

# NMSU

## Department of Astronomy

### Department Handbook

#### Academic Year 2023-2024

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## 1 Our Values

The NMSU Department of Astronomy values a welcoming professional work environment, free from any and all discrimination and harassment, to all who are interested in learning about the Universe. We value a set of diverse perspectives and backgrounds in promoting this environment in all our undergraduate classes, graduate classes, and all professional work settings. As a member organization of the American Astronomical Society, our department strictly adheres to their [Code of Ethics](#) and we hold all our faculty, staff, graduate students, and undergraduate students to these high standards.

## 2 Our Mission

The NMSU Department of Astronomy strives to develop and communicate the human endeavor to understand the Universe. We accomplish this through continuing development of knowledge in our research program, our graduate and undergraduate course offerings, and our outreach. Our graduate program provides students the opportunity to become deeply involved in astrophysics research, and educates students in skills that are useful for a variety of careers. Our undergraduate program educates students in critical thinking in concepts in astronomy. The department provides astronomy outreach to the community in order to spread knowledge and understanding of our Universe.

## 3 Land Use Acknowledgement

New Mexico State University honors Native American knowledges and worldviews based on intimate relationships to the natural world. The genesis of the Southwest Indigenous Peoples, including the Pueblo, Navajo, and Apache, established their guardianship of the lands now occupied by New Mexico State University. As the state's Land-Grant University, we acknowledge and respect the sovereign Indian Nations and Indigenous Peoples. We pledge to have a meaningful and respectful relationship with the sovereign Indian Nations, Indigenous communities, and Native American Peoples within the institution.

This land use acknowledgement was created in Faculty Senate Proposition 06-19/20: Memorial in support of NMSU's Land Acknowledgement Statement in October of 2019 and approved by the Faculty Senate in December of 2019. The Memorial was acknowledged by President Floros and Provost Parker in June of 2020. We encourage this be shared in classes and on syllabi as we begin to marry action with words to acknowledge and respect the Peoples of this land.

## 4 Purpose of this Department Handbook

This primary intent of this guide is to introduce our new graduate students through the procedures required by NMSU to achieve an advanced degree in Astronomy. However, all current students, faculty, and staff should read it carefully and refer to it often. This document is edited with updates at the end of each academic year, so any comments and improvements should be sent directly to the Department Head at any time. As it is clearly impossible for any written guide to anticipate all questions and the program itself is an evolving entity, when you do have questions about the program or material in this handbook, students should consult immediately and directly with their advisor.

In cases where this Department Handbook document may inadvertently disagree with the NMSU policy, that NMSU policy always overrules this document. In cases where other information on our website may inadvertently disagree with this Department Handbook, this document overrules the website.

## 5 Ethics

### 5.1 Professional behavior and a discrimination-free workplace

Both NMSU and the Department of Astronomy are committed to providing a harassment-free work environment. The NMSU policy on discrimination, harassment, and sexual misconduct can be found at: <https://>

[//equity.nmsu.edu/discrimination-and-equal-opportunity/notice-of-non-discrimination.html](http://equity.nmsu.edu/discrimination-and-equal-opportunity/notice-of-non-discrimination.html).

We are compliant with Title IX of the Education Amendments of 1972, which prohibits sexual misconduct, sexual discrimination, sexual harassment, and retaliation. NMSU does not discriminate on the basis of age, ancestry, color, disability, gender identity, genetic information, national origin, race, religion, retaliation, serious medical condition, sex (including pregnancy), sexual orientation, spousal affiliation, or protected veteran status in its programs and activities, as required by equal opportunity / affirmative action regulations and laws, and University policy and rules. We have a student-led “Inclusive Astronomy” group that meets weekly to discuss all issues of inclusivity, and two colloquia each year focused on issues of inclusivity in our research field, university, and department.

In particular, any behavior that might be considered to have sexual connotations, either physical or verbal, must be avoided in any and all interactions between two people at different levels of authority in a professional environment. Specifically, there should never be any such behavior between professors and students at any level, and there should never be any such behavior between graduate students in a TA role and the students in their classes.

## **5.2 Reporting concerns of of discrimination and harassment**

### **5.2.1 When should I report an issue?**

While we recognize that there are differing ideas about what constitutes harassment, in our department we adopt the most conservative definition and adopt an “always err on the side of caution” attitude and behavior. If you ever find yourself in an uncomfortable situation you are expected to report those, even if you do not think it has reached the level of your definition of harassment; it is always much better to report issues, and therefore permit discussions of appropriate standards at the right level. It is also possible that something you’ve noticed is already part of a bigger problem, and that problem can only be identified by reporting it. It is also probable that someone less empowered than you is being affected worse than you. So don’t let things slide, under a pretense of trying to not cause trouble. Speak up. If anyone ever feels subjected to, or witnesses, insensitivity, discrimination, and/or harassment, they must report it.

### **5.2.2 To whom should I report an issue?**

Students should report concerns directly to their advisor, or any faculty member they feel comfortable talking to, or bring those issues directly to the Department Head. If they prefer to chat to a peer first, then please do so as it can be comforting to bring someone else along as an ally while reporting any issue. A faculty member will listen carefully and are empowered to try to solve the issue if they can. They may also advocate you immediately all go along to the Department Head to discuss it. In any case, whether solved or unsolved by the faculty member, all issues shall always be reported by the faculty member to the Department Head within 1 week.

Staff members should report concerns to their supervisor, or bring them directly to the Department Head. The supervisor will listen carefully and is empowered to try to solve the issue if possible. They may advocate you immediately all go along to the Department Head to discuss it. In any case, whether solved or unsolved by the supervisor, all issues shall always be reported by the supervisor to the Department Head within 1 week.

Faculty should report directly to the Department Head.

Any issue discussed with any department personnel must be communicated to the Department Head unless the Department Head is the subject of the report, in which case it will be communicated to the Dean of the College of Arts and Sciences. If necessary, and within University policy, the Department Head (or Dean) will determine a course of action, in consultation with the Office of Institutional Equity.

### 5.2.3 What should I do if someone reports an issue to me?

If someone brings something to your attention, your first instinct must be to listen. Allowing a problem to be shared is a good start. Don't try to solve it yourself. Never guarantee anonymity, as that would set up an unfair burden on you. Instead clarify that you will do everything you can do, and that has to include talking to the right people to find the solution. Then, be the ally in helping that person report it. Go along with them as support. Finally, set up a follow-up chat to see if the issue was handled correctly. Anonymous reporting put severe constraints on the effectiveness of a solution. So take advantage of speaking to a person and talk to a peer first. Then ask that peer to go along with you to report it. However, if there are exceptional prevailing circumstances, NMSU has contracted with an external provider, EthicsPoint, to provide employees with an alternative anonymous way to confidentially report activities that are in violation of university policy, see: <https://ethicsreport.nmsu.edu/>.

### 5.2.4 What will happen after I report an issue?

All reports will be handled professionally and courteously. Depending on the nature of the report, this may include intervention from the Department Head, the College of Arts and Sciences, the Associated Students of NMSU, Employee and Labor Relations, the Faculty Grievance Review Board, or any other entities as appropriate. Per NMSU policy, the Office of Institutional Equity will always be notified of any reports of harassment, so if such behavior is reported to you, you have a legal obligation to notify the Department Head, and the Department Head has a legal obligation to notify OIE. See <https://equity.nmsu.edu/home/incident-report.html> for information on OIE. After any action is determined, you will be contacted with a follow up notice.

### 5.2.5 Behavior outside of NMSU

We are aware of notable occurrences of unacceptable behavior at astronomy conferences, and other professional settings, from faculty at other institutions. These are entirely unacceptable, and we are proud that our research field has moved to act to stop these from even occurring again. In our department the responsibility for acceptable behavior extends outside of NMSU, and into all professional settings. The American Astronomical Society has provided information about sexual harassment and reporting for AAS meetings, to which we strictly adhere. See: <http://aas.org/policies/anti-harassment-policy>.

## 5.3 Academic ethics

We hold ourselves to the highest possible standards of ethics about the work we do and how we do it. At a high level, science depends on people being ethical about research: we must faithfully report what we do and what we find, taking care not to overemphasize facts that might support a view that we hold while underemphasizing facts that do not. In classes, we always demand complete honesty. On tests, we expect that no one will ever consult any material that has not been explicitly provided as allowed, or attempt to copy work of other students. For homework, we encourage discussion of questions among students, while at the same time expect that each individual student puts in individual effort to develop an understanding independently, and reports their own solutions.

For some classes, solution sets may have been distributed to students in previous years for homeworks or for exams, and it is possible that some professors may use similar or identical questions. As a result, we expect that our students to never make any attempt to get or distribute previous answers. Confusion as to whether some academic behavior is possibly permitted or not, does not constitute an acceptable defense. When in doubt about such behavior, ask an appropriate person, whether that be a peer, a senior student, the professor of the class, your advisor, or the Department Head.

## 5.4 Norms of collaboration

Our Department is in agreement with NMSU administration efforts to foster a supportive university by establishing respectful communication norms and building community.

- Be respectful and civil – respect everyone at every rank/position. Understand that nobody is here to cause pain or damage to anyone but we are here to do the best we can with what we have. And we are all humans and make mistakes – we should help to understand mistakes and work together to fix them and learn from them (e.g., avoid “pointing fingers” and criticizing).
- Assume best intent at all times - We must assume good faith in those we engage.
- We will not personalize professional differences.
- Practice constructive criticism that is solution-focused (i.e., if you bring a problem, bring a solution).
- Disagree in the room, but not outside it - Behind closed doors the disagreements will be many and loud.
- We discuss the issue on the table; with facts/data; without presumption that anyone is attacking another person, personalities, or positions; openly and without fear of retaliation, sabotage, or other negative consequences (i.e., we stick to the issues and all work together to resolve the issues for the betterment of the institution).
- We discuss issues with directness and maybe even (tempered!) passion, and when the issue is put to bed, we respect and enjoy each other.

## 6 Components of the Academic Program

There are many different facets of participating in our graduate program, and so one overriding issue everyone should consider as critical is that of time management, i.e., how much time you spend overall on the program and how much time you choose to spend on the different aspects. While your advisor, along with all faculty and staff, are here to help and advise you, ultimately what you get out of the program, and your future prospects, are determined by your choices. Students often want to know how to prioritize the different aspects of the program. This is a challenging question, as the choices may differ for different students, and at different times in the program. It is important to recognize that individual students need to decide for themselves how they choose to prioritize their time, and everyone else is here to help you with that choice.

### 6.1 Research

Most students enroll with the goal of having a career as an academic researcher in astrophysics, and we have developed our program primarily with this goal in mind. However, it is becoming increasingly challenging to obtain long-term employment in an academic position. Factors outside your control may lead to an realization that you have other paths, and you should always keep these alternatives in mind.

While research is often the primary goal, students find their personal allocation of this component is the hardest to manage. This is especially true in the first several years of the program, because of competing demands of classes, teaching, and outreach. As research is probably a high priority for you, your advisor will urge you to set aside time specifically for it. Note that research begins with reading to find out about a topic, then dedicating work to achieve new knowledge, and gets completed with the dissemination of your new discovery. The primary dissemination tool in academics is via scientific publications, and in most cases, the primary judgement of people (e.g., in job searches) is their publication record. As you proceed with research, you should always be working on writing up your results as you are developing them. In this way the process of writing becomes integral to the research process.

Some key ways to get up to speed on active research areas are to

- read papers: you should be aware of the main journals and, in particular, the astronomy preprint archive, [astro-ph](#). Get in the habit of looking at this regularly, and downloading and reading papers. Keep track of the papers that you have read: recognize that you need to put time aside for reading.
- talk about research: you can talk with other students, with your advisor, and with visitors. Discussions are the best to develop your ideas and get new ones. In order to end up with a career in which you enjoy research, you have to develop a confidence and enjoyment in talking about it.
- go to meetings where you can hear about, and present, research results. While there are several large general meetings in astronomy (the American Astronomical Society twice annual meetings, the Division of Planetary Sciences annual meeting, the Solar Physics Division annual meeting), these general meetings are not the only, or necessarily the best, opportunity to recognize the level of research that is often being performed by early-career graduate students. Look for topical meetings on subjects that you are working in, and talk to your advisor to find ways to go to these.

Plan to talk with your advisor regularly about research, and about what it will take for you to succeed.

### 6.2 Coursework

Classes are a very significant component of the program during the first two years. While the academic requirements for the program are outlined in detail in a subsequent section, here are a few key points :

- astronomy, like other fields, is constantly advancing and, in many cases, becoming increasingly specialized. While our classes aim to provide you the most important concepts in astrophysics, as well as making you aware of the latest advances, it is impossible to cover “everything”. Classes provide



an introduction, and a framework, for you to understand new material, and so you will certainly need to continue to learn through your own initiative outside of classes. Never accept that if you know everything that is taught in class and no more, that you will somehow then be sufficiently prepared for a career in research. Instead, always consider what more you want to know, and then go try to learn it, through asking questions, reading books, and reading research articles.

- Grades in graduate school are generally nowhere near as important as they are for undergraduates. If you want to go on in the field, people will scrutinize your research record **far** more than your grades. Of course, understanding the material is critical, and related to the grade you get, but the understanding and ability to apply it is much more important than the grade itself. In our graduate courses, we expect students want to learn, will be given the freedom and opportunity to learn, and will have one-on-one accessibility to our faculty. So we expect mostly A grades, with a few B grades. A C grade in any graduate course during your time at NMSU indicates your future may not lie in astrophysics research.

### 6.3 Teaching

Teaching is an critical component of the program, as it an integral component of many career paths in astrophysics research. Obviously, if your primary goal is an academic position at a university, your teaching success is vital. Universities are increasingly interested in the quality and innovations in teaching, as equal importance to research accomplishments. Furthermore, many of astrophysics graduates end up in predominantly teaching positions, where it is clear that teaching experience is critical. Another important role of teaching is that it generally provides financial support for many of our students. Our Teaching Assistants (TAs) play a vital role in our introductory undergraduate General Education classes (those with a title ending with 'G'). If you are a TA for one of these, your primary duty will be to teach and grade the lab sections of the class. It is critical that you become familiar with the labs beforehand, in order for them to go smoothly. There are several resources available to help you with this: generally, the TAs schedule weekly meetings to go over upcoming labs, and previous TAs have put together notes and teaching materials for most of the labs. In addition to labs, you may also be called upon to help wiht grading from the main class section. We also teach several 300 level undergraduate classes ((those with a title ending with 'V'), which generally have more writing assignments. TAs in these classes may spend more of their time in the class delivery and grading papers.

It is clear and the more traditional, didactic, modes of teaching are not especially effective, and yet our higher education community often calls upon people to teach without giving them any instruction in teaching styles. You should think about and constantly develop, your own teaching style, and discuss how you do optimise this with faculty and other students. Many people in our department, and university-wide have lots of background and resources about best practices in teaching and learning. A key component of effective teaching is getting students to be excited and enthusiastic about learning. Much of student learning behavior is generated by the teacher. If you are excited and interested by what you are talking about, it becomes more likely that the students will be. While we can't guarantee that this will be true for all students, the converse is almost always true: if you aren't excited and interested, the students almost certainly won't be either. The NMSU Teaching Academy provides lot of (free) professional trainging, and you are encourages to attend several of these each year.

As a TA, you may be called on to help out at the campus observatory. Generally, we require that undergraduate students in our introductory classes to go to the campus observatory twice in a semester; this means a total of roughly 500 visits to the observatory each semester. We usually have an open campus observatory two nights a week, staffed by different TAs on different nights. Sometimes we hold remote observing sessions. It is important that you are comfortable with knowing what is in the sky, and knowing how to operate the telescopes, before you are involved in one of these sessions. Note that campus observatory knowledge is also required when you help out with one of the department's monthly open houses. Our lab and observatory manager holds a campus observatory and public outreach training session at the beginning of each academic year, mandatory for new students and encouraged for all.

## Teaching expectations

Being a Teaching Assistant does come with significant responsibility. Obviously, you need to show up prepared for your teaching. On top of this, timely grading of labs and other materials is of critical importance to the students who are taking the class - they deserve timely response to their work. It is always in your best interest to keep up with grading: putting off grading work does not make it go away. We expect all work to be graded and back with students within one week, maximum. If you find that you are having a hard time keeping up with grading responsibilities, discuss the situation with the professor of the class *immediately*. It may be that you are taking more time to grade than is required, and the professor (or other TAs) will be able to provide some tips and guidelines on efficient time management. **If you do not meet your responsibilities as a TA, you will not be hired as a TA in future semesters, which in turn will have significant implications for your financial support.**

## 6.4 Public Outreach

Most of the funds that support the department (and astronomy in general) are derived from state and federal tax dollars, and thus from the tax payers of the state and country. In return for this support, it is our responsibility to give back to the public. Fortunately for astronomy, people are genuinely interested in what we do, and talking with them about it can be a lot of fun. The department has an excellent reputation in the local community for outreach efforts, and we value this reputation. Our graduate students play a critical role in these outreach activities, which include presentations to schools in Las Cruces and the surrounding southern New Mexico communities, local civic groups, and local astronomical interest groups. Some of the outreach events are nighttime events that involve looking at the sky. The public finds our subjects very exciting, interesting, and fun, and above all else, your participation should be exciting, interesting, and fun for you.

We strongly encourage students, faculty, and staff to participate in outreach efforts. In particular every graduate student will do a minimum of two events each academic year. Usually, local groups approach the department with a request for someone to do an event with them. These requests are channeled to the Astronomy Graduate Student Organization (AGSO) officers, who then ask for volunteers to do the event, and keep records of what events are provided and who volunteers for them. Note that there are some perks for participating in these events: they count as public service events for the NMSU Graduate Student Council, and, if an individual has sufficient hours of public service, you can apply to the NMSU GSC for funding assistance, e.g. with travel to conferences (<https://gsc.nmsu.edu/>). In addition, the department makes some financial outreach awards to students who excel at outreach events.

Each student and faculty member will, at minimum, participate in one monthly Observatory Open House, or equivalent, each year. These events are usually held on the Friday evening nearest in time to first-quarter moon in each month of the academic year. These events are well known and well attended, and offer the community the opportunity to view the skies through the telescopes here on campus at the Tombaugh observatory. They may also be held remotely at our Tortugas Mountain Observatory. A schedule of participation will usually be distributed at the start of the Fall semester. At these events, graduate students are generally expected to run the telescopes, so it is important you are comfortable on operating them before the open house.

## 6.5 Astronomy Graduate Students Organization

The Astronomy Graduate Students Organization, AGSO, was created to interface the astronomy graduate students with the more general student organizations (ASNMSU, GSC) and the astronomy department. Leadership positions are elected annually. More information can be found at <https://astro.nmsu.edu>. See Organizations – Astronomy Graduate Students Organization.

## 6.6 Milestones in the graduate Ph.D. program

As you move through our graduate program, consider the following as expected and typical timelines toward completion of a Ph.D. Later sections in this guide will describe many of these things in detail. Each student may take a somewhat unique path, in that some will complete their thesis proposal sooner and so may graduate in less than 5 years, whereas some may complete their Ph.D. in their 6th year.

Year	Category	Activities
1	Classes	Regular department classes & seminar each semester. Other learning based on material in classes, with other students, and your interests, read supplementary material
	Teaching	Learn and teach undergraduate labs. Recognize different teaching styles and develop your own.
	Research	Identify a topic you're interested in with your initial advisor, work on during year as time allows, with good progress in summer months.
	Exams	Take cume exams monthly, starting in the second semester.
	Outreach	At least one event.
	Other	Establish NM residency. <a href="https://records.nmsu.edu/students/residency.html">https://records.nmsu.edu/students/residency.html</a>
2	Classes	Regular department classes & seminar each semester & research credit (ASTR 598).
	Teaching	Continue to develop teaching style and skills.
	Research	Ramp up time spent on research. Identify thesis topic and funding applications.
	Exams	Continue monthly cumes; Complete your Qualifying Exam by the end of fall semester.
	Outreach	At least one event.
3	Classes	Research credits (ASTR 599 for Master's thesis preparation and completion, ASTR 600 for Ph.D. thesis proposal preparation, ASTR 700 for research after your thesis proposal).
	Teaching	As determined by your path through the program.
	Research	Finalize committee, prepare thesis proposal, confirm funding for 2 years.
	Exams	Complete your Comprehensive Exam by end of sixth semester. This comprises: 5 cumes passes, successful oral classwork exam by end of fifth semester, and complete and pass thesis proposal.
	Outreach	At least one event.
	Future prep	Consider your job possibilities and interests. Attendance at topical conferences. Consider AGSO and university student leadership positions.
4	Classes	9 x ASTR 700 credits each semester.
	Teaching	As determined by your path through the program.
	Research	Work on thesis. Publish papers. Write up your thesis as you proceed.
	Outreach	At least one event.
	Future prep	Discuss job interests and possibilities with external contacts; prepare for job application timescale and associated timescales for supporting materials. Present work at conferences. Consider AGSO and university student leadership positions.
5	Classes	9 x ASTR 700 credits each semester.
	Teaching	As determined by your path through the program.
	Research	Complete your research. Finish and submit your publications and your thesis.
	Exams	Dissertation defense.
	Outreach	At least one event.
	Future prep	Job applications (and potential interviews).

## 6.7 Job awareness and expectations

There will always be far more graduates with Ph.D.s than there are faculty positions. As such there are many more opportunities at research institutes (e.g. NASA centers, NSF centers, AURA), research companies, and international options. The skills that you obtain in graduate school are directly applicable in all science fields. Discuss with your advisor how to develop and document skills that may be useful when seeking employment, either within astronomy or outside the field. If you plan to continue in the field, note that it

will be important for you to make connections with professionals outside of the department. The more that other people know about you, the greater the possibility of job offers will likely be. External contacts are an important source of recommendation letters for job positions, and they must know enough about you and your work in order to write strong letters. The American Astronomical Society compiles information related to career resources at <https://aas.org/jobs/career-resources>.

## 6.8 Time expectations

Many people in the field of astrophysics, including everyone in this department, are constantly striving to find the right work-life balance. Working more than 40 hours per week should not be a requirement. However, you should be aware that most of the people in the field say that they spend more than this. The key to being successful, especially if working in the framework of a 40 hour work week, is being extremely careful about making your work hours productive. Astronomy graduate school is a full-time commitment, so you should plan and expect to dedicate a productive 40 hours a week at least. Time management is an essential skill, and even more essential if you want to succeed without having to put in an excessive amount of time. Think carefully about how much time you want and need to put into your various different activities. Your advisor is the best initial resource for assistance with time management.

In summary, the tasks that our graduate students will learn to balance include:

- Coursework: homework, exams, group work;
- Teaching: Leading labs, resolving student concerns, and grading;
- Research: reading, first-author work, nth-author work, conferences, attending colloquia and other discussion groups, proposals (for grants, telescope time, or positions);
- Outreach: deciding what you can or cannot participate in.

This is clearly a lot of balls to juggle. All of these tasks are important, but not all equally so at all points in your graduate school career. For example, grants and meetings at set times are usually more important than coursework, and grading to deadlines is usually more important than outreach. A key skill for graduate students to develop involves learning to balance these tasks without neglecting any of them. For example, it is far better (and more difficult) to cut research back to 15-30 minutes a day during exam season than to eliminate it entirely. You may find that an electronic app such as TimeEdition or ToggI will be useful to you in tracking how you divide your time; you may find these data useful when discussing progress with your supervisor.

Here is a sample weekly time allocation for students who have a TA in their first year:

- Teaching: < 14 hours
- Coursework (including attendance at lectures and homework): > 21 hours
- Research: 2.5 hours
- Group meetings / Departmental events: 2.5 hours

Of course, you should expect some significant variations in individual weeks. But if you are spending zero hours per week on research or 25 hours per week on teaching, averaged over a month, speak to your advisor immediately to resolve this.

## 6.9 Mentorship

The faculty consider mentoring of graduate students one of their primary responsibilities. It is a highly challenging and highly rewarding aspect of the job. A detailed mentoring agreement has been developed

that will be completed each semester between each mentor and mentee. It is a Google form that can be found at this link: <https://forms.gle/ge7B4V4uAjzcCVWQA>.

The agreement is meant to help encourage discussion of goals and expectations between mentors and mentees (i.e., faculty and graduate students). Experience has suggested that sometimes different parties have different assumptions or expectations about various aspects of the program and the mentor-mentee relationship, and that it is better to try to explicitly discuss these before misunderstandings or issues arise.

## 7 Academic Requirements and Policies

A typical roadmap for the Ph.D .program, including course and credit-hour minimum requirements, is summarized in the following table. Note there is some flexibility for each of these components, so make sure to discuss your plans and progress with your advisor.

Year, Semester	Course	Credits	Cumulative	Notes
Yr1, Fall	ASTR500	1	1	Must take ASTR503 <sup>1</sup>
	3 regular ASTR courses	9	9	
Yr1, Spring	ASTR500	1	2	
	3 regular courses	9	18	
Yr2, Fall	ASTR500	1	3	Or 3 courses, 9 credits <sup>2</sup> Required minimum 3 credits complete
	2 regular ASTR courses	6	24	
	ASTR598	3	3	
Yr2, Spring	ASTR500	1	4	Required minimum 4 credits complete Required minimum 33 credits complete
	3 regular ASTR courses	9	33	
Yr 3, Fall	ASTR600	8	8	Required minimum 6 credits complete <sup>3</sup> Not required, but recommended
	ASTR 601	1	1	
Yr 3, Spring	ASTR600	9	18	
Yr 4, Fall	ASTR700	9	9	
Yr 4, Spring	ASTR700	9	18	Required minimum 18 credits complete
Yr 5, Fall	ASTR700	9	27	
Yr 5, Spring	ASTR700	9	36	

(1) All students must take ASTR503 in the fall of their first year. See Section 7.1.1

(2) All students must take 3 credits of ASTR598 in either fall or spring of their second year. So students can take 6 regular credits + ASTR598 in fall and then 9 regular credits in spring, or vice versa. See Section 7.1.1

(3) Once a student had completed their Comprehensive Exam, they should start taking ASTR700 the following semester. See Section 7.2.2.

### 7.1 Course offerings and requirements

The Astronomy department offers a series of 3-credit, 500- and 600-level, Astronomy courses, which will provide you with much of the essential background needed for your research. You are also required to take 4 semesters of 1-credit ASTR 500 as a formal introduction to a career in science. In addition, you have the option of taking some classes in graduate programs other than Astronomy. All course selections should be made in consultation with your advisor and should be based on your research plans and career aspirations. If you take any undergraduate classes to supplement your background or address deficiencies, be aware that they will not count to your graduate degree course requirements. You should review any undergraduate course work with your faculty advisor. With this outline in mind, lets now consider the specific details of the academic requirements.

#### 7.1.1 Astronomy department courses

The full astronomy course catalog, with a description of each course is available at <https://catalogs.nmsu.edu/nmsu/graduate-school/astronomy-doctor-philosophy/>

The course numbers and titles for the regular graduate courses (501-597, 601-699) are as follow (all of the graduate classes are 3 credit classes except as noted:

- ASTR 503 Astrophysics
- ASTR 506 Dynamics and Hydrodynamics
- ASTR 535 Observational Techniques
- ASTR 545 Stellar Spectroscopy
- ASTR 555 Galaxies I
- ASTR 565 Stellar Interiors
- ASTR 601 These Proposal Preparation (1 credit)
- ASTR 605 Interstellar Medium
- ASTR 616 Galaxies II
- ASTR 620 Planetary Surface and Atmospheric Processes
- ASTR 621 Planetary System Formation
- ASTR 630 Statistical and Numerical Methods in Astrophysics
- ASTR 670 Heliophysics, Space Plasmas, and Space Weather
- ASTR 671 Solar Astrophysics
- ASTR 698 Special Topics

Note: ASTR 698 is usually made available as a 3-credit course, but may also be used for temporarily as counting from 1-9 credits on occasion.

The other ASTR courses that students take during the program are:

- ASTR 500 Seminar (1 credit)
- ASTR 598 Special Research Programs (1-6 credits)
- ASTR 599 Master's Thesis (for terminal Master's only, 1-15 credits)
- ASTR 600 Predissertation Research (1-15 credits)
- ASTR 700 Dissertation Research (1-15 credits)

The astronomy graduate courses are offered in *roughly* the following two-year rotation:

Year, Semester	Course
Year A, Fall	ASTR 503, ASTR 535, ASTR 565, ASTR 605
Year A, Spring	ASTR 621, ASTR 630, ASTR 670
Year B, Fall	ASTR 503, ASTR 555, ASTR 620, ASTR 698
Year B, Spring	ASTR 506, ASTR 545, ASTR 616

The courses that may actually be offered in any given semester are subject to change, in order to accommodate student interest, faculty leave, and other personal circumstances. Since NMSU policy requires that graduate classes have a minimum of 5 students per class, there is a possibility that some classes will not be able to be offered unless students end up distributed roughly evenly between the courses that are being offered. All first year students must take ASTR503 in their first semester, and select two from the other three. All second year students, who will have already taken ASTR503, should take the other three courses in the fall. Note all students will take a ASTR 598 for 3 credits sometime in their second year, and so will not be able to take all the taught courses that year. Discuss with your advisor the preferences of the courses that work best for you each semester.

At NMSU, all graduate students are required to register for a full set of 9 credits every semester in order to qualify for employment as a teaching assistant or research assistant. Students pay tuition according to the number of credits that they are enrolled in.

**Important as of 2023:** For students in their next-to-last semester, it is possible to only register for 6 credits and remain a "full-time" graduate student. This lowers your tuition costs.

For students in their last semester, it is sufficient to only register for 1 credit.

### 7.1.2 Out-of-department courses

Astronomy graduate students can (but are not required to) take up to two graduate level classes from departments other than Astronomy and have them count towards the degree requirement. Traditionally, these have been in the departments of physics, electrical engineering, or computerscience selected from the following list:

PHYS 462	Intermediate Electricity & Magnetism II
PHYS 511	Methods of Theoretical Physics I
PHYS 551	Classical Mechanics (4 credits)
PHYS 554	Quantum Mechanics I / PHYS 555 Quantum Mechanics II
PHYS 562	Electromagnetic Theory (4 credits)
PHYS 571	Advanced Experimental Optics (Lab, 2 credits)
PHYS 576	Advanced Comput. Phys.
PHYS 584	Statistical Mechanics
PHYS 590	Nuclear Physics
EE 528	Radiometry and Infrared Detectors
EE 577	Fourier Methods in Electro-Optics
CS 579	Introduction to Computational Science

Other courses, or courses offered by other departments such as Mechanical Engineering, Geology, or Math, are also viable as out-of-department courses (e.g., for those students intending to specialize in planetary science, courses taught in the Geology department and Geophysics courses taught in the Physics department could be considered). You should discuss with your advisor as to which, if any, out-of-department courses are required to meet the needs or your research interests. The NMSU Computer Science department offers some 400-level programming language courses. While these courses are generally offered at a level (< 500) below that required of our graduate students, taking these courses as an ‘extra’ course can be worthwhile since a lot of astrophysics research requires knowledge of a programming language. However these would not count toward the degree requirement.

## 7.2 Astronomy Ph.D. Degree Program

### 7.2.1 Summary of course and credit requirements

Program Element	Minimum	Year
ASTR 500 (Seminar) X 4	4 credits (4 semesters)	Yr1 and Yr2
ASTR “regular”graduate classes (501-597, 601-699)	33 credits (11 courses)	Yr1 and Yr2
Any two courses (6 credits) may be out of dept. graduate classes		
ASTR 598 (Special Research Programs)	3 credits	Yr 2
ASTR 600 (Pre-dissertation Research)	6 credits	Yr 3
ASTR 700 (Doctoral Dissertation)	18 credits	Yr 4 and Yr 5
Minimum Total Credits	64 credits	

Students *may* take two out-of-department classes to fulfill the overall credit requirements, if these classes are deemed by the student’s Committee to be appropriate to the student’s program-of-study. A maximum of one 3-credit course numbered between 450 and 499 can be applied to the out-of-department course/credit-hour requirement, and only with the approval of the student’s advisor and Committee. Otherwise, out of department classes must be at the 500 or greater level. If more than 6 credits of out-of-department classes are taken, they *may* potentially count toward the required total courses/credit hours, but only with the approval of the student’s advisor and Committee.

### 7.2.2 Research credits

Several different course numbers involve research credits: ASTR 598, ASTR 599, ASTR 600, and ASTR 700. ASTR 598 will be taken by each student sometime in their second year. It provides a formal introduction



to doing a research project. It may or may not involve research that subsequently develops into a thesis project. As the first research credits, it is important to try to carefully consider goals and expectations for ASTR 598 with your advisor, in particular, to make sure that it does not fall secondary to the (perhaps) more immediate demands of formal classwork, teaching etc. You get a grade in ASTR 598 just like in any other class. To assist in making a productive ASTR 598, there are formal guidelines that you will discuss with your ASTR 598 advisor. These include:

- setting up, within the first two weeks of the semester, a schedule with milestones
- making sure that the research project involves background research on the topic, and not just analysis of some new data, techniques, etc.; trying to “do research” without a background of why it is interesting and important often leads to problems later.
- requiring a written report and an oral presentation of what has been accomplished at the end of the semester. The oral report usually occurs as part of a Pizza lunch talk (see below) and the written reports may end up being very useful towards the development of a publication or thesis document

ASTR 600 and ASTR 700 credits are specifically for dissertation research. A student may take anywhere from 1-9 credits of these in a semester. ASTR 600 credits are taken before the thesis proposal is done, and ASTR 700 credits are taken after the thesis proposal is complete. Specific milestones/requirements for ASTR 600 and ASTR 700 should be discussed with your advisor.

ASTR500 is specifically for students who are working towards a terminal Masters thesis, rather than towards a Ph.D. dissertation.

### **7.2.3 Special cases and exceptions**

The above course requirements are intended for those students entering the program with a B.A. or B.S. and a typical background in Astronomy and Physics. Some students may have studied Physics or Astronomy at the graduate level at some other institution and / or will enter the program with an M.S. degree. In these circumstances, some of the specific course requirements might be waived upon concurrence of the student’s Committee. Students in this category must, before the end of their first semester with the department, establish a special set of course and credit requirements with their Committee.

Upon entering, some students might have deficiencies in their academic background which would require their enrollment in advanced level undergraduate courses to remedy these deficiencies. These background, or make-up courses, must be taken in addition to the basic course requirements of the department. That is, credits for these courses may not be used to satisfy any part of the course and credit requirements for the Ph.D. program.

### **7.2.4 Initial advisor and committee**

Upon entering the program, each student is assigned an advisor, usually matching the research interests of the student, if any have been expressed. There is no committment on the part of either the student or the advisor that this needs to develop into a dissertation advising role. The advisor serves as a formal point of contact for students to have with a faculty member, but students are encouraged to talk with every faculty members about potential research ideas. Students and primary advisors will meet regularly to carry out a mentoring plan and agreement (Sec.6.9), to make sure that both parties define, understand, and perform their roles and responsibilities. This should be a “living” agreement, as it may change as student and faculty interests and outlooks evolve. The secondary advisor provides an additional formal point of contact. Students and primary advisors will include the secondary advisor in a meeting at least once per semester, and in the Qualifying Exam (Sec. 7.3.1).

After completion of your coursework and CUMEs, a larger committee will be required for the oral comprehensive exam and the dissertation work. This will include three department faculty members and requires one “Dean’s representative” from outside the department. If you have taken some courses from outside the

department, you may have identified someone who can assist with this; if not, your advisor will help you to find a Dean's representative.

### 7.2.5 Academic probation

The NMSU Graduate School maintains specific policies about academic probation. Critically, any student with a cumulative graduate level GPA below 3.0 will be placed on some level of academic probation. Once on probation, a student must achieve a semester GPA of 3.0 to avoid going on academic suspension. In addition, there are strict restrictions on being able to take a full course load or being employed as a TA when on academic probation. **Note: This might need to be changed soon based on new policies.**

## 7.3 Departmental Examinations for Ph.D. Students

In successfully completing the program leading to a Ph.D. in Astronomy, a student will have been formally evaluated on three occasions. These three occasions also mark as essential and timely milestones, showing you are progressing through the 5-year program. In each case, paperwork must be completed by the student and advisor, and sent to the astronomy front office. These forms can be found at <https://gradschool.nmsu.edu/> (see under 'Current Students' – Graduate forms), or by contacting the astronomy front office. In order to complete any of these steps, a student must be registered in at least 1 credit hour during that particular semester. This is not a problem during the academic year, when you will usually be registered for 9+ credits. However, be aware that if you want to complete one of these steps during the summer semester you will have to register for 1-credit hour.

The three exams are listed here and discussed in more detail in the following subsections.

1. The first exam is the **Qualifying Examination**. This is an evaluation of the student's progress and generally involves a meeting with the initial primary and secondary advisors to discuss progress in the areas of cumes (see next point), classes, research, teaching, and outreach. Generally, if the student is making good progress then they are immediately advanced to Ph.D. candidacy, which means a slight increase in assistantship salary. The qualifying exam meeting should be completed during the **third semester** and always before December of the second year.
2. The second time is the **Comprehensive Examination**. This involves three portions: written cumulative exams (cumes), an oral classwork exam, and an oral and written thesis proposal.
  - (a) In place of a single written coursework comprehensive exam, the Astronomy department provides a series of monthly written "cume" exams. Students are required to pass five of these exams within four semesters (18 attempts), starting in the spring semester of the first year.
  - (b) After passing 5 cumes and completing required classes, students should immediately take an oral coursework comprehensive exam. It is always in the students' best interests to take this as soon as possible once standard courses are complete, while this material is still fresh in their head. The oral coursework part of the comprehensive exam should be completed as soon as possible after the fourth semester, and always by December of the third year.
  - (c) As the final part of the Comprehensive Examination, students present a written thesis proposal to their Committee, and an oral thesis proposal to the whole department, followed by a discussion with their Committee. The thesis defense part of the comprehensive exam should be completed as soon as possible after the oral coursework, and always by the **end of the third year**.
3. Third, upon final completion of all dissertation work, the student undergoes a **Final Dissertation Examination**. This consists of the submission of a written thesis to the Committee, and a colloquium presentation of the thesis work to the department, followed by a meeting with the thesis Committee. The final examination should be completed within two years of completion of the comprehensive exam, with a **goal of May of the fifth year, and always by December of the sixth year**.

### 7.3.1 Qualifying Examination

The intent of the Qualifying Examination is to determine whether it is in the best interest of the student to proceed with graduate studies in astronomy. The Department of Astronomy does not give an explicit or formalized qualifying exam. In place of such an exam, the department substitutes an evaluation of the student by members of the faculty. This evaluation of the student can normally be made following the completion of at least 12 credit hours of graduate-level course work. The Qualifying Exam must be successfully passed by all students wishing to pursue a Ph.D. in Astronomy. The student's primary and secondary advisors will assess the student's academic record, interest, ability, enthusiasm, research efforts, teaching efforts, and performance on the cumulative examinations (see below). A minimum of two 'passed' cumulative exams is expected in order for a 'PASS' on the Qualifying exam to be achieved (although meeting in the third semester trumps this requirement). Hence, this qualifying exam evaluation will be, in part, based upon the assessments of other members of the faculty.

The goal is to provide an opportunity for the student to receive feedback (as well as perform some self-assessment) on all aspects of our graduate program, allowing for discussion of what aspects are working well as well as areas for additional progress, and for the latter, laying out some near- and mid-range goals and developing an actionable plan as a group to help you achieve those milestones.

As for how to prepare, students certainly don't have to prepare anything formal like a written document. At a minimum, it would be worth taking another look at this section of the Department Handbook to remind yourself of the various milestones throughout the graduate program. Think about reflecting on these areas in a "self-assessment" way, i.e., being open to discussing your strengths, areas for improvement, accomplishments, and goals as related to those core elements of our graduate program.

The student's primary and secondary advisors will make a recommendation as to whether or not the student is qualified to proceed with additional Ph.D. studies. If passed, the student and the Graduate School must be notified (i.e., the student will be regarded as having "passed" their qualifying exam) by completion and submission of the appropriate paperwork through the astronomy front office. This will be handled by the student's supervisor. If the faculty judge it to be in the best interest of the student, they may recommend that Ph.D. graduate studies in Astronomy be discontinued. In cases in which the student's performance is judged to have been marginal, the faculty may require and administer further written or oral examination of the student.

Within one week of the Qualifying Examination, the student's primary and secondary advisors will always recommend that either:

1. The Graduate School be notified that the Qualifying Examination has been passed and the student's Ph.D. program of study be filed with the Graduate School; or
2. The decision as to the student's qualification be delayed or deferred one semester; or
3. The student be classified as having NOT passed the qualifying examination.

In all cases the student shall be informed of the recommendation, preferably at the end of the Examination itself, and always within one week of the examination. In the last two instances, the student may ask that the entire faculty, as a whole, to review the decision of the student's primary and secondary advisors. This request should be submitted to the Department Head within one week of the notification above.

*Graduate School forms:* At the conclusion, the advisor will complete the "Doctoral Qualifying Examination" form available at <https://gradschool.nmsu.edu/>, or by contacting the astronomy front office) and submit the completed form to the astronomy front office.

### 7.3.2 Comprehensive Examination

The Comprehensive Exam consists of three portions. The first, written, portion is given in the form of cumulative exams (see below). To satisfy the requirements for the written portion of the comprehensive

exam, the student must pass five cumulative examinations. After this, the student shall move onto the second, oral, coursework examination. The third component is a thesis proposal. All these components shall be completed by the end of the third year in the program.

### **Part 1: Written comprehensive cumulative “cume” exams**

The faculty will administer nine written examinations (hereafter, CUMES) during each academic year: four in the fall semester and five in the spring semester, on a  $\sim$  monthly basis. Typically, these are given on Friday mornings throughout the semester. Students will begin to take the CUMES starting in their *second* semester, i.e. beginning in January of their first year. Students must pass five CUMES by the end of their fifth semester, i.e., pass 5 out of 18. Once five CUMES have been passed, students no longer need to take any further CUMES. If the student does not pass five CUMES on this timescale, then the faculty, as a whole, will meet and decide between the following two options:

1. The student will be given a one semester extension to pass the remaining exam(s).
2. The student will be considered to have failed the comprehensive exam.

A student will not be permitted to attempt more than 18 CUMES, unless provided permission from the faculty as a whole. A student will not be permitted to take the remaining parts of the comprehensive exam until five CUMES have been passed.

Students entering the program with a Master’s degree may petition the faculty, as a whole, to start taking CUMES during their first semester, but they will still be required to pass 5 out of their first 18 exams.

Each CUME will be written by a single faculty member, with specific input from a second faculty member, and with the faculty as a whole given an opportunity to provide additional input. All faculty will be notified, at the beginning of the semester, as to which CUME they will write and administer. Generally, students will not be notified in advance of who is administering any exam. The content of the exam is at the discretion of the faculty, but typically the CUMES are related to a short paper from the astronomical literature that is distributed with the exam, to test the ability of students to put the content of the paper into context, i.e., to understand the background of the subject, to be able to follow calculations and discussion in the paper, and to be able to discuss and work problems on related topics. These exams are designed to test a student’s knowledge of the literature, the student’s academic and research background, and the student’s ability to understand and deal with what may be unfamiliar material. At least some of the material on the exam will be related to core material discussed across the graduate curriculum.

When the CUME is based on a research paper, that paper will be made available to students 30 to 60 minutes before the beginning of the exam, to provide time for the students to read it and have a chance to think about the subject before starting the exam. During this reading time (and during the exam time), no other resources can be consulted, including web resources, discussion with other students, formulae in calculators, etc.

The CUMES will be graded by the faculty member who developed the exam, with some degree of grade checking by the independent secondary faculty member, and with the faculty as a whole given an opportunity to provide additional input. Exams are graded on a numerical scale, and the faculty member may identify the critical grade needed to achieve a pass on the exam. As far as completion of the five exams is concerned, students may be provided the numerical score or may only be informed if they have passed or failed.

The cume results will be delivered to the students within 2 weeks of the exam date in most cases.

CUME Review: The faculty member administering the current CUME will hold a review of the exam typically 1 week after the exam was taken (the following Friday) under most circumstances. The results will likely not be known at this time, which is fine. It is strongly recommended that students attend the review, as it will build their skills in identifying how to properly approach CUME-type questions, and learn new material.

Excused CUMES: There are only 2 permitted reasons to miss a CUME: (1) a personal or family emergency or

illness; (2) professional travel (conference, meeting, etc.). In this case, the student will notify the Department Head in advance, who will then make arrangements with the CUME giver to administer the exam either ahead of time or after the scheduled exam.

All other absences are considered unexcused and will result in a failed cume (not a missed cume).

### **Formation of a dissertation committee**

Once a student has passed five cume exams, it becomes the student's responsibility to immediately form a Dissertation Committee and set a date as soon as possible to complete the next two components. Once a Dissertation Committee is formed, the designations of a student's initial primary and secondary advisor are removed and the Dissertation Committee will thereafter oversee the student's progress toward a degree. As a matter of continuity, frequently, but not always, the initial advisor will become the Chair of the new Dissertation Committee (and so continue to act as the student's advisor) and the secondary advisor will be one member of the Dissertation Committee.

The Chair of the Dissertation Committee will be the Chair for all the subsequent examinations (oral comprehensive, thesis proposal, and final examination), as well as acting as the principal advisor for the dissertation research. The Dissertation Committee shall consist of at least three members of the Astronomy faculty (including the Chair) plus one Graduate Faculty member from another NMSU department. Selection of those faculty members to the Dissertation Committee requires careful thought on the part of the student and advisor, and requires approval by the advisor. An NMSU Graduate Faculty member from outside the department is required to be on the the Dissertation Committee to serve as the official Dean's representative. Often this is a faculty member outside the department with whom students might have taken a class; if you don't know anyone outside the department, your advisor shall assist with finding someone. External astronomers, with a Ph.D, from outside NMSU are also frequently nominated by the candidate for membership on the Dissertation Committee; the chairperson of the Dissertation Committee has the responsibility of approving such individuals following the guidelines established by the Graduate School. Any external-to-NMSU Dissertation Committee members do not replace NMSU dissertation committee members.

All members of the Dissertation Committee must be member of the Graduate Faculty. It is the responsibility of each faculty member to retain their membership on the Graduate Faculty. These are generally 3-year appointments, and can mostly be renewed within 1 month. It is the responsibility of the advisor, working through the Department Head, to obtain Graduate Faculty membership for external-to-NMSU members. This is a longer process, which can take 3 months to complete. Details on how to apply to become a member of, and renew membership of, the NMSU Graduate Faculty are available at <https://gradschool.nmsu.edu/> (see under 'Faculty and Staff' – Obtaining Faculty Status), or by contacting the astronomy front office. Details on names and contact information for all current members of the Graduate Faculty, including the end date of their current term can be found under 'Faculty and Staff' – Graduate Faculty Directory) at that same page.

### **Second and third components of the Comprehensive Examination**

The remaining two components of the Comprehensive Examination will be taken as soon as possible once

- the student has completed 40 credits at the end of their second year (i.e., after completion of 11 standard courses, 1 X ASTR598 and 4 X ASTR500), and
- the first component is complete (i.e., 5 cume exams have been passed).

It is the obligation of the student and advisor to set the dates and times of the second and third components satisfactory to all concerned (and the date of the Colloquium must be coordinated with the Colloquium Coordinator, see below). These second and third components will usually occur in order, with the Oral Coursework Examination second (always by December of the third year in the program) and the Thesis Proposal third (always by May of the third year in the program).

If the student wishes to take the second and third components in reverse order, they must obtain written permission from their advisor, Committee, and the Department Head before completing either component.

If the committee views both the Oral Coursework Examination and Thesis Proposal as satisfactory, then the student will continue with their Ph.D. If two or more committee members believe either component is inadequate, the decision may be postponed and the student may be asked to repeat that component at another meeting of their Dissertation committee. Alternatively, students may be advised to not continue with the program.

## **Part 2: Oral Coursework Examination**

The members of the Dissertation Committee will meet with the student to ascertain their knowledge of factual material, techniques, theory, and methods in Astronomy that were taken in the first two years of courses. The exam will be oral, and is expected to predominantly cover classes that the student has taken in the program, but can include any core Astronomy material. The level of difficulty, the nature of the subject material, and the duration are up to the individual members of the Committee.

## **Part 3: Thesis Proposal**

The student will prepare a written outline, anywhere from 10-20 single-spaced pages (discuss expected length with advisor), of proposed dissertation research and send this to the Dissertation Committee at least one week prior to a colloquium. The student will then present a colloquium to the entire Astronomy department on the topic of their thesis proposal. The colloquium will include a discussion of previous research in this field, planned observations or theoretical calculations, scientific goals, the impact of this research on the field, and a 2 year timeline for the completion of the Ph.D. thesis. The student will describe the proposed research in sufficient detail so that the committee members will be able to judge the appropriateness of the proposed research. Following the colloquium, the student will be questioned by the Dissertation Committee concerning detailed background knowledge of the dissertation subject, and observational or theoretical techniques. The student will be strongly encouraged to take the 1-credit ASTR 601 "Thesis Proposal Preparation" course in the first semester of their third year.

## **Award of a Master's in Astronomy**

Upon successful completion of all portions of the Comprehensive Exam, a student is eligible to receive a Master's of Science degree in Astronomy while progressing onto their Ph. D. To be awarded this Master's degree, the student shall complete an "Application for Degree" document, and an MS "Program of Study" document which will not include any ASTR 600 credits the student might have previously earned. The completed documents, along with a memo requesting the Master's degree from the advisor, should be completed by the student and advisor and sent to the astronomy front office.

*Graduate School Forms:* The formal completion of the Comprehensive Exam occurs when all three portions of the Comprehensive Exam are completed and passed. In most cases, this means it will be the formal completion of the Thesis Proposal that is registered with the Graduate School. **In order for this to be accomplished, the Graduate School must be notified about the date of the Thesis Proposal colloquium at least 10 days before it occurs. All forms must be completed by the advisor and student, and sent to the front office, in advance, so that the Graduate School can send out the necessary paperwork for signatures at the end of the third component.** This includes a "Program of Study and Committee for Doctoral Students" and the "Doctorate of Philosophy Examination Form" both available at <https://gradschool.nmsu.edu/> (see under 'Current Students' – Graduate forms), or by contacting the astronomy front office. It is the responsibility of the student and advisor to ensure the Dean's Representative has received the necessary voting forms from the Graduate School prior to the Thesis Proposal.

### 7.3.3 Final Dissertation Examination

In the Department of Astronomy we expect a Ph.D. candidate to complete their thesis research within 2 years of the completion of their Comprehensive Examination. Sometimes it benefits a student to take longer, for example, they have an NSF graduate student fellowship that runs for another few months, or they have a final project they would like to publish. Sometimes a student has personal issues that delayed their progress at some stage. On the other hand, sometimes a student has professional (an exciting new job) or personal issue that can push them to submit early. In all cases, it is the responsibility of the student and advisor to discuss the best timeline, to be completed no later than December of the sixth year. Any delays beyond that date shall only be permitted with consent of the Dissertation Committee and Department Head. Officially, the Graduate School permits for up to 5 years to successfully defend their dissertation after successful completion of the Comprehensive Exam.

The Dissertation Examination will consist of an approximately hour-long colloquium presented to the entire department followed by a second hour or more of examination by the committee. At the conclusion, the Dissertation Committee will then vote to pass, fail, or adjourn. The Dean's Representative will submit their paperwork.

*Graduate School forms:* The candidate will schedule a final oral colloquium for the Department, with the examination by their committee following immediately after the colloquium. The date of the colloquium should be coordinated with the Colloquium Coordinator (see below). It is the obligation of the student and advisor to set the date and times of the Dissertation Examination as satisfactory to all concerned (and the date of the colloquium should be coordinated with the Colloquium Coordinator, see below). The student will provide copies of the dissertation to all members of their Dissertation Committee at least three (3) weeks prior to the scheduled final examination. If the content is acceptable to the Committee, the Ph.D. candidate will work with the advisor to submit the appropriate forms to the Graduate School. **In order for this to be accomplished, the Graduate School must be notified about the date of the Final Dissertation Examination at least 2 weeks before it occurs. All forms must be completed by the advisor and student, and sent to the front office, in advance, so that the Graduate School can send out the necessary paperwork for signatures at the end of the Dissertation Examination.** This includes a "Program of Study and Committee for Doctoral Students" and the "Doctorate of Philosophy Examination Form" both available at <https://gradschool.nmsu.edu/> (see under 'Current Students' – Graduate forms **Note: This may go away and be done automatically on their end with Star Audit.**), or by contacting the astronomy front office. The student should also obtain, and complete, the Doctoral Dissertation Title Submission form (see below for submission of this.) It is the responsibility of the student and advisor to ensure the Dean's Representative has received the necessary voting forms from the Graduate School prior to the Thesis Proposal. The advisor must also complete and submit the "Report of Final Thesis / Dissertation Grade" form available by logging into <https://my.nmsu.edu/> (see under 'Faculty' – More – Faculty Menu)

A handy summary table of the above milestones, requirements, and action items can be found in Appendix A in Table A.

## 8 Master's Degree Program

This section details the process for students who wish to pursue a terminal Master's. For those students who will get their Master's on the way to a Ph.D., refer to Sec 7.3.2. Some students may elect to pursue a Terminal Master's degree rather than a Ph.D. upon the advice of their advisor or committee. The rules for graduating with Terminal M.S. are outlined below. For the Terminal M.S. degree in Astronomy, the student must satisfy the requirements of the department as well as those established by the Graduate School. The department requires a minimum of 33 credit of which six are generally for Master's Thesis research. Under some exceptional circumstances, the thesis requirement may be waived, in which case the credit requirements must be satisfied in formal course work. Such a waiver requires agreement by both the student's committee and the Department Head. In all cases, the student seeking a Terminal M.S. degree must pass a final oral examination covering course and any relevant research work.

### Course Requirements

The minimum course requirements for a Thesis MS will include:

ASTR 500 (Seminar) X 3	3 credits (3 semesters)
ASTR "regular" graduate classes (501-597, 601-699)	21 credits (7 courses)
Any two course (6 credits) may be out of dept. graduate classes	
ASTR 598 (Special Research Programs)	3 credits
ASTR 599 (Pre-dissertation Research)	6 credits
Minimum Total Credits	33 credits

For a student who has been approved to pursue a Coursework-only MS Astronomy degree, the minimum course requirements are:

ASTR 500 (Seminar) X 3	3 credits (3 semesters)
ASTR "regular" graduate classes (501-597, 601-699)	27 credits (9 courses)
Any two course (6 credits) may be out of dept. graduate classes	
ASTR 598 (Special Research Programs)	3 credits
Minimum Total Credits	33 credits

Upon making a decision to pursue a Terminal M.S. degree, the student will form a Master's committee. In selecting a Master's committee, the student will first find an advising professor who will act as Master's committee chairperson for the final oral examination, as well as being the principal advisor in the thesis research. The Master's degree committee must consist of at least two members of the Astronomy department faculty plus one Graduate Faculty member from another NMSU department. Selection of a faculty member as a member of the Master's committee requires careful thought on the part of the student, and approval by that faculty member. The student and advisor will obtain a Graduate Dean's Representative, who will be appointed to the Master's committee by the Dean of the Graduate School. In almost all cases the out-of-department NMSU faculty member on the Master's committee will serve in this Dean's Representative role. All committee members must be a member of the NMSU Graduate Faculty. The student is encouraged to consider a committee greater in number than the minimum requirement described above.

Upon completion of the thesis, the student will schedule a final oral examination by their committee. The exam will include a public presentation of the research conducted for the Thesis. It is the responsibility of the student to schedule this exam on a day and time that is satisfactory to all members of the committee. The student will provide copies of the thesis to all members of his/her committee at least three (3) weeks prior to the scheduled final examination. If the thesis content is acceptable to the Master's committee, the student will then submit the appropriate exam scheduling forms to the Graduate School for the Final Oral Examination at least two weeks prior to the scheduled exam date. The final oral examination for the M.S. will include questions related to the thesis research, and can also address basic principles addressed in the student's coursework. The Master's committee will then vote to pass, fail, or adjourn. If the committee votes to adjourn, the exam must reconvene within three (3) weeks of final decision.



## 9 Student Financial Support

The faculty as a whole is proud to find financial support for all of our graduate students throughout their time in the Astronomy department. Most of our students are NMSU graduate assistants, where the assistantships can either be teaching assistantships (funded by the state) or research assistantships (funded by grants). A student is considered funded as a base level if they receive total compensation that matches or exceeds the equivalent of 20 hours/week for the full year. This may be a TA, RA, or fellowship. Often students fellowship are more than the standard TA or RA, and on occasion can be awarded on top of salary.

### 9.1 Graduate-student union

In early 2023, NMSU and the United Electrical, Radio and Machine Workers of America (representing the graduate workers) reached an agreement. One of the primary benefits that came out of the negotiations is 2 credits of tuition remission. From the agreement:

NMSU will guarantee a base level of scholarship of at least \$650.00 or two (2) credit hours of tuition (including differential tuition for nursing and engineering) and Required Fees (not including additional fees), whichever is greater, per semester per student to all bargaining unit members holding an assistantship or combined assistantships of 0.50 FTE or higher, prorated for those with less than a 0.50 FTE or combined FTE. This base level scholarship will be provided each Fall and Spring semester subject to budgetary constraints.

For the most updated information, and to read the agreement in detail, visit <https://gradschool.nmsu.edu/ga-and-union/collective-bargaining-agreement.html>.

### 9.2 Financial planning

Students and advisor should discuss financial support early in the program, and frequently throughout their time at NMSU. The advisor is your primary means of obtaining an RA, requesting a TA, getting tuition and health care reimbursements, and winning an external fellowship. It is student's responsibility to plan, in collaboration with their research supervisor, how dissertation research will be funded. The best approach is to identify a faculty member with grant support performing research in an area of interest to you. Begin working on a project with this faculty member (via ASTR 598 or 600) and demonstrate your abilities in this research. Under the best circumstances, a dissertation proposal will emerge from this research and the faculty member will already have an RA in place, which they will offer to you. Thus, it is important to identify a project which is of common interest to you and a professor, and that project should be supported by a grant.

However, students should always feel free to discuss research and funding with any member of the faculty, as the assignment of primary advisor for research is not set until the thesis proposal is written. At that time, it is expected that the student and advisor will have created a financial plan that will fund the senior years in thesis research. Critically, since TA support is not available during the summer, students and advisors must confirm their summer support with each other early in the spring semester each year.

### 9.3 Webber Fellowships

The William Webber Voyager Graduate Fellowships were established in 2015, enabled by a generous gift from William and Barbara Webber. The late Dr. Webber performed prolific research in residence at NMSU for several decades, after his previous retirement from the University of New Hampshire. Much of his work is related to cosmic rays and the heliosphere, and he had been deeply involved in the extended mission of the Voyager spacecraft. The Fellowships were established to support the excitement of discovery, for example, as experienced by Dr. Webber as part of his involvement with the NASA Voyager mission. The fund enables the department to issue significant cash awards to students in their first two year to help the department to attract and retain top-quality students. Students usually use these funds to pay for relocation to NMSU,

and tuition during their first two years. The Department Head has discretion as to the number and amount of awards.

#### **9.4 Student success funds**

The college provides some funds to the Department Head to enable Student Success. These are dedicated to support students in financial hardship, and often are awarded as tuition payments, or health insurance reimbursements. They can also be provided as professional membership to the AAS, or travel support. Student requests for Student Success funds should be directed through their advisor, which will work with the Department Head to discuss what types of assistance can be provided on a case-by-case basis.

#### **9.5 Tuition and health insurance**

\*As of 2023, two credits of tuition are provided by the university, as discussed in the Collective Bargaining Agreement.\* At NMSU, tuition remission is not made routinely available, so students are held responsible for paying tuition costs. In their first and second years, these are commonly covered by the Webber fellowship payments. In senior years, these are often covered by an advisors research grant, a fellowship, NASA Epscor, or other source. Students should discuss their health insurance needs with their advisor; there are options to purchase healthcare on a state plan and often these costs are reimbursable depending on the specific grant or fellowship funds, or by requesting to the Student Success funds (see above). Sometimes students find better insurance options, with lower deductibles, from a parent or spouse and in these cases the costs are not reimbursable.

The faculty as a whole take pride in always including tuition payments and health insurance reimbursements in all external proposals (excepting those rare occasions where it can be explicitly forbidden). Everyone in the department strives to work with all relevant parties to provide for a good stable solution to normalizing tuition reimbursements and health insurance for our graduate students.

#### **9.6 Residency**

So long as you are employed as a graduate assistant, you are eligible for NMSU in-state tuition. However, there have been some issues in the past with getting in-state tuition if you are on an external fellowship. Because of this, all students should establish and apply for NM residency during their first semester. Instructions for how to do so can be found at <http://registrar.nmsu.edu/residency>.

#### **9.7 Graduate assistantships**

NMSU graduate assistantships can be awarded for either teaching (TA) or research (RA). The NMSU graduate assistantships formally cover 20 hours of work per week during the academic year. During the summer, when students are supported as RAs, there is more flexibility in the amount of pay that can be offered, up to 40 hours per week). The summer hiring level more often varies because of grant funding availability from an advisor. It is common for first and second year students to be supported as TAs, with more senior students supported as RAs, but exceptions to this often occur depending on a number of different circumstances, including student needs, advisor funding levels, admissions offers, etc. Funding flexibility is a very real part of academic life, and so everyone works within the framework of available resources. This can lead to different conditions for different people.

##### **9.7.1 Teaching assistantships**

Teaching Assistantships are provided to the department by the College and the Graduate School. The Department Head will assign TAs to each faculty and class sections, based on schedules, and when possible, faculty and student preferences. Because of different teaching styles and course requirements, there is no guarantee that the nature of all TAs will be equal for all students. Student and faculty shall discuss the expectations for each course at the start of the semester, complete a TA contract document, and meet

frequently throughout the semester to change these if needed, and to ensure these expectations are being adhered to. As noted above, there is a significant responsibility associated with being a TA, which can include teaching, grading components, and mentoring in classes. If you cannot meet these responsibilities, you may not be offered a TA position in subsequent semesters, which can have significant implications for financial support.

### **9.7.2 Research assistantships**

Research Assistantships generally comes from externally-funded research grants that have awarded to individual faculty. These are written by faculty to funding agencies and so are awarded with specific expectations of work that must be accomplished with the funding. Often these project align well with a students's thesis proposal, and so there is a natural fit between the grant and the student. It is extremely important that students take their responsibilities as grant-funded RAs seriously. Not only are you being supported by public funds to accomplish research, but the ability of faculty to continue to be successful in obtaining future grants depends strongly on their ability to demonstrate success, as measured by concrete deliverables like papers, on previous grants.

### **9.7.3 Other funding opportunities**

There are multiple opportunities for students to apply for independent funding, as well as some funding fellowship opportunities that the faculty can apply for on your behalf. Students should identify and discuss these with their advisor, and are strongly encouraged to be aware of, and apply for, all independent funding opportunities when they are available. Some of these include NSF graduate research fellowships, NASA student fellowships (e.g., NESSF, ASTAR), and NM Space Grant Consortium opportunities. Obtaining independent funding frees you to work on the specific research you proposed to do, and frees up otehr TA and RA funds available for other students. In come cases, NMSU may first deduct the tuition associated with the period of the fellowship, and make the remainder available to the student. The faculty as a whole attempts to take advantage of all award opportunities it is aware of for eligible students. Some of these awards may require that a FAFSA financial aid document be completed and made available to the award-providing office. Thus, all students are encouraged to complete and submit a FAFSA document at the start of each calendar year.

## **10 Department Personnel**

We have a large, thriving deparment consisting of eleven tenured or tenure-track faculty, three emeritus professors, about a dozen research associates and postdoctoral assistants, two professional office staff, nearly forty Observatory staff, and several dozen graduate students in the Astronomy department. In total we have over 100 personnel all working to further our understanding of the Universe. In addition, there are many adjunct faculty from various other institutions who are affiliated with the department, and we typically have numerous visitors throughout the year. This provides the diversity of atmosphere we value, giving students lots of chances to talk with any and all of them on a regular basis.

The faculty are here to help you through your course work and to advise you on your research. The names and research areas of the faculty are listed below. If you have an interest in one of the research areas of these individuals, seek them out, begin discussions about their research field, and identify possible research areas.

Joe Burchett	Assistant Professor	Gas around galaxies, Galaxies
Nancy Chanover	Professor APO 3.5m Director PI of PDS Atmospheres Node	Planetary Atmospheres, Instrumentation
Chris Churchill	Professor	Quasar Absorption Lines, Intergalactic Medium
Kristian Finlator	Associate Professor	High redshift galaxy evolution, Hydrodynamic simulations
Jon Holtzman	Professor	Stellar Population, Star Formation, Instrumentation
Jason Jackiewicz	Professor, Department Head PI SONG in NM	Helioseismology, Solar Physics, Asteroseismology
Wladimir Lyra	Associate Professor	Planet Formation, Computational astrophysics
James McAteer	Professor Sunspot Solar Observatory Director	Solar physics, Heliophysics, Space weather, Instrumentation
Eric Nielsen	Assistant Professor	Extrasolar planets, Direct planet detection
Moire Prescott	Associate Professor	High redshift galaxy formation, Lyman alpha structures
Juie Shetye	Assitant Professor	Solar physics, Chromosphere

## 11 Facilities

### 11.1 The Astronomy building

Your primary base of operation will be the Astronomy Building on the campus of NMSU. All students are assigned an office, and given keys to their office and the outside doors.

The mailing address, to receive regular mail is:

*Yourname*, Department of Astronomy, Box 30001, MSC 4500, New Mexico State University, Las Cruces NM 88003

The shipping address, to receive orders, books, etc. is:

Department of Astronomy, 1320 Frenger Mall, New Mexico State University, Las Cruces NM 88003

The astronomy department will be your home for the duration of your time in the program. Please treat it with care and respect. Eacy year we take care to reconsider our office spaces, clean up any clutter, and remodel as needed in order to keep our building looking good for years to come. Everyone has to take responsibility for building security. After 5:00 pm and on the weekends, the Astronomy Building must remain locked. In these off hours, please close and lock the library and computer room doors before leaving the building. Your care and attention to building security will help to prevent any loss of personal or department property. Get to know the astronomy support staff; Riah, our Administrative Assistant, Lydia, our Office Accountant, and Zach, our lab manager and IT support. They will be your front line support during your entire time at NMSU.

There are several other rooms in the Astronomy Building with which you should become acquainted. The Astronomy Conference Room is Room 119; it is the site of almost all graduate Astronomy classes, seminars,

and examinations. It has a touchscreen projector, with inbuilt video, microphone, external audio, and a secondary external video. The copying machine is located in Room 116 (across the hall from the department office). Across from the mailboxes is the coffee and snacks room. The primary computer facilities for the department are located in Room 118.

There are several other buildings in close proximity to Astronomy with which you should also become familiar. The science library is in Branson Hall, just to the north of the Astronomy Building. You should acquaint yourself with the Astronomy book and periodical collections there on the third floor. The Frenger food court is just east of the building, and the main Zuhl library is just beyond that. The Corbett Student Union has some other food options and offers general student area with several services.

Our regular undergraduate classroom (including labs) and colloquium room is Biology Annex 102 (BX102). The Biology Annex is located immediately opposite the Astronomy building, to the south. Most of the lab equipment is located in the auxiliary room in the back of BX 102. If you are employed as a TA, you should get a key to BX102 from the astronomy front office. BX102 has a projector accessible from the computer or a laptop. You log into the computer system using your NMSU username and password. It also has an audio system to broadcast sound, and a video and microphones in the ceiling. Familiarize yourself with usage of the equipment before your first day of planning to run a lab or make a presentation. A key to the projection cabinet is usually kept inside the auxiliary storage room in BX102, hanging on the light switch.

#### **11.1.1 Department reading room and visitor office**

The astronomy department maintains a small library in Room 207, which includes a copy of all previous dissertations of department graduates, CUME exams, and both graduate and undergraduate textbooks. This gets used for smaller meetings, as a visitors office, and as a study space, so please respect the multiple uses of the space. You can reserve it by contacting the astronomy front office. Some recent astronomical journals, recent preprints of papers from institutions around the world can be found in the department reading room. Older issues of most of the science journals can be found in the Branson Hall Library. Finally, star and galaxy atlases, the Palomar Sky Survey, and the ESO Southern Hemisphere Survey can also be found in the library. Books and older journals can be checked out of the department's reading room using the check-out sheet. However, new journals are not to be removed from the library except for copying. This should be done quickly and the journal should be returned promptly.

#### **11.1.2 NASA Planetary Data System (PDS) Planetary Atmospheres Node**

The astronomy department is home to NASA's Atmospheres Node of the Planetary Data System, which means we host data from space missions involving planetary atmospheres and provide access to it to the general community. The PDS node has an office in the middle of the building upstairs, four permanent staff members and a number of student staff members.

#### **11.1.3 Observatories offices**

Some staff from Apache Point Observatory and Sunspot Solar Observatory also have offices in the Astronomy department on campus.

### **11.2 Observatories**

NMSU operates the Apache Point Observatory and Sunspot Solar Observatory located in the Sacramento Mountains east of Las Cruces, about a two hour drive away. These sites are home to five telescopes:

- the [ARC 3.5m telescope](#)
- the [Sloan Digital Sky Survey \(SDSS\) 2.5m telescope](#)
- the [NMSU 1-m SONG in New Mexico telescope](#)

- the [ARCSAT](#) 0.5m telescope
- the [Dunn Solar Telescope](#)

In conjunction with these, we operate the Astronomy Visitors Center at the Sunspot Solar Observatory. These are great facilities for possible research projects; they provide resources that are not commonly available in graduate programs. Take some time to learn about their capabilities via information on the web and/or by talking with faculty and other students.

### 11.2.1 ARC 3.5-m telescope

The 3.5m is scheduled on a quarterly basis. NMSU owns 15.625% of the time, in proportion to its contribution to the operations costs, split between bright and dark time. The time is allocated internally in the department, but is scheduled by the ARC 3.5m management team. Since advance time is needed for both the allocation and the scheduling, NMSU proposals are generally due early-mid month of November (for Q1), February (for Q2), May (for Q3), and August (for Q4): you should receive email soliciting proposals a few weeks before these deadlines. If you have any interest in the 3.5m telescope and certainly if you ever plan to propose for time, you should [subscribe](#) to the [apo35m-general](#) email list (it does not generate a lot of traffic!). This is how the telescope schedules are distributed, and, if you are successful in proposing for time, how you will find out when time has been scheduled.

Proposals are welcome from anyone associated with the department: faculty, staff, APO staff, postdocs, and graduate students. There is no guaranteed time for any of these constituencies. If there is oversubscription for the time in any given quarter, proposals are evaluated and time allocated by the [Observatories Committee](#). The criteria for ranking proposals include, but are not limited to: quality of the research proposal; success of previously awarded (in particular, as judged by publication); importance of proposal towards completion of a dissertation; and importance of proposal towards funded research or funding proposals. The balance between these is determined by the Observatories Committee and may evolve with time. There is a [user wiki](#) for the telescope where users are encouraged to share information about the telescope and its instruments. This can be read by anyone; if you wish to post to it, you need to [register](#) for an account. Much of the use of the ARC 3.5m telescope is performed by remote observing, through an interface called [TUI](#). Observers must be certified before they are allowed to observe remotely; certification involves learning how to use the telescope and understanding how it works, with a minimum of 3 nights on site. We train and certify all of our graduate students through an observing run done in conjunction with the ASTR 535 class.

### 11.2.2 SDSS telescope

The [SDSS](#) project conducts several survey projects, and all department members have access to the survey products and to collaborations with the large SDSS community. The department and University have invested a significant amount to participate in these projects, and all members of the department are encouraged to take advantage of this participation.

### 11.2.3 Dunn Solar Telescope

The [DST](#) conducts both synoptic and PI studies of the Sun on behalf of the Sunspot Solar Observatory. About 25% of observing time is available for anyone members of the department: faculty, staff, APO staff, postdocs, and graduate students. It also hosts innovative instrumentation opportunities and coordinated observation with NASA and NSF facilities.

### 11.2.4 Other APO telescopes

The NMSU 1-m SONG telescope and the [ARCSAT](#) provide additional opportunities for research projects.

## 11.3 Campus Observatories

### 11.3.1 Tombaugh Observatory

The Tombaugh on-campus observatory is located next to the large student parking lot and neighboring running track just off of Williams Street. The observatory is mainly used for our undergraduate labs and other public viewing events. Every student is trained and checked-out on the equipment at the beginning of their first semester. Some online instructions can be found at <http://astronomy.nmsu.edu/astro-wiki/doku.php?id=wiki:user:tombaugh>. There is a separate key for the observatory domes. Inside the dome, you can find another key hanging up that can be used to open the gate.

### 11.3.2 Tortugas Mt. Observatory

There is a 24" telescope in a dome on the north peak of Tortugas Mt that is readily visible from town (See the large white 'A', east of campus). This observatory was used extensively for several decades since its construction in the 1960s, especially for planet monitoring purposes. It was brought back into service as a remote, robotic telescope in 2010, in collaboration with the American Association of Variable Star Observers, and also hosts our live streaming social media events several times per year.

## 11.4 Computing resources

All students can have a basic computer workstation or personal laptop on their desk. The computers usually run the Linux operating system (specifically, the RedHat/CentOS flavor of Linux). All computers are networked and there are central servers that host accounts and disks. As a result, if you have a department account, you can log onto any of the department computers; there are not individual accounts for individual machines.

Your computer provides basic computer services like editing of files, web access, email access, image display, plotting, and the capability to compile and run basic programs. Many basic programs are installed either on each individual system, or centrally on the server disks, and thus accessible to all machines. However, the desktop computers are probably not optimal for significant computing.

When you require significant computing resources for your research (e.g. more powerful/faster processing, more memory, etc.), there are several centrally located department computers that are available via remote login. You can find the names of those on a department wiki page: <http://astronomy.nmsu.edu/astro-wiki/doku.php?id=computingresources>.

There is also a campus-wide high-performance computing facility, Discovery, that everyone can access. You will have to do a short Canvas training to gain access. The webpage with all relevant information is here: <https://hpc.nmsu.edu/discovery/>. We recommend exploring this option, many students and faculty have been using this machine over the past few years.

If you even find that your work is being limited in any way by the a lack of computational power, you discuss the issue with your advisor. If you have any issues or questions about computing/software/etc, you should send them in an email to [astro-issues@nmsu.edu](mailto:astro-issues@nmsu.edu). This will ensure that they are documented, and will be viewed by more than one person. It is OK to shutdown or reboot your computer using the menus on the login screen, but please let us know if you are having problems.

Computers and computer disks do occasionally fail, so it is important to consider backing up important data and files. Within the department, we have implemented several disk-to-disk backup systems:

- on a daily basis, *small* files are backed up to a disk on a central server. Copies of small files are stored for a week, so these backups also serve as a short-term record if you inadvertently mess up one of your files.
- on a weekly basis, the *primary* disk on many of the workstations are backed up to a central server.

Here, all files are backed up, but the backup from the previous week is not kept.

- **No backups** are done for *secondary* disks on workstations, nor of the large disk RAID arrays on several of the compute nodes.

It is important to recognize that disk-to-disk backups, especially within the department, are not foolproof. In an extreme example, if a fire or a hacker takes down the entire building, the backups will go along with the originals. As a result, it is always a good idea to keep an off-site backup of your critical files. It is inexpensive to buy a USB disk that you can bring in occasionally, sync your files to, and bring home.

#### 11.4.1 External access

NMSU now restricts off-campus access to machines unless you are connected to a VPN client. You can obtain the software here: <https://agit.nmsu.edu/services/vpn.html>. Once connected, we restrict login access from outside of NMSU to a single gateway machine, `astronomy.nmsu.edu`. You can connect to this machine from anywhere using the SSH login protocol. Once logged into `astronomy.nmsu.edu`, you can login to any of the individual nodes if you need to via: `ssh machinename`

#### 11.4.2 Laptops and internet access

Most students also use their own personal laptops. To get these connected to the network, you will need to first register your machine in the NMSU system. This is easily accomplished by pointing your browser to `netreg.nmsu.edu` (often, it will automatically be redirected there), and filling out the requested information (you'll need to know your `my.nmsu.edu` access information). You can connect to the network with an Ethernet cable if there is a spare port in your office or via a wireless connection. The entire building has access to the AggieAir wireless network.

#### 11.4.3 Email

Your NMSU email address will be `username@nmsu.edu`, where your *username* is chosen by you when you first access the NMSU `my.nmsu.edu` system; we set astronomy usernames to match the NMSU username. Email coming into `username@nmsu.edu` can be accessed via the `my.nmsu.edu` webmail system. However, some department members choose to forward mail from `my.nmsu.edu` either to a personal, external email address (e.g., gmail or whatever), or to a local address in the astronomy department (`username@astronomy.nmsu.edu`). You can set up automatic forwarding in the `my.nmsu.edu` email system.

#### 11.4.4 Web pages

The department hosts a set of web pages at <http://astro.nmsu.edu> with a uniform “look-and feel”. Under ‘People - Directory’ you will see that everyone has their own page. Contact `issues@astronomy.nmsu.edu` for instructions for how to establish and keep the contents of your department web pages. Given that web pages have become a de facto way for people (including potential employers) to learn about others, you should keep your web page up-to-date and professional.

## 12 Department Events

Your physical and mental attendance at departmental and university-sponsored seminars is an important component of your educational experience (and will be so during your entire career). The department sponsors several seminar series. You are expected to attend all of these, even if you feel that the topic is outside of your immediate interests: our goal is to produce well-rounded graduates. Attendance offers exposure to topics you might not otherwise see, the opportunity to observe what characteristics make for a good or not-so-good seminar presentation, and the chance to make professional contacts which could be important in your future. Seminars are advertised with web page postings and email reminders.



## 12.1 Colloquia

Our most formal series is the departmental Colloquia. These seminars are often presented by visitors to the department, and thus offer insight into work being performed elsewhere in the astrophysics communities. These events are usually scheduled for Friday afternoons at 3:15 PM in BX102. Coffee, tea, and cookies are usually provided at 3:00 PM in advance of the talk. We generally schedule a round-table discussion between the speaker and graduate students immediately following the colloquium; attendance by students is expected, and this is a great opportunity to talk as a group with speakers about their interests and experiences in the field. When a visitor comes to town to present a colloquium, they are generally here for a full day or two, and we schedule slots for the visitor to meet with individuals. Students should sign up for these slots, especially for students that work in a research area related to that of the speaker; this is a great opportunity to make some connections outside of the department. There are also opportunities to talk with speakers in a small, less formal, group setting, by signing up to go to lunch or dinner (which also gets you a meal paid for by the department).

## 12.2 Pizza lunch

Our Pizza Lunch series is less formal. This series gives people an opportunity to present results in a relaxed setting. This can include presentations by departmental visitors, faculty talking about new ideas, students ‘practicing’ a talk which they will give at an upcoming conference etc. One aspect of this series is the pizzas which are delivered prior to each meeting, thus the name Pizza Lunch.

We strongly encourage students to give one pizza-lunch presentation a year to update their committee and the department on the stage of their research, especially after they transition from classes to research. If you are taking research credits via ASTR 598, you will be expected to make a presentation as part of the class.

## 12.3 Astro-ph discussions

Twice a week, everyone gets together to discuss recent papers posted on the arXiv server (astro-ph). We try to limit these sessions to 30 minutes each, and cover two papers per session with a short presentation and discussion: presenters are asked to try to restrict presented materials to just 2 figures per paper. Ideally, people skim the astro-ph postings, vote on those they find interesting, and volunteer to present on some.

## 12.4 Inclusive astronomy

We have an Inclusive Astronomy group that meets weeks to talk about diversity and inclusion issues and initiatives, both within the department and in the broader field. All department members are welcome and encouraged to attend.

## 12.5 Seminar class

ASTR 500, referred to as ‘Seminar class’, is a 1 credit class in which first and second year students registered each of their first four semesters. This class meets weekly, at which time one of the registered students may present a talk on material covered in an assigned paper. Generally, there will be a particular theme for the semester. These seminar presentations are open to the entire department, and faculty and third-year and above students are encouraged to attend and participate in the discussions.

Different faculty have different philosophies of what style of seminar is most beneficial. The general idea of seminar is to get some exposure to subject material that may not be covered in classes, and to get experience with presenting material to a group of people.

## 12.6 Research group meetings

Some of the research groups have regular meetings to discuss a variety of topics within their research area. This includes a Planetary group, Solar group, and Galaxies group. These are always informal and relaxed

and anyone can always sit in at any time. Students can be the prime drivers of research group meetings, so if you are interested in something that isn't happening, go ahead and propose to your advisor that you would like to start one.

## 12.7 Tea time

We hold a tea time once per week, where different department members rotate bringing in some sort of treat for everybody to share, along with coffee and tea provided by the department. Please sign up when the announcement goes out. Tea time is an informal opportunity for people to get together and discuss anything and everything.

## 13 Information

### 13.1 University policies

All department members need to be aware of official NMSU policy on a variety of subjects. Information on current NMSU policy can be found at <https://arp.nmsu.edu/>. NMSU, like many other institutions, now requires all employees to participate in annual online compliance trainings. These should be completed in a timely manner.

### 13.2 Purchases and travel

There may be circumstances where you will be reimbursed for expenses, either for work-related purchases or work-related travel. You should always request specific permission from your advisor before making the expenditure. Once approved, you need to submit receipts to the astronomy front office so they can process a reimbursement. If you work with the astronomy front office in advance, it is possible to purchase plane tickets directly without having to lay out your own money in advance. Note that, for reimbursement, receipts are always required for meeting registration, plane tickets, hotel, etc.

Outside of travel, you will usually be asked to charge expenses directly to the department credit card from which they can then be covered by charging an appropriate internal account, i.e. without requiring personal reimbursement to you. The astronomy front office staff are these to help you with credit card purchases.

Note that international travel requires pre-approval, see <https://provost.nmsu.edu/international-travel-procedures/index.html>.

### 13.3 Questions

We hope that this guide will provide answers to many of your questions about getting started in graduate school. Clearly, each student will develop individual concerns and questions. Communicate these first with your advisor who will either know the answer, or will point you to the right person. Here are a few individuals to contact for help in answering any questions:

Building issues/problems	Riah Preciado
Computer issues/problems	astro-issues@nmsu.edu / Zach Edwards
Laboratory/Observatory issues/Problems	Zach Edwards
Hiring issues	Riah Preciado
Reimbursement issues	Riah Preciado
Grants issues	Lydia Medrano
APO 3.5m issues/problems	Nancy Chanover
Sunspot issues/problems	Juie Shetye
General issues	Jason Jackiewicz

# Appendices

A Progress table

Table 1: Summary of formal milestones.

Milestone	Personnel	Timeframe	Prerequisites	Student (to do prior/post)	Supervisor (to do prior/post)	Notes
Comprehensive Part 1: CUMEs	Student	First cume in 2nd sem.; pass 5 out of 18 attempts (over 4 sems.)	-	-	Cume giver updates student progress spreadsheet	-
Qualifying exam	Student + 2 faculty advisers	Goal: by end of 3rd sem.	Suggested: 2 cumes or end of 3rd sem.	Schedule meeting with both faculty	Fill in Doctoral Qualifying Exam form; enter result in student progress spreadsheet	Pay raise G1 to G2
Comprehensive Part 2: Course-work oral exam	Student + full committee	Goal: by end of 5th sem.	5 passed cumes; 4 sems. of courses (~40 credits); graduate faculty status for committee members	Form full committee; ensure graduate faculty status of members; find a common meeting time	Enter data in student progress spreadsheet	no official paper-work
Comprehensive Part 3: Thesis proposal	Student + full committee	Goal: by end of 6th sem.	Coursework oral exam; graduate faculty status for committee members	Find a common time; reserve a date on dept. schedule; Program of Study form; Doctoral Examination form; work with Riah to reserve a room; submit forms to Grad. School 10 days before exam; send proposal document to committee 10 days before exam; send title and abstract to colloquium organizer	Enter result in student progress spreadsheet; ensure Dean's Rep. submits paperwork	Pay raise G2 to G3; Apply for Master's (optional)
Thesis defense	Student + full committee	Goal: by end of 10th semester	Thesis proposal; dissertation document; graduate faculty status for committee members	Find a common time; reserve a date on dept. schedule; register for graduation; Program of Study form; Doctoral examination form; Dissertation Title form; submit to Grad. School 10 days before exam; work with Riah to reserve a room; send dissertation document to committee 14 days before exam; send title and abstract to colloquium organizer	Enter data in student progress spreadsheet; ensure Dean's Rep. submits paperwork; faculty confirmation of grades form	Well done!