Graduate Student Handbook
Department of Physics
New Mexico State University

Draft

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1 Introduction

Welcome to NMSU! The Physics Department's graduate program provides a rigorous academic and professional training environment to prepare students for a future career not only in physics but also in any of a wide range of disciplines. A graduate education in physics helps develop skills in math, computing, electronics, statistical analysis, data science, and many other areas. You are expected to develop in particular problem-solving skills and independence in thinking. Students who graduate from our program with a Ph.D. or Master's degree find jobs in national labs; a variety of industries; health care; national security; and even finance; in addition to pursuing careers in academia.

Research is a crucial part of a graduate program of studies and the Physics Department maintains a very active research program both inside and outside the department. These range from small research teams to huge international collaborations conducting experiments at labs in the US and abroad. Faculty members and our students and postdoctoral associates have over the years forged collaborations and relationships with researchers at Los Alamos National Lab; Sandia National Lab; Fermi National Accelerator Lab; Brookhaven National Lab; Thomas Jefferson National Accelerator Facility; Argonne National Lab; Oak Ridge National Lab; NASA; Kirtland Air Force Research Lab, and institutions abroad such as CERN, in Switzerland; DESY, in Germany; and RIKEN, in Japan.

The relatively small graduate student population allows for close contact between faculty and students, where everyone seems to know everyone. This guide will help you familiarize yourselves with the department, its faculty and staff, facilities, as well as the structure and organization of the program and expectations from graduate students seeking a degree in physics.

We are proud to provide personalized guidance at all stages of the graduate program. New graduate students meet with the Department Head and are advised by the Graduate Program Director (Graduate Advisor). Once you have a research advisor, this faculty member becomes your primary point of contact. You should always feel free to communicate with the Department Head or the Program Director in addition to your advisor for resolving issues or whenever encountering any difficulties with your studies, research, or anything else where you feel help is needed. And finally, your comments on this document and suggestions for clarifications or other improvements are very much welcomed at any time.

This Handbook describes the Physics Department policies and requirements and is intended to serve as a guide to graduate studies in physics. The New Mexico State University's Academic Catalog is the definitive source for all university rules and procedures and should always be consulted. The full current catalog for the Las Cruces campus is available online, at https://catalogs.nmsu.edu/nmsu/

2 The Physics Department

2.1 Physical Location

The Physics Department is housed in Gardiner Hall at 1255 N. Horseshoe Dr. The department offices and labs occupy the top two floors and parts of the first floor and the basement.

All the physics classes and labs you will take, as well as the labs and tutoring sessions where you serve as a Teaching Assistant, will be in this building; although occasionally some of you will take a course in another department. The department office is on the second floor, southeast corner. Physics graduate students are given desk space in the building as well.

2.2 Personnel

During the 2026-27 academic year, there are eleven tenured and tenure-track faculty members; three college or visiting professors; several professors emeriti and affiliated and visiting faculty from other institutions; five postdoctoral research associates; a lab coordinator; approximately thirty-five graduate students; and an administrative assistant. While not all the personnel listed below are always on campus, you are invited to meet, discuss, and exchange ideas with as many members of the faculty and students as possible, as part of your graduate educational experience.

2.2.1 Faculty

Tenured or Tenure-Track Faculty

- Stefan Zollner, Professor; Department Head
- Burcu Duran, Assistant Professor
- Michael Engelhardt, Professor
- Boris Kiefer, Professor
- Ludi Miao, Assistant Professor
- Michael Paolone, Associate Professor
- David Ruth, Assistant Professor
- Matthew Sievert, Associate Professor
- Raza Sufian, Assistant Professor
- Jacob Urquidi, Associate Professor
- Igor Vasiliev, Professor

College Faculty

- Michaela Burkardt, College Professor
- Charles Bruce, College Research Professor
- Douglas Wertepny, Visiting Professor
- Krishna Acharya, Visiting Professor

2.2.2 Emeritus Professors

- George Burleson
- Michael DeAntonio
- Thomas Hearn
- Stephen Kanim
- Gary Kyle
- Heinrich Nakotte
- James Ni
- Stephen Pate-Morales
- Vassili Papavassiliou

2.2.3 Affiliated Faculty

- Vivek Anil
- Joseph Bahder
- Rigo Carrasco
- Paul Higbie
- Willam Horowitz
- Jan Hrabovsky
- Keh-Fei Liu
- Jesus Saenz
- Robert Wagner

2.2.4 Postdoctoral Research Associates

- Kuruppu Chatura
- Huma Haider
- Liam Hockley
- Churamani Paudel
- (To be filled)

2.2.5 Department Staff

- Marisela Chavez, Administrative Assistant
- Francisco Carreto-Parra, Manager, Lab Instruction
- Michael Granado, Research Staff

2.3 Facilities

There is a wide variety of experimental research equipment in several labs in Gardiner Hall. In-house equipment includes a spectroscopic ellipsometer; a high-resolution, X-ray diffractometer; a 10-meter, small-angle, X-ray diffractometer; liquids, energy-dispersive diffractometer; two two-crystal, vacuum, X-ray spectrometers; a high-resolution, electron spectrometer; an energy-dispersive, X-ray spectrometer, one electron microscope; specimen-preparation equipment; ultra-high-vacuum chambers; mass spectrometers; an X-ray, photoemission spectrometer; low-energy, electron-diffraction, spherical and planar, Fabry-Perot interferometers; a near-field, optical microscope; an atomic-force microscope; a femtosecond laser; a nanosecond, optical, parametric oscillator; a tunable-diode laser; standalone Nd: YAG lasers; 1- and 2-D detector arrays; a streak camera, a gravity meter; a magnetometer; a broadband seismometer; NIM and CAMAC data-acquisition and control electronics combined with a variety of radiation detectors; and a PuBe neutron source.

The department makes sure that every graduate student has access to essential computing equipment and some IT support. Personal computers and laptops can be registered to use the wired and campus-wide wireless networks.

3 Graduate Program Components

The academic program of a graduate student in physics consists of several components and you are urged to devote your attention to all: coursework, research, and teaching. While public outreach is not mandated for graduate students, it is a very important aspect for the health of the department, which relies extensively on funding from federal and state government institutions, and its relationships with the community; students often contribute and such contributions are greatly appreciated.

3.1 Courses

Most students will enter with a sufficient mastery of intermediate physics, but becoming an independent researcher or professional requires a higher level of understanding and ability to work with technically and intellectually complex problems. The department offers a wide array of advanced courses to facilitate accomplishment of this goal. There are core course requirements, described later, for Master's and Ph.D. students; there are also electives — specialized courses that will help you advance in your knowledge of your chosen field — and you are encouraged to enroll in appropriate electives, after consulting with your advisor, even after you have completed your formal course requirements.

A typical course load is three courses, or nine credit hours, per semester. This is also the minimum number required to be considered a full-time student, which is necessary for holding a Graduate Assistantship (and maintaining your immigration status if you are an international student). Taking more than this number of credits is normally not recommended for students who also have a full teaching assignment of twenty hours per week. Any exceptions to that guideline must be approved by your advisor. You may also take research for credit (PHYS 600) whenever there are not enough formal courses available in a given semester, provided you have a research advisor or other faculty or staff member who will supervise your research.

Most students will take classes mainly, if not exclusively, in physics. However, it is acceptable to take additional classes outside the department that your advisor and you agree are important for your development as a scientist. Such courses can be in computer science, electrical engineering, chemistry, mathematics, and many other areas. You must discuss with your advisor any time you are interested in taking a class that is not part of your required schedule; your advisor and you together will determine whether such a course is in the best interest of your program and will advance, rather than delay, your progress towards a degree.

In addition to classes taken for credit, there are opportunities for additional gain of knowledge in the form of seminars and colloquia. The physics colloquium is usually held on Thursdays at 4:00 pm and all faculty and graduate and undergraduate students are strongly urged to attend. These lectures are typically at the non-specialist level and the speakers are requested to make their presentations accessible to a wide audience. Specialized seminars are often scheduled by the various research groups and are announced to the relevant members of the department, but anybody is welcome to attend.

Your education cannot be complete without significant exposure to the scientific literature. Many of the classes you take will require that you read research papers to complement information in your textbooks. This should be considered as the absolute minimum. You must become familiar with the important journals in your intended area of specialization and make it a point to read papers at any opportunity, by following citations in books or other papers or by doing searches for specific topics. The NMSU library system subscribes to many of the journals that you need and has archives of past volumes. In addition, there are extensive repositories of preprints freely available to everyone that you should be familiar with, such as arXiv. You will need to read many papers before you are in a position to write your first one!

The main library at NMSU is Zuhl Library. However, for most scientific fields you will find the relevant journals and books in Branson Library. Both are located within a short walking distance from the Physics Dept. building. More importantly, library subscriptions give you electronic access to new and archived articles while you are connected to the NMSU network, directly or through a Virtual Private Network (VPN). The library will also help you get access to articles that are not available through journal subscriptions or books that are not part of their collection. Talk to your advisor if you have difficulties finding an article or other reference that you need for your work.

3.2 Research

The faculty and staff of the department conduct research in several fields. Active areas of theoretical and experimental research currently include solid-state/condensed-matter physics and materials science; and high-energy, nuclear and particle physics. You are urged to become familiar with the research activities in the department early on and develop your ideas about the direction you want your research to take, which may not necessarily be what you intended to do when you entered the graduate program. All faculty members are willing to meet with students and describe their research work, give tours to their facilities, and discuss the possibility of accepting a new student into their group.

You are as well encouraged to explore venturing into research early, while still taking classes and especially during the summer months. Research is a crucial component of a scientist's training and even if you are a Master's student who has chosen the no-thesis option, some experience in research will be invaluable in your future career.

If your research area is in experimental, high-energy physics, nuclear or particle, you will almost certainly be required to move to a National Lab, such as Fermilab, Brookhaven, or Jefferson Lab, to participate in an experiment after you complete your course and exam requirements. This part of your program can take several years, as much of the analysis of the data is usually also conducted in the lab, in collaboration with groups that can range from a few dozen to hundreds of physicists. Some students will not return to campus until it is time to defend their dissertation. Some work in this field is also conducted on campus, especially some radiation detector development and testing.

Students in solid-state or condensed-matter physics may do much of their research using the facilities in the department, but could also spend extensive period of time in labs such as Los Alamos, Sandia, or Argonne taking advantage of the accelerators and other equipment there, needed for their work. Students pursuing a degree in theoretical physics will usually do all their work on campus, although visits to National Labs for collaborating with scientists there are also not uncommon. If you spend any time at a National Lab, you are urged to maximize the opportunities for professional development by attending seminars and discussing and exchanging ideas with the scientists.

There are many laboratory instruments, pieces of experimental equipment, and computers in the department, used for teaching, research, or both purposes. A detailed list of the available equipment is given in the previous section on the department. We also make use of university facilities, such as the Physical Sciences Lab, as well as Discovery, a High-Performance Computing Cluster available free to all students, faculty, and staff who request an account.

3.3 Teaching

Most of the incoming graduate students are offered Teaching Assistantships; the exceptions are usually students who have an outside scholarship or are picked up immediately as Research Assistants, supported by one of the research groups in the department. Graduate Assistantships provide financial support to students during their graduate program, but serve several other purposes as well. Teaching Assistants fill critical needs of the department in accomplishing its educational mission, and at the same time acquire invaluable teach-

ing experience for their future careers. Many of you will pursue careers as educators after completing your degrees and your teaching skills developed during your graduate program of studies will be important for your future employers. For all these reasons, your teaching duties must be taken as seriously as your classwork and your research.

Teaching duties typically involve some combination of supervising undergraduate — and in a few cases graduate — labs, grading undergraduate and graduate homework assignments, and providing tutoring for students in introductory physics courses outside the classroom. Except for the grading assignments, these duties involve direct contact with students. It is very important that your teaching duties are performed with professionalism and with respect towards the diverse student body in our university. The code of conduct will be explained to you during the initial Teaching Assistant meeting at the start of your first semester, but this represents only the minimum expectations from our TAs. You should consider that you entered the field because you find physics fascinating and exciting and this should guide your attitude when teaching physics to those who may be encountering the subject for the first time, as is the case for many students enrolled in the introductory physics labs. Your enthusiasm can be contagious and some of your students today may end up being your colleagues tomorrow.

Introductory labs are supervised by faculty members who are the designated "Instructors of Record." These instructors regularly call meetings with their Teaching Assistants to discuss the upcoming labs and any related issues. Your presence is essential and you should not miss these meetings without a serious excuse and without notifying your instructor in advance.

Your teaching assignments, for those of you holding a full Teaching Assistantship, are for twenty hours per week. These time requirements may fluctuate somewhat from one week to the next, given the schedules and specific activities on a given week, but if you believe that you have to spend consistently more time than your assigned hours you are urged to bring this to the attention of the instructor or instructors of your classes and, if necessary, the Graduate Program Director and the Physics Department Head. Every effort will be made to resolve any issues and ensure that your teaching load does not adversely impact your own studies.

You should be aware that foreign students whose native language is not English and who were offered a teaching assignment must take the International Teaching Assistant Screening upon arrival. Based on the results of the screening, you may be required to take one or more language or communications courses and you may not be allowed assignments where direct student contact is required, until such courses are completed successfully. This limits the type of Teaching Assistant duties that can be assigned to only homework grading. International students with language deficiencies are strongly urged to work diligently to improve their skills in order to be able to be assigned any regular duties without restrictions. See the section on support below for additional details.

As a Teaching Assistant, you are evaluated at the end of each semester for your performance and compliance with the instructor's guidelines and expectations from you. While the department has every intention to continue your support as long as you are making satisfactory progress in your studies and towards your degree, this support cannot be guaranteed unless your teaching performance also meets expectations.

Occasionally, departmental needs will require that a graduate student teach a class not

as an assistant but as the principal instructor. Such assignments involve a higher level of responsibility and abilities and are reserved only for the best-performing TAs, as determined by the instructors of the courses in which those students were serving as Teaching Assistants. Being assigned as the instructor in a course is the highest honor recognizing your teaching abilities and a very valuable item to add to your resume.

Missed Work It is extremely important that your work as a lab TA or in the Tutoring Room is always covered. Your students rely on you for making progress towards *their* degrees. On rare occasions, it will be inevitable that you are unable to show up at work, because of illness or other emergency. In such cases, you must make every effort to find a qualified replacement and also inform the office of the Physics Department of the situation. The office will try to help if you are unable to find a replacement, but the primary responsibility for resolving the issue rests with you. Note that travel, even for departmental business, does not constitute an emergency. In case of travel, you must arrange for a replacement to cover any missed assignments well in advance.

3.4 Outreach

The Physics Graduate Student Organization (PGSO) has an active outreach program and all students are invited to join in these efforts. These include participation in the Physics Olympiad, visits to schools, judging in science fairs, and organizing the department's Physics Fun Day. Please contact the current PGSO President if you are interested in finding out where you can fit in and how to get involved.

4 Degree Requirements

This section lists in more detail the requirements for the various graduate degrees and describes your path to a degree. For more advanced students, especially those having a research advisor, it is your responsibility to request regular meetings with your advisor and discuss your program and his or her appraisal of your progress and expectations from you.

4.1 Beginning Students

Incoming graduate students must meet with the Graduate Program Director (Graduate Advisor) before registering for classes. The meeting serves to inform you on the degree requirements, including courses, and discuss the courses you should take during your first semester. There are specific requirements for core courses, advanced courses, and labs, described in more detail elsewhere, and these are not offered every year; some courses are two-semester sequences and not taking the first part of a sequence implies that you will also not be able to take the second part for up to two years. The advisor will explain to you which courses are expected to be offered over the next few semesters and plan with you a schedule that will allow you to make quick progress towards your degree. In general, required courses must be taken the first time they are available and only when not enough required courses, not already taken, are scheduled in a semester should you consider electives. Any

variation on this rule must be approved by the advisor. During your meeting, you should discuss any perceived deficits in your undergraduate preparation. In some cases, the advisor may recommend taking one or more remedial, 400-level classes during your first semester. Courses numbered 450 or higher can count towards a Master's degree (for up to nine credits) but not towards the required credits for the Doctorate.

In later semesters, and in some cases already in the first semester, a student will have a research advisor. When a research advisor exists, he or she becomes your primary advisor with whom you should discuss and obtain permission for your course schedule, always keeping the Graduate Advisor informed.

You are strongly encouraged to spend your first year learning about the research areas in the department and identifying a tentative research advisor. Some Research Assistantships are available during the summer months and you are urged to explore any such opportunities. It is possible to change research advisors in later semesters and you should not be dissuaded from selecting an advisor by not being certain you would want to do your doctorate in this area.

4.2 Qualifying Exam

Both Master's and Ph.D. students must take the Qualifying Exam. This exam is offered once a year, at the start of the Spring Semester, in two sessions, morning and afternoon. It is based on a typical undergraduate physics curriculum and is designed to judge the students' preparation for a graduate program in physics. Subjects covered are Classical Mechanics; Electricity and Magnetism (may include special relativity); Modern Physics (Quantum Mechanics); and Thermodynamics (including Statistical Mechanics, at the undergraduate level). Sample problems from past exams are available online to help your preparation. You must take the exam the first time it is offered; this includes students who start their graduate studies in the Spring Semester. You may be asked to take one or more remedial courses based on the results of this exam.

Master's students who elect to follow the thesis option can be exempted from the Qualifying Exam requirement. This choice must be made during the student's first semester and the student must have an identified research advisor who has agreed to supervise the thesis work, for this exemption to be granted.

The results of the exam are discussed in a faculty meeting and the faculty votes on the outcomes. You will receive official notification in writing on your outcome. A decision will be one of the following: approved to continue on a Ph.D. program; recommended to limit graduate studies to a Master's program; or fail. Master's students need to pass at the Master's level to continue their studies. A student may petition to the faculty to be granted a second attempt at the Qualifying Exam, the following year.

When a student fails the Qualifying Exam, the decision may be to discontinue graduate studies, or re-evaluate progress at the completion of the current, Spring Semester, after which a committee will make a recommendation whether the student should be allowed to enroll in further semesters and retake the exam the following spring. Not taking the exam at the first opportunity counts as a failure.

A Ph.D. student passing at the Master's level may petition the faculty to retake the exam the next time it is offered in order to attempt to pass at the Ph.D. level. The faculty

may defer the decision until the end of the current semester if additional information from coursework performance is deemed to be desirable.

You are allowed to view your exam upon request, under the supervision of a faculty member. If you believe any errors were made in the grading, you may appeal to the Chair of the Qualifying Exam Organizing Committee and then to the Department Head, before following any additional appeal process as specified by the university.

4.3 Comprehensive Exam

This section applies to students who are pursuing a doctoral degree. After the completion of the core courses, you must take the Comprehensive Exam in order to become a doctoral degree candidate. This normally happens after the completion of four semesters of graduate courses, for students who enter the graduate program in the Fall Semester, which is typical. Students who enter in the Spring Semester should discuss with the Graduate Advisor the schedule of their Comprehensive Exam. It is based on the graduate, physics core curriculum taught in the department and is designed to test the students' mastery of graduate-level physics needed for becoming a researcher in the field. The exam is offered once a year, at the start of the Fall Semester. It has a written and an oral part. The written part is given in three sessions, held on three separate mornings: Quantum Mechanics; Electrodynamics; and Classical Mechanics and Statistical Mechanics. The outcomes of the written exam are again discussed in a faculty meeting and the faculty votes on whether a student will be allowed to proceed to the oral exam, which must be held before the end of the Fall semester. You will receive official notification of the outcome and recommendations in writing. The same policies apply regarding appeals as for the Qualifying Exam.

A graduate committee must be formed by the student and approved by the department before the oral exam can be administered. The oral exam will contain questions on the same areas of physics covered in the written part and may include questions on a student's research activities up to that point and future research plans. A student failing the oral exam may be asked by the committee to retake both parts the following year, or to discontinue graduate studies. In the latter case, the student may petition to take a final, Master's oral exam in order to receive a Master's degree, provided all other requirements for that degree have been satisfied.

For students not passing the written Comprehensive Exam, the faculty may recommend retaking, or terminating graduate studies with a Master's degree. An oral, final Master's exam must still be taken in the latter case.

In certain cases, when a student's performance was not deemed sufficient for an outright pass for a student who is already engaged in research, the student's advisor may petition for a conditional pass. This will typically take place during the faculty meeting where the results of the written part are discussed; however, the advisor may defer the decision on petitioning for a conditional pass when additional information on the student's research progress would be desirable. In all cases, the petition should be submitted early enough to allow for the oral exam to be administered before the end of the semester when the written part took place, in order to comply with Graduate School rules.

In order to argue in favor of a conditional pass, the advisor must present information on the student's research activities and promise for doing independent research. If the petition

is granted, the student will be asked to present his or her research during the oral exam and a plan for successfully completing a doctoral program to the satisfaction of the committee, which will ask questions relevant to the research as presented. The presentation must be concise enough to allow time for the remaining part of the exam. The committee will then proceed with the exam on physics topics, identical to the case of an unconditional pass. The student must make available to the committee a research progress report and plan at least two weeks before the date of the oral exam. A research plan without evidence of any existing research progress is not an acceptable substitute.

4.4 Graduate Committee Meetings

After admission to candidacy for the doctoral degree, your graduate committee will meet with you once a year to evaluate your progress and report to the Department Head and the Graduate Program Director. The presence of a Dean's representative in this meeting is not required, but may be desirable in cases when this person happens to be engaged with your research. The committee will report on any areas of concern, if applicable, and will discuss mitigating strategies with your thesis advisor and the Graduate Program Director. If you are requesting continuing departmental support in the form of a Teaching Assistantship, this report will be considered as one factor, together with your performance in past teaching assignments.

4.5 Degree Requirements

The number of credits and specific course requirements are described in detail in the Graduate School Catalog, which should be consulted as the definitive guide. The following summarizes the main points in order to serve as a guide for designing a program that will allow for the most efficient path to a degree and to know what to expect and what is expected from you as you navigate graduate school life.

In your first week of your graduate studies, you will meet with the Graduate Advisor, who will describe the course requirements for your program and recommend enrollment in courses for the first semester. When you have a research advisor, this person will be primarily responsible for defining your schedule and enrollment. In the following, graduate advisor can mean either your research advisor, if any, or the Graduate Program Director. You should always keep your advisor informed of your plans and consult with him or her before enrolling in any courses, especially if these are electives, courses outside the department, or classes after the minimum credit requirements have been satisfied. There are some tight credit requirements and you should be familiar with them in order to make steady progress and graduate in a timely fashion.

Whenever credits are mentioned, it is implied that these are completed at NMSU or transfered from elsewhere. The Graduate School has it own requirements for allowing credits to be transfered and the catalog should be consulted for those. The Physics Department must also agree to allow transfer of credits as equivalent to physics courses taught here. In a typical case, the department will only consider approving transfer of credits after a student has successfully completed one semester of courses at NMSU and passed the Qualifying Exam, if the graduate advisor and Department Head are satisfied with the student's performance.

4.5.1 Requirements for the Ph.D. Degree

For the Ph.D. degree, you will need at least 36 credits in formal courses numbered 500 and higher. The Physics Dept. requires that all Ph.D. students take eight "core courses." These are

- PHYS 511 Mathematical Methods of Physics I
- PHYS 551 Classical Mechanics
- PHYS 554/555 Quantum Mechanics I/II
- PHYS 561/562 Electromagnetic Theory I/II
- PHYS 576 Advanced Computational Physics I
- PHYS 584 Statistical Mechanics

A 500-level lab is also required. Three lab courses offered every year are

- PHYS 575 Advanced Physics Lab (mainly condensed-matter/solid-state physics; usually offered in the spring semester)
- PHYS 593 Advanced Experimental Nuclear Physics (nuclear and particle physics; usually offered in the fall semester)
- PHYS 571 Advanced Experimental Optics (for condensed-matter/solid-state physics)

Other lab courses may be offered less regularly.

Some applied physics 500-level courses may include a one-credit lab. Three such courses may be combined to satisfy the advanced lab requirement.

Most students will choose the lab that best suits their research interest; however, these may not be fully defined by the time you take the lab. Discuss with the graduate advisor which option is best for you and when one of the alternative options will be offered next.

In addition, two advanced, 600-level courses are also required. Popular choices include

- PHYS 688 Advanced Condensed Matter Physics
- PHYS 689 Advanced Modern Materials
- PHYS 691/692 Quantum Field Theory I/II

Other advanced courses are occasionally offered under the PHYS 620 number. Watch out for announcements and consult the syllabus for details on the content in a given semester. If interested, discuss with the instructor whether this is appropriate for you and what is expected in terms of prior knowledge.

Finally, one or more electives will satisfy the 36-credit requirement. There is no limit on the number of electives you can take and electives on relevant topics outside the department are possible. These options must be discussed with your graduate advisor or research advisor who must give permission. This will ensure that your progress toward the Ph.D. will not be

delayed by your taking unnecessary classes. You must also keep in mind that taking courses for which you may not be adequately prepared could adversely affect your GPA and your eligibility to be a Graduate Assistant.

A standard course load for a student holding a 20-hour/week Teaching or Research Assistantship is three courses, or nine credits. (Nine credits are required for being a full-time student, which is necessary for holding a Graduate Assistantship.) If you have not yet completed all the core-course requirements, you must choose among the core courses offered in that semester and only take alternative classes when there are no three such courses available. Any variance on this rule must be approved ahead of time by the graduate advisor. Pay particular attention to courses not offered every year. These include most graduate courses other than PHYS 511 and 576. Graduate students are expected to complete their core courses in two academic years, or four semesters, in order to be ready for the Comprehensive Exam at the start of their third year. Not taking a core course at the first opportunity could make it impossible to complete the core curriculum in two years. Also, all incoming graduate students should take Mathematical Methods in the fall of their first year. This course forms the basis for most of the other subjects and should be taken at the start of every graduate program.

Occasionally, there will not be three courses that you have not already taken available for you in a given semester. You may complete the required nine credits by enrolling in PHYS 600 (research) with a faculty member who agrees to supervise your research. Note that PHYS 600 does not count toward the two required 600-level (formal) courses, but is a great way to jump-start your research program, or make progress in your research if you already have a research advisor and a topic.

Dissertation Research After passing the Comprehensive Exam, including the oral exam, you are eligible to enroll for dissertation credits, PHYS 700. You will need at least 18 dissertation credits, equivalent to two semesters of full-time dissertation research; although almost all students will require substantially more time than that. The total number of formal- and informal-course credits, including dissertation research, required for the Ph.D. is 72, equivalent to four academic years. Most students need between five and six years, and occasionally more, to complete a doctorate. You should be aware of some time limits that the Graduate School imposes:

- The dissertation defense must take place no more than five years after the Comprehensive Exam or the exam must be retaken

While students very rarely hit this limit, you should keep this constraint in mind when defining your program.

Thesis Defense The oral defense of your dissertation will be the final step on your path to a doctorate. You will present your research to your graduate committee, consisting of your advisor, at least two other members from the department, and a representative of the Dean of the Graduate School. The committee must be given the final draft of your thesis at least two weeks prior to the defense and preferably more, in order to have a chance to read it through and be able to offer meaningful suggestions for improvement. They will ask you

questions about your research and about physics in general. When the committee is satisfied with the presentation of your work and your mastery of fundamental physics, they will vote for you to be awarded the Ph.D. degree. You will still have to submit a final version of your thesis, which incorporates any comments by committee members, to the Graduate School.

Publication Requirement A publication, based to a significant degree on your research work, is required before you schedule your doctoral thesis defense. Here "publication" is understood in a liberal sense: it could be a submitted manuscript to a refereed journal; or a draft paper in a state that is essentially ready to be submitted, pending minor revisions or comments from collaborators. In the case of a not-yet-submitted draft, the committee will comment on whether this manuscript is publication-quality and on its worthiness as a piece of scientific literature. The paper need not be on the exact same topic as the thesis but should be based on the same research activities. In all cases, you must supply a brief note outlining your own role in the paper: setting up an experiment or computation; taking and analyzing data; writing parts or all of the manuscript, as applicable. This is particularly crucial in cases of large collaborations and papers with multiple co-authors. You should be ready to discuss aspects of the paper when asked by the committee, even if the topic is not identical to your thesis topic. The Department Head must approve the committee's appraisal before signing off to the scheduling of your defense.

4.5.2 Requirements for the Master's Degree

The Physics Dept. also offers the Master's degree for students who desire an advanced degree in a shorter period of time for their professional development without the lengthy time investment in research required for a doctorate. A Master's degree can be awarded with or without the thesis option. A thesis may be in any of the areas of research concentration in the department and must be supervised by a faculty member of the Physics or another science or engineering department. It is also possible, and strongly encouraged, to obtain a Master's degree en route to the Ph.D., as soon as all requirements for the Master's have been satisfied.

A terminal Master's degree should normally be completed within two academic years. For students graduating from NMSU with a Bachelor's degree in physics, it is possible to enroll in an accelerated Master's program and complete the degree in one additional year (the so-called Master's Accelerated Program, or 4+1, program – MAP) with careful planning during their senior year, by taking advantage of a university rule that allows up to twelve credits to count toward both a Bachelor's and a Master's degree. This is not easily compatible with the thesis option and may require taking additional credits during the summer term, in order to avoid overloading the student's schedule during the academic year. While a thesis is possible, it will require additional time to complete.

The Graduate Program Director serves as the graduate advisor for all Master's students except for those who select the thesis option and have a research advisor.

For the Master's degree, you must complete at least 30 credits of graduate-level courses, at least 21 of which must be in physics. Courses numbered 450 and higher are considered graduate-level; however, there are restrictions, described below. Exceptions must be approved by the graduate advisor in advance.

- Not more than nine credits may be in courses numbered between 450 and 499
- At most three credits may be for independent study or other informal courses and will count toward the 21 credits in physics, provided they are in these areas (these credits can be for research, PHYS 600)
- Every student must complete a three-credit, 500-level lab (see requirements for the Ph.D. degree above for some appropriate lab options)
- Master's students must demonstrate or develop knowledge of computer programming. Usually, this is accomplished by completing three credits of computer programming (selected from PHYS 576 Advanced Computational Physics I or PHYS 476 Computational Physics I); exceptions must be approved by the graduate advisor
- At most six credits of Master's thesis research, PHYS 599, can count toward the 30 credits and cannot count toward the 21 credits in physics; these will only count toward the 30 credits if the student has selected the thesis option and successfully defends a Master's thesis
- If a student has credits in both PHYS 599 and PHYS 600, the total number counted cannot be more than six

Master's Final Exam In order to be awarded the Master's degree, you must pass a final, oral exam. This will confirm your mastery of physics in general and, if the thesis option has been selected, will include a presentation and defense of your thesis. If you are seeking the Master's en route to the Ph.D. and have passed the Comprehensive Oral Exam, this can be used as a substitute of the Master's Final Exam, if the thesis option has not been selected. Ph.D. students who wish to obtain the Master's degree with a thesis may request that their Master's thesis defense take place concurrently with the Comprehensive Oral Exam and avoid having to take an oral exam twice. The request must approved by the Physics Dept. and the Graduate School.

5 Financial Support

Graduate students are usually admitted with financial support by the department, whether they enter the Master's or the Doctoral program, unless they have outside support, such as a fellowship or scholarship from the US or a foreign government or another institution. Such students with outside support are screened using the same rigorous criteria regarding admission as the students who request departmental support. Financial support for incoming students normally consists of a Teaching Assistantship, but in certain cases it is possible for a student to receive a Research Assistantship in the first year, if there is specific interest from a faculty member with available funding in hiring the student. Initial support is for a period of one academic year, unless otherwise specified on a student's admission offer letter.

Teaching Assistantships consist of some combination of lab supervision, homework grading, and tutoring, for a total of 20 hours of work per week for a full assistantship. Research

Assistant duties are defined by the faculty member providing the financial support and are subject to the same, 20-hour-per-week limit.

International students whose native language is not English will be required to take the International Teaching Assistant (ITA) screening before they can start their teaching assignment. If this applies to you, based on the result of this screening you may be required to take one or more language or communications classes before you can be assigned teaching duties involving direct student contact; until then, your assignment could be limited to grading. These courses may be one or more of the following: COMM 485, International Teaching Assistant Development; SPCD 470, Scholarly Writing for International Graduate Students; and in rare cases of significant language deficiencies, SPCD 110, Intermediate English as a Second Language Composition and Grammar Review. Independently of the result of the ITA screening, you are expected to continue working to improve your language skills. Every Teaching Assistant will at some point be required to assist in a lab and tutoring sessions and unsatisfactory communications and language skills are detrimental to the educational mission of the department and therefore not acceptable.

Teaching Assistants are expected to take three **physics** courses per semester, if such are available in any given semester, until all the courses required by the program are completed. Any variance to this rule must be approved in advance by the Graduate Program Director, or the student's research advisor, if any. Students who are required to take a language or communication course, as described in the paragraph above, must take this as a fourth course; the department will in general attempt to provide partial support for the increased tuition due to the additional course, if funds are available.

While support in later years cannot be guaranteed, the department makes every effort to continue supporting students who were admitted with an assistantship, for as long as they continue to make satisfactory progress toward their degree, subject to the availability of funds; but note that the university has a five-year (or in some cases six-year) limit on Graduate Assistantships financed through state funds, as Teaching Assistantships usually are. Some of the criteria used to determine satisfactory progress are described below, although these are not exhaustive.

In some cases, departmental funds for financial support of graduate students are limited. There are several criteria for prioritizing allocation of resources to student support. Students in their first two years of graduate studies receive priority for Teaching Assistantships, provided they have passed the Qualifying Exam at least at the Master's level. In accordance with University rules, you must also maintain a 3.0 or higher cumulative GPA and a full course schedule, defined as at least nine credits (three regular courses) per semester. Students whose cumulative GPA falls below 3.0 are placed on Academic Probation for the following semester and are not eligible to hold a Teaching Assistantship. They can become eligible again when their GPA is raised again to at least 3.0.

Independently of academic record, your performance in your previous teaching assignments is also crucial in deciding on continuing support. As a Graduate Assistant, you are part of the teaching and research mission of the university and responsible for contributing to the institution's success. Lab instructors, instructors of courses whose homework is graded, and faculty members responsible for tutoring assignments provide feedback regarding the efficacy of Teaching Assistants; support may be discontinued for serious underperformance. In the case of students with inadequate communication skills, support may not continue if

the student is not making significant progress in addressing the deficiencies, thereby limiting the range of possible assignments.

A Research Assistantship may also be discontinued for various reasons, including loss of funding or change of advisor or plans. The department will attempt to provide support for students who lost research funding through no fault of their own, but lower priority will be given to students whose assistantship was discontinued due to unsatisfactory research output, or whose academic performance is considered inadequate.

5.1 Stipends

There are three levels of Graduate Assistant Stipends, depending on student status. Level I is for new graduate students without a Master's degree. Level II is for students who hold a Master's degree or students on their second year who have already passed the Qualifying Exam. Level III is for doctoral students who have passed the Comprehensive Exam and have advanced to the Candidacy for the Ph.D. The Physics Department Teaching Assistant stipends during the 2026-27 Academic Year for a 20-hour/week assignment and for a two-semester, or nine-month employment, are shown in Table 1. Stipends for students who are assigned teaching duties during the summer semesters vary, according to the assigned hours.

Level I	Level II	Level III
$23,607	$24,091	$24,578

Table 1: Physics Department Teaching Assistant stipends

Research Assistant stipends supported through research grants are determined by the individual faculty members holding the grant and must comply with the Graduate School minimum stipends.

5.2 Tuition Waivers

The university provides full tuition waivers for Graduate Assistants having at least a ten-hour-per-week assignment. Students are responsible for the cost of the required health care.

5.3 Students in the Third or Later Years

Beyond your second year, different criteria apply. You are expected to have finished your required, core courses and have passed the comprehensive exam, if you are a student in the doctoral program; you should also have a research advisor and a defined thesis project. An advisor who cannot provide financial support in terms of a Research Assistantship may request that the department continue to assign a Teaching Assistantship to a student at this, advanced stage, providing evidence for progress toward the degree. Students who do not have a research advisor after the end of their second year may still be considered for a Teaching Assistantship on a case-by-case basis. Such exceptional support will in general be limited to no more than a total of three years since the start of the graduate program, after which a request from an advisor is required. Similarly, students who have not passed

the Comprehensive Exam may only be considered for an assistantship by the department at the request of the research advisor. No departmental support will be provided if the faculty recommends that a student discontinue graduate studies following a Qualifying or Comprehensive Exam.

5.4 Master's Students

If you are a Master's student without the thesis option, you are expected to complete the program within two years, or four semesters, and no additional support should be expected after the end of that period, unless you are admitted to the Ph.D. program. If you have chosen the Master's thesis option, it is understood that more than two years may sometimes be required to complete the program. The same principle applies as for doctoral students: your thesis advisor must request continuing support beyond the two-year limit, supplying evidence of your progress. As for students in the "4+1," Master's Accelerated Program, they are in general expected to complete their degree in one academic year, including the summer term. These are NMSU students who transfer twelve credits from advanced undergraduate courses to double-count for the Master's as well as the Bachelor's degree. Support may be extended for an additional semester in exceptional cases, as determined by the Department Head and the Graduate Program Director.

5.5 School-Imposed Time Limits on Support

The Graduate School limits the number of years a student can receive financial support from state funds, as Teaching Assistantships usually are. These limits depend on the students' status and program:

Master's students: Two years, or four semesters (may petition for a fifth semester)

Ph.D. students:

The limits are dependent on the student's educational background upon entering the NMSU graduate program; they are:

- Four years if entering with a Master's degree (may petition for a fifth year)
- Five years if entering directly from a Bachelor's program (may petition for a sixth year)

Research Assistantships, which are normally not funded by the state, are not subject to these limits. You should be aware of these constraints when planning your program of study. If you believe that you will need to petition for an extension, you should discuss this with your advisor well in advance.

6 Ethics and Professional Conduct

The New Mexico State University has defined a set of rules of conduct, covering academic, social, and professional conduct. The University's Student Handbook, available at

https://studenthandbook.nmsu.edu/ must be consulted for the latest version of the rules and for information on resources and procedures. This page also contains a Notice of Non-Discrimination and Equal Opportunity. Please discuss with your research advisor, graduate advisor, or department head if you have any questions or require additional clarifications.

Academic misconduct includes issues like plagiarism (use of material from other sources without clear acknowledgement or citation of the source) and cheating in exams or class assignments. To avoid inadvertently violating the rules, please consult the syllabus and if still unclear ask the course instructor for what is allowed in a given course: collaboration among students on assignments, material that can be used in an exam, etc. You are responsible for being aware of and following all the rules in each class you take.

7 Representation

As of December 30, 2022, Graduate Assistants at NMSU, Teaching or Research, are represented by a union, the United Electrical, Radio and Machine Workers of America, through a collective bargaining agreement. This agreement may affect several of the topics listed in this handbook, including salaries and benefits, work requirements, code of conduct, and conflict resolution, among others. A copy of the agreement can always be found at https://gradschool.nmsu.edu/ga-and-union/collective-bargaining-agreement.html. Students will be provided with information on the union upon entering a graduate program. Union membership, which involves payment of dues, is voluntary; however, the agreement applies to all gradate students. You are encouraged to become familiar with the agreement and the ways it affects relationships between graduate students and the university.