and must be approved by the DGS.

- The Oral Comprehensive Examination Committee must consist of five or more members, including the core/voting members previously selected for the written examination and the Minor Advisor.
- The Committee must include the department-appointed PTYS Standing Oral Comprehensive Examination Committee member. The standing member ensures departmental standards are met and that all students are held to equal standards.
- The student's Faculty Advisor chairs the Oral Comprehensive Examination Committee and must be a member of the PTYS/LPL Graduate Faculty ("regular" member), which includes tenured and tenure-track faculty (including those with courtesy appointments in PTYS/LPL) and faculty with career-track titles of Research Professor and Professor of Practice.
- The Faculty Advisor/Committee Chair has special responsibilities:
 - Assume principal responsibility for advising Ph.D. and/or Master's students.
 - Commit the time for this work and be accessible to the student.
 - Establish appropriate benchmarks with the student to help ensure timely degree completion.
 - Take primary responsibility for the development and administration of the appropriate examinations, including thesis/dissertation work through completion of the degree.

- In concert with the student's committee, oversee and approve the student's comprehensive exams, dissertation/thesis proposal, dissertation/thesis research, and final written dissertation/thesis/creative project.
- Uphold the standards and quality for scholarship expected of graduate students in the Department of Planetary Sciences and the field of planetary science.
- At least 50% of the Committee members must be from the PTYS/LPL Graduate Faculty. The balance of the committee may be regular members or approved "special" members. Special members must be reviewed and approved by the Dean of the Graduate College; contact the Graduate Coordinator for more information.
- If there are co-chairs of the Committee, one chair must be a regular member from the PTYS/LPL Graduate Faculty; the co-chair can be either a regular or special member.
- For any exam, if the Standing Member and the Faculty Advisor are the same person, the DGS or Department Head will appoint a substitute Standing Member.
- The Committee must include at least one member representing the student's minor area of study.

Documents Required in Advance of the Oral Comprehensive Examination

In advance of the oral exam:

1. At least 3 weeks prior to the exam date, student must complete the online [Comprehensive Exam Committee Appointment Form \(GradPath\)](#).
2. Student must complete the online [Announcement of Doctoral Comprehensive Exam Form \(GradPath\)](#).
3. At least 3 weeks prior to the oral examination, the student must supply the following to their Oral Comprehensive Examination Committee:
 - (a) a primary written proposal outlining the primary proposed dissertation research; 1200-1800 words, plus supporting figures, tables, captions, and references.
 - (b) a second written proposal presenting an alternate dissertation project; 600-1200 words, plus supporting figures, tables, captions, and references.

Both proposals should include a:

- clear statement of the problems to be investigated
- description of the proposed research objectives
- description of prior results
- description of the suitability of the methods proposed for carrying out the proposed investigation

- description of the significance of the proposed work as it relates to broader issues in planetary science
- clear work plan as to how the project will be implemented
- description of the appropriate skills and techniques necessary for project success as well as how they will be developed or acquired by the student.

Proposals must follow the word limits and be written expressly for the oral comprehensive examination. They should directly address the required guidelines, not simply reuse observing proposals, fellowship applications, or other documents prepared for different purposes. While projects may overlap with those from previous proposals, the documents submitted to the oral examination committee must be tailored specifically for this examination.

Format of the Oral Comprehensive Examination

- Examination must cover both the major and the minor subjects.
- Exam is closed to the public.
- The Oral Comprehensive Examination may not last less than 2 hours but must not last more than 3 hours.
- Exam begins with a presentation of the primary research proposal; presentation should last no more than 15 minutes. The student may be asked to present the second proposal at the discretion of the committee and so should be prepared to do so. Following this presentation, the examination is open to questions by the committee.
- Remote participation by one or more committee members by video conference should be avoided but is permitted on the condition that the student and all committee members can effectively communicate and view slides, whiteboards, etc. The student must confirm any potential remote participation with the Graduate Coordinator at least 2 weeks in advance of the exam to ensure appropriate accommodations can be made.
- All members must participate in the entire examination. The exam will be paused if any committee member needs to temporarily step out or loses their digital connection.

- Students should avoid taking the oral exam during the summer. Candidates should notify the GAAC and the Graduate Coordinator as soon as possible if they anticipate difficulty in scheduling the exam. The GAAC and the Graduate Coordinator will work with the student and committee chair to find suitable replacement committee members, if necessary.
- The Graduate College allows no more than one re-take of the Oral Comprehensive Examination.

Outcomes for the Preliminary Oral Comprehensive Examination

Failing the examination results from a negative vote of two or more committee members. An abstention counts as a negative vote.

The Dissertation Committee recommends to the DGS that the candidate has passed the oral exam, failed with the opportunity to retake the exam not sooner than 6 weeks after the failed exam and not longer than 12 months after, or failed without the opportunity to retake the exam.

In order to pass the oral examination, the student is expected to demonstrate

- capacity to conduct independent research;
- substantive research accomplishments and progress to date;
- the ability to articulate how their research relates to and informs the broader field of planetary science;
- broad knowledge of the discipline and sufficient depth of understanding of their chosen field of study and research;
- viability and scientific merit of the proposed research projects; and
- the ability to respond effectively to questions and think critically in real time.

If committee recommendation is failure without the possibility to retake the exam, the DGS will review the decision and make the final determination and recommendation. If the DGS determines that the student has failed without the opportunity to retake the exam, the student will be recommended to the Graduate College for dismissal from the Ph.D. program. In some cases, a student may still be eligible to earn a M.S. degree and should meet with the Faculty Advisor and DGS to discuss this option.

Students shall be allowed a maximum of 2 attempts at passing the oral portion of the Comprehensive Exam, but shall not change the composition of the committee, except with the permission of the DGS and the Graduate College.

ADVANCEMENT TO CANDIDACY

When the student has passed the written and oral portions of the Comprehensive Examination, and the Graduate Student Academic Services office has confirmed completion of the required courses on the approved [Doctoral Plan of Study](#), the student will advance to doctoral candidacy. The student will be billed the [graduate candidacy](#)

[fees](#) and will be notified by e-mail. The candidacy fees are one-time fees and the student will not be billed again if the reported graduation date is changed. Students will form a dissertation committee by the time of advancement to candidacy, [as required](#) by the Graduate College.

Upon advancement to candidacy, the student may register for PTYS 920 dissertation units in order to satisfy the requirement of eighteen (18) PTYS 920 units before the dissertation defense. PTYS will not permit enrollment in 920 units unless coursework on the approved Doctoral Plan of Study has been completed. Dissertation units (PTYS 920) may be taken concurrently with the last remaining units from the Plan of Study. Please consult with the Graduate Coordinator to confirm your eligibility for enrollment in 920 units.

SATISFACTORY PROGRESS AND ACADEMIC STANDING AFTER CANDIDACY

Ph.D. students are expected to satisfy Graduate College rules on [academic standing and academic progress](#).

Dissertation Progress Reports

After advancement to candidacy, good academic standing in the Department of Planetary Sciences doctoral program requires, in addition to the requirements outlined above, that Dissertation Progress Reports (DPRs).

- Students are required to meet with a majority of the Ph.D. Dissertation Committee and file a DPR with the Academic Office annually for 3 years after successful completion of their Oral Comprehensive Exam and every 6 months thereafter.
- DPRs are due by the anniversary date of the Oral Comprehensive Exam and (when required) on the anniversary date plus 6 months.
- A student's failure to meet with their committee within one month of the required timeframe is equivalent to an unsatisfactory progress report.
- In the event of an unsatisfactory progress report, the Dissertation Committee chair will deliver a letter to the student explaining the reason for the unsatisfactory report within two weeks of the Dissertation Progress meeting.
 - Letter must also indicate how the student can return to satisfactory standing and the date by which these actions must occur. Copies of this letter must be filed with the Graduate College, the chair of the GAAC, the department head and assistant department head. The student may appeal the Dissertation Committee's decision to the DGS after receiving this letter.

- A second Dissertation Progress Report must be delivered within 6 months of the unsatisfactory report. If this DPR is satisfactory, the student is once again considered to be making academic progress. If this DPR is unsatisfactory, the department recommends to the Graduate College that the student be placed on [academic probation](#).

DISSERTATION AND DEFENSE

Students should review the University of Arizona Graduate College [requirements for the dissertation](#).

Students must file the [Doctoral Committee Appointment For Candidacy \(GradPath\)](#) no later than six months before the Final Oral Defense Examination is scheduled. Any changes to the committee should be reported to the [Graduate Student Academic Services](#) office (contact the PTYS Graduate Coordinator). The [Doctoral Committee Appointment](#) form reports the student's planned dissertation committee, dissertation title (subject to change) and the expected graduation term. It requires approval from the Dissertation Director and the major and minor departments. The approval signature from the minor department on this form indicates both approval of the reported dissertation committee and confirmation that the student has satisfied all requirements for the minor.

Every student in a doctoral program must have an approved dissertation prospectus or proposal on file within their department. As soon as the student has an approved prospectus/proposal on file within the department, the department's Graduate Coordinator will submit the prospectus/proposal confirmation form in [GradPath](#) on behalf of the student.

All Ph.D. programs require the completion of a dissertation which meets required standards of scholarship and demonstrates the candidate's ability to conduct original research. Students must write a Ph.D. dissertation describing the significant results of their research. The results must be original and of high enough quality to merit publication in the peer-reviewed literature. The determination of whether a dissertation meets these criteria lies solely with scholars on the Dissertation Committee. Programs and committees may **not** require that the work be published. Students must select a Dissertation Committee and Chair that are qualified to judge that the quality of the dissertation meets the department's standards of scholarship. The committee cannot require that outside actors such as editors, publishers, editorial reviewer, accreditation boards, etc. make that determination for them.

Reprints of published papers or preprints of manuscripts submitted for publication may be included as chapters in theses or dissertations if the student is the first or sole author and if the student's committee consents. Because the thesis or dissertation must represent an integrated body of original scholarly work, the relevance of the work to the

thesis must be explained in the Introduction or elsewhere within the thesis. Reprints or preprints of papers on which the student is an author, but not the first author, may only be included as appendices, although the work that the student contributed may be included within the body of the thesis or dissertation. Written permission must be obtained for the use of any copyrighted material.

Ph.D. Dissertation Committee

Students should review the Graduate College policies about [Graduate Faculty](#) and [Dissertation Committees](#).

Students must have an approved Dissertation Committee and Chair in place by the time of their first required Dissertation Progress Report, i.e., no later than 1 year after passing the Oral Comprehensive Exam. Failure to name an approved Chair and Committee within this timeframe is equivalent to an unsatisfactory progress report (see above for consequences and procedures for an unsatisfactory DPR).

- The student and their Faculty Advisor recommend members of the Ph.D. Dissertation Committee. These recommendations must be reviewed and approved in [GradPath](#) by the DGS.
- The memberships of the Oral Comprehensive Examination and Ph.D. Dissertation Committees are often similar but there is no requirement that they be similar or identical.
- The Ph.D. Dissertation Committee does not have to include the Standing Member from the PTYS Oral Comprehensive Examination Committee.
- The student's Faculty Advisor chairs the Ph.D. Committee and serves as Dissertation Advisor/Committee Chair. The chair of the Committee must be a member of the PTYS/LPL Graduate Faculty ("regular" member). If there are co-chairs of the Committee, one chair must be a regular member from the PTYS/LPL Graduate Faculty; the co-chair can be either a regular or special member. The [Dissertation Committee Chair has special responsibilities](#).
- The Dissertation Committee must consist of at least 3 members from the PTYS/LPL Graduate Faculty ("regular" members), which includes tenured and tenure-track faculty (including those with courtesy appointments in PTYS/LPL) and faculty with career-track titles of Research Professor and Professor of Practice.
- At least 50% of the Committee members must be from the PTYS/LPL Graduate Faculty. The balance of the committee may be regular members or approved "special" members. Special members must be reviewed and approved by the Dean of the Graduate College; contact the Graduate Coordinator for more information.
- Candidates must develop a proposal of sufficient academic merit and on a topic that satisfies their committee.

- The Ph.D. Dissertation Committee administers the Final Oral Defense Examination.

Final Oral Defense Examination

Students should review the University of Arizona Graduate College requirements for the [Final Oral Defense Examination](#).

- Upon the completion of the dissertation, the candidate must take a Final Oral Defense Examination.
- All other Ph.D. Degree Requirements must be completed prior to scheduling the Final Oral Defense Examination. The minimal required number of PTYS 920 units (18) must be completed either before, or in the same semester as, the dissertation defense
- Students must pass the Final Oral Defense Examination within 5 years of passing the Oral Comprehensive Examination. Should a student not finish within that time period, they may be allowed to re-take the Comprehensive Exam with permission of the program, and then proceed to complete other requirements, e.g., the dissertation.
- Date, time, and location of the final examination must be scheduled with the Graduate College in advance using the [Announcement of Final Oral Defense form in GradPath](#). This form should be submitted enough in advance of the examination that all approvers can grant their approval in time for the form to reach the Graduate College one week prior to the exam. Students should work with the Graduate Coordinator to submit this information.
- The Final Oral Defense Examination consists of two parts: (1) a public presentation during which the candidate describes the results of their research and addresses questions from the audience and (2) a closed examination, where the members of the Ph.D. Dissertation Committee question the student to determine whether the dissertation meets the faculty's standards for independent intellectual and scholarly achievement. The entire proceedings may not exceed three hours.
- All members of the Dissertation Committee must be present for the entire examination. The exam will be paused if any committee member needs to temporarily step out or loses their digital connection.
- Remote participation by one or more committee members by video conference should be avoided but is permitted on the condition that the student and all committee members can effectively communicate and view slides, whiteboards, etc. The student must confirm any potential remote participation with the Graduate Coordinator at least 2 weeks in advance of the exam to ensure appropriate accommodations can be made.

- A student must be in good academic standing to schedule the defense. The examination focuses on the dissertation itself but can include general questioning related to the field(s) of study within the scope of the dissertation.
- Final Oral Defense Examinations should be scheduled during days when the university is in session and during normal business hours. Permission to hold examinations during university holiday closures or outside of normal university business hours may be granted by Graduate College; students should consult with their Graduate Coordinator.
- Copies of the dissertation must be distributed to the Dissertation Committee 4 weeks prior to the Final Oral Defense Examination. At this time, the dissertation must be complete, containing all figures and references in addition to the text.

Outcomes for the Final Oral Defense Examination

The Ph.D. Dissertation Committee may accept the dissertation as is, accept the dissertation subject to modifications, or reject the dissertation. In the latter case, the student is dismissed from the Ph.D. program.

Acceptance or rejection of the dissertation is decided by vote of the Dissertation Committee. In accordance with the [University of Arizona Graduate College requirements](#), if there is more than one dissenting vote then the dissertation is rejected. Abstention counts as a dissenting vote.

If the committee requires revisions to the dissertation, those must be done in a timely manner, not to exceed one year. If the revisions are not completed by the dissertation submission deadline for the term when the student defends, the student will be required to register for the next semester and will graduate in the semester when the revisions are complete and approved. If revisions are not done by the end of the time to degree period, the student will have to re-take comprehensive examinations to demonstrate currency of knowledge.

Upon successful completion of the Final Oral Defense Examination and satisfaction of all requirements, the committee chair will initiate and complete the [Results of Final Oral Defense form \(GradPath\)](#).

Submission of the Dissertation

Upon successful completion of the Final Oral Defense examination and having gained final approval from the Dissertation Committee after completing any revisions needed following the defense, the candidate submits the dissertation electronically via the [submission website](#) maintained by ProQuest/UMI. This submission must be made by the [submission deadline](#) for the desired graduation term. The Graduate College will check the formatting of the submitted dissertation and may request changes before accepting the submission. When the dissertation has been accepted by the Graduate

College, [completion of requirements](#) has been fulfilled, and all other [final items](#) are accounted for, the degree will be awarded provided the degree conferral date for the graduation term has been reached. Please consult with the Graduate Coordinator for the relevant semester for the conferral date.

One digital (PDF) copy of the dissertation must be provided to the Graduate Coordinator for archiving in the PTYS library.

Storage and Publication of Dissertation

ProQuest/UMI catalogs and stores the dissertation and sends catalog information to the Library of Congress for distribution for depository catalogs and libraries. The dissertation will also be archived in the University of Arizona [Campus Repository](#), where it serves as the record of the student's research.

Publication of the dissertation by ProQuest and the Campus Repository does not preclude publication by other means, and successful candidates are urged to submit dissertation material for publication in scholarly or professional journals. Suitable acknowledgment must indicate the publication was a dissertation, or portion of a dissertation, submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at the University of Arizona.

Upon receipt of the finalized dissertation, the Dean of the Graduate College will recommend conferral of the doctoral degree by the Arizona Board of Regents.

SUMMARY OF RULES AND POLICIES FOR ACADEMIC STANDING, ACADEMIC PROGRESS, AND ACADEMIC PROBATION

University of Arizona Graduate College Policies

- [Academic Probation](#)
- [Grievance Policy](#) and [Summary of Grievance Types and Responsible Parties](#)
- [Minimum Academic Requirements](#)
- [Satisfactory Academic Progress](#)

Department of Planetary Sciences Policies

Before advancement to candidacy, the Department/DGS will recommend academic probation to the Graduate College if the:

1. Student does not maintain GPA of 3.0 or above for the PTYS core courses for two consecutive semesters.
2. Student does not have an approved designated Faculty Advisor for more than three months (the maximum which the DGS can act as a temporary advisor).
3. Student does not attempt the Oral Comprehensive Examination before the end of the sixth semester.

After advancement to candidacy, the Department/DGS will recommend academic probation to the Graduate College if:

1. Two consecutive Dissertation Progress Reports indicate unsatisfactory progress toward completion of the dissertation (note that missing a Dissertation Committee meeting deadline constitutes an unsatisfactory progress report, as does not having an approved Dissertation Committee and Chair in place by the time of the first required DPR).
2. Student does not have an approved designated Faculty Advisor for more than three months (the maximum which the DGS can act as a temporary advisor).

Dismissal from Program

The Department/DGS will recommend dismissal from the Ph.D. program to the Graduate College if:

1. Academic Probation persists for two semesters.
2. The student fails the Written Comprehensive Examination for a second time.
3. The student fails the Oral Comprehensive Examination for a second time.
4. The student's dissertation is rejected during the Final Oral Defense Examination.

Student Appeals Process

If a student wishes to appeal any of the requirements mentioned above, the appeal should be made in writing to the Director of Graduate Studies. The appeal will be reviewed by the GAAC and requires a majority vote to succeed. The GAAC may place additional requirements/deadlines on the student as a prerequisite for continuing in the program.

Students who wish to appeal the decision of the GAAC must submit an appeal in writing to Head of the Department of Planetary Sciences, who will make a decision in consultation with other faculty, as appropriate.