Orientation Manual:
New Physics Graduate Students

Department of Physics
The University of Texas at Austin

Staff & Students[1]
Department of Physics
The University of Texas at Austin
Austin, TX 78712

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[1] This manual is available online at http://www.ph.utexas.edu/doc/grad_manual.pdf. Send comments to graduate@physics.utexas.edu.

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Chapter 1: Introduction

1.1 Purpose of this Manual

This manual is intended to provide an overview and concise statement about how the Department of Physics at The University of Texas at Austin is organized and provides support for graduate students. It is particularly relevant for graduate student assistants, especially Teaching Assistants (TAs) including Graders and Discussion TAs, as well as for Assistant Instructors (AIs). The organization and operation of the Department are under the control of the departmental Budget Council, the faculty, and administered through the Chair of the Department and the policies are based on the *Rules and Regulations of the Board of Regents* [1]. Many of the *Regents' Rules* are further expressed and refined for the UT-Austin campus in both the *[Original] Handbook of Operating Procedures* and the *Revised Handbook of Operating Procedures* [2] (revision of these documents is a long-term project still in progress). Academic procedures and policies are given in the *General Information Catalog* [3], the *Undergraduate Catalog* [4], and the *Graduate Catalog* [5]. In addition, there are numerous policy issues discussed in handouts from offices such as The International Office and The Office of Human Resource Services. In the following, when discussing a specific topic, we will provide the references to the appropriate documentation. Much of this material is available in the library and also on the web and we will provide the links where they are available. A best first source of information and advice to new graduate students is the Graduate Coordinator (see Section 2.2.3).

1.2 General Comments

The Department of Physics is a large department, among the largest physics departments in the country. The University of Texas at Austin, as measured by enrollment at a single campus, is the largest in the country. The student body is diverse with most of the undergraduates from the State of Texas and most of the graduate enrollment from out-of-state. There are approximately 220 undergraduate majors and 230 graduate students. A large fraction of the teaching-load of the Department resides in service courses for non-majors. The research interests of the faculty span all the areas of modern physics and some of these groups are among the best in the world. In addition, the University is in the center of the City of Austin, a growing progressive urban center which is also home to two other smaller universities and a large community college system, the latter is home to approximately 30,000 students itself. The purpose of this preamble is to make clear that there is a full range of options for housing, entertainment, and transportation. Similarly, there is a full spectrum of research opportunities. These are choices that have to be worked out over time. Special courses and seminars supporting these choices will be reviewed (see Section 3.3.5) but, in general, none of these issues will be covered in detail in this manual.

The University administrative units which most effect the lives of graduate students in our department are The College of Natural Sciences and The Graduate School. The general division of issues between these units is obvious from their names. The College manages the undergraduate program and the budget of the Department. The Graduate School administers graduate programs and sets policy for student programs (see Section 2.2.3). In addition, University Health Services provides medical services and The International Office provides support for international students. These units are administered by the Vice President for Student Affairs and the Vice-Provost for International Programs, respectively.

The Department of Physics is primarily housed in Robert Lee Moore Hall (RLM) located at the southeast corner of Dean Keeton (formerly: 26th Street) and Speedway. There are two principal lecture halls and a lecture demonstrations support facility (Section 2.3.6) in Painter Hall at 24th Street between Inner Campus Drive and Speedway. In addition, the Particles and Fields research group has laboratory space in the Engineering Science Building (ENS) located to the southeast of RLM. In addition to facilities on the Main Campus, the University has a Research Campus nine miles to the north, the J.J. Pickle Research Campus. Several facilities, in particular: the Applied Research Laboratories (ARL), a defense-oriented contract research laboratory, and the Nuclear Engineering Teaching Laboratory, which may be of special interest, are located there.

1.3 On Being a Graduate Student

You are about to start on your program of graduate education. In many ways, this is an extension of the undergraduate experience. Also, it will be very different. The first big difference is that, in almost all cases, you will be wearing two hats—as a student and as an employee generally working in an instructional or research situation. For most of you the "employee working in an instructional or research situation" hat may be new. It also turns out that the student hat is probably more different than you may anticipate. Discussions with experienced graduate students are a good idea but remember that the grapevine is not always the most reliable source of information. If the issue is important to you, you should refer to this manual or ask the Graduate Coordinator, Matthew Ervin (see Section 2.2.3). Here we will review some general principles that should be helpful. Keep in mind that all people are unique and the following is only a general guide.

As a graduate student, we assume, in general, that you are here to pursue a Ph.D. There are a few students who enter with the intention of ending their graduate education with a master's degree but that is a rarity. A fair fraction of students start with the intention of pursuing the Ph.D. but choose, usually for personal reasons, to end their studies with an M.A. Despite this reality, the University considers you to be a Master's Candidate until you qualify for Ph.D. Candidacy. The process of Qualification demarks a major threshold in your academic program (Section 3.3.2 discusses the requirements). In a sense, your academic life in the program falls into two general categories: pre- and post-Qualification. Prior to qualifying, you generally take courses and begin to think about your subfield of specialization. This 'thinking' could be done in the form of working in a lab part-time, usually without support other than a TA position. Post-Qualification, you work on your dissertation and take a few highly-specialized courses in your field of interest or perhaps some advanced course outside your subfield, a requirement of The Graduate School and the program. You will generally be supported as a Graduate Research Assistant (GRA) but in some cases students continue as TAs or AIs for most of their graduate education.

Prior to Qualification, which must be accomplished in two years and a semester, you take required Core Courses together with a few Advanced Courses (see Section 3.3.3). In all cases, expect that the course work will be much greater than that which you have experienced in any undergraduate course previously. This is especially true of the Core Courses. In fact, the full-time load of at least nine (9) credit hours, is generally met for incoming graduate students with a registration in one or two Core Courses. The remainder of the nine-hour registration is generally softer courses such as Graduate Colloquy or a seminar course. All TAs are required to take the 398T 'Supervised Teaching in Physics' (see Section 3.3.4) in their first year. In addition, you will probably find the format and nature of the graduate courses different. The homework assignments will be quite difficult and time-consuming. There may be take-home exams. Generally, you are on your honor to complete these in a fashion that is consistent with the norms of the University's Policy on Academic Honesty. Collusion or copying of answers from other students or from collections of problem solutions is inappropriate and, if proved, can lead to penalties including dismissal. Do your own work. In some cases, an instructor may encourage group work. Be sure to clarify with the instructor the level of collaboration that is allowed.

Remember that almost all graduate students are employed for twenty hours per week in either a teaching or research position. The combination of classes and significant employment will consume most of your time.

During this pre-Qualification period, you will have to pick a research area and a faculty supervisor. There are courses such as the "Introduction to Graduate Research" seminar (see Section 3.3.2) which are designed to help you in choosing. In addition, there are opportunities to work as a GRA in labs in the summer. This is particularly valuable for students in the first and second summer as a means of support but also because it introduces you to the research area of the lab. Students should seek such positions early in the spring semester. In addition, faculty will assist students in finding summer appointments at National Laboratories such as Sandia, Los Alamos, Oak Ridge, and Livermore. Regardless, the selection of the research project and faculty supervisor is among the most important that a student can make and should be done with great care.

After qualifying, academic life is dominated by dissertation research. In a formal process the student petitions for Ph.D. Candidacy (see Section 3.3.2). This is the step that establishes the student's Program of Work toward a Ph.D. and, more specifically, is the first formal step in preparing a dissertation. The dissertation topic is one jointly agreed upon by the student and his or her faculty supervisor who also serves as chair of the student's Ph.D. committee that monitors the progress of the student's work. In most cases, there is support as a GRA for work on the dissertation topic; the faculty supervisor of the dissertation will have a grant to support student's work. The preparation of a dissertation takes from three to five years depending on a variety of factors.

After the student is admitted to candidacy the nine-hour registration is generally in dissertation courses, PHY X99, where X is 3, 6 or 9 (see Section 3.3.3) depending on whether other courses are taken.

Finally, there is an excellent paper housed on the Indiana University website (http://www.cs.indiana.edu/how.2b/how.2b.html) entitled, "How To Be A Good Graduate Student", while it is not the final word on being a graduate student, but it is an excellent place to begin. You are strongly encouraged to make yourself familiar with this work.

1.4 Student Responsibility

While the University faculty and staff members give students academic advice and assistance, each student is expected to take responsibility for his or her education and personal development. The student must know and abide by the academic and disciplinary policies given in this catalog and in *General Information*, including rules governing quantity of work, the standard of work required to continue in the University, warning status and scholastic dismissal, and enforced withdrawal. The student must also know and meet the requirements of his or her degree program; must enroll in courses appropriate to the program; must meet prerequisites and take courses in the proper sequence to ensure orderly and timely progress; and must seek advice about degree requirements and other University policies when necessary.

The student must give correct local and permanent postal addresses, telephone numbers, and e-mail address to the Office of the Registrar and must notify this office immediately of any changes. Official correspondence is sent to the postal or e-mail address last given to the registrar; if the student has failed to correct this address, he or she will not be relieved of responsibility on the grounds that the correspondence was not delivered. Students may update their addresses and telephone numbers at http://registrar.utexas.edu/services/.

The student must register by the deadlines given in the *Course Schedule* and must verify his or her schedule of classes each semester, must see that necessary corrections are made, and must keep documentations of all schedule changes and other transactions.

Students should familiarize themselves with the following sources of information:

University catalogs. *General Information* gives important information about academic policies and procedures that apply to all students. It includes the official academic calendar, admission procedures, residence requirements, information about tuition and fees, and policies on quantity of work, grades and the grade point average, adding and dropping courses, and withdrawal from the University. This catalog also gives historical and current information about the University's organization and physical facilities. It describes the services of the Division of Student Affairs and the libraries and research facilities that support the University's academic programs.

The *Graduate Catalog* gives information about degrees offered by The Graduate School. It describes academic policies and procedures that apply to gradate students and lists courses and members of Graduate Studies Committees.

Catalogs are available online at http://registrar.utexas.edu/catalogs/index.html.

The Course Schedule. The *Course Schedule* is published by the Office of the Registrar and is available before registration for each semester and summer session at http://registrar.utexas.edu/schedules/index.html. The *Course Schedule* includes information about registration procedures; times, locations, instructors, prerequisites, and special fees of classes offered; and advising locations.

The University Directory. The printed University directory is redistributed by Texas Student Media each fall. It gives physical and e-mail addresses and telephone numbers of University offices and of students and faculty and staff members. Current directory information is available online at http://www.utexas.edu/directory/.

World Wide Web. The address for the University's home page on the World Wide Web is http://www.utexas.edu/. In addition to the publications described above, the Web site includes sites maintained by departments, colleges, graduate programs, museums, libraries, research units, and student-service offices.

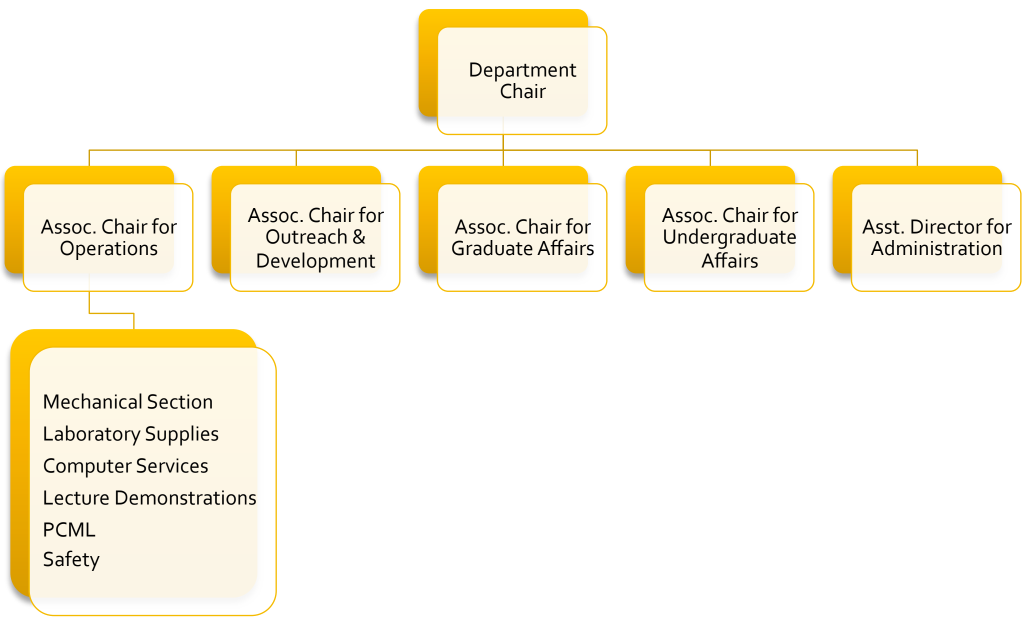
The Office of Graduate Studies is the central sources of information for graduate students. Doctoral and master's degree evaluators provide information about procedures for submission of reports, theses, dissertations, and treatises, and the student services section assists with registration and related matters. Information for both prospective and current students is available at http://www.utexas.edu/ogs.

Graduate advisers, assistant graduate advisers, and graduate coordinators. The graduate adviser for each program is a faculty member designated to advise students and represent the Graduate School in matters pertaining to graduate study. He or she provides information about he program, including admission and degree requirements, and about fellowships, teaching assistantships, and research assistantships. The Graduate Coordinator, a staff member who assists the Graduate Adviser and other faculty members in the administration of the program, also provides services to students.

Chapter 2: Organization and Operation

2.1 Organization of the Department

The Department is managed by a Department Chair, four Associate Chairs, and an Assistant Director for Administration. The Chair and Associate Chairs constitute the Department's Management Committee. The Department Chair is appointed by the Dean of the College of Natural Sciences for a four-year term, upon consultation with The Budget Council; the Associate Chairs are appointed by the Department Chair.



Presently, there are 15 faculty committees ranging from the Department Development Committee to the Lecture Demonstrations Committee, each reporting to a member of the Management Committee. These committees have a varying degree of importance in and impact on your life as a graduate student in the Department. Those which are of most importance to you are described in sections 2.1.2, 2.1.3, 2.1.4, and 2.1.5 below. All of the committees are listed in the next section.

2.1.1 Department Committees

Reporting to the Department Chair:

Budget Council Advisory Committee (BCAC)[2]
Faculty Recruitment Committee[1]
Management Committee

[2] The BCAC and Faculty Recruitment Committee report to the BC as well as to the Department Chair.

Reporting to the Associate Chair for Operations:

Operations Committee
Lecture Demonstration Committee
Safety Committee

Reporting to the Associate Chair for Outreach and Development:

Department Development Committee
Outreach Committee
Colloquium Committee
Saturday Workshop Committee
Department Web Page Committee

Reporting to the Associate Chair for Graduate Affairs:

Graduate Recruitment Committee
Graduate Studies Subcommittee
Graduate Welfare Committee

Reporting to the Associate Chair for Undergraduate Affairs:

Committee for Undergraduate Affairs
Undergraduate Advising Committee

2.1.2 The Graduate Studies Committee (& Sub-Committee) [GSC & GSSC]

The Graduate Studies Committee consists of the faculty of the Physics Department as well as a few faculty from outside the Department who are deemed qualified to supervise the dissertations of Physics students; it is officially in charge of graduate academic affairs.

Since the GSC is so large, The Graduate Studies Sub-Committee (GSSC), which has one member from each research area, has been given many of the policy-making powers of the GSC. Waivers of requirements or extensions and transfers of credit are acted on by the GSSC in response to graduate student petitions. The Chair of both the GSC and the GSSC in Physics is Professor Phil Morrison, who is responsible for each student's registration, records, and progress. He is the Department's representative to the Vice-Provost and Dean of Graduate Studies. To communicate with the GSSC, contact the Graduate Coordinator, Matthew Ervin (see Section 2.2.3).

2.1.3 The Graduate Welfare Committee [GWC]

The Graduate Welfare Committee supervises the welfare of the Department's graduate students; it is currently chaired by Professor Alex de Lozanne. Any issues of importance to graduate students as they are related to the nature of their employment, benefits, or academic program can be brought to the GWC. There are Graduate Student Representatives on the GWC and they are your best contact. A list of the students currently working with the Committee is available on the GWC website listed below. The students maintain a Grad Issues website at http://www.ph.utexas.edu/~gradissu/ and you may email them at gradreps@physics.utexas.edu.

2.1.4 The Graduate Recruitment Committee [GRC]

The Graduate Recruitment Committee is currently chaired by Professor Richard Fitzpatrick, and is tasked with recruiting new graduate students. This Committee is also responsible for preparing for the Annual Graduate Recruitment Open House held each spring. Students' assistance with Recruitment Week is a great help.

2.1.5 The Operations Committee

The Operations Committee is chaired by the Associate Chair for Operations, Professor Gerald Hoffmann. The Operations Committee is charged with various operational aspects of the Department, including: the Mechanical Section, Laboratory Supplies, Computer Services, Lecture Demonstrations, PCML, serving as liaison to the PMA Library, and Space policy and assignments. Detailed office assignments following guidelines set by the committee are made by Ben Costello (see Section 2.2.8).

2.2 Administrative Offices

Most of the general administrative units of the Department of Physics are housed on the fifth level of RLM. Shops are generally on the third level of RLM. The following is a list of the areas of responsibility for each unit and the staff and their location. There are often problems or questions that do not fit neatly into a particular niche. For cases like this, it is most efficient to ask either Matthew Ervin in the Graduate Office (RLM 5.224) or Eric Hayes Patkowski in the Department's Main Office (RLM 5.208).

2.2.1 Chair's Office

The Department Chair, Richard Hazeltine, is responsible for teaching assignments. He generally delegates authority for the assignments of TA/AIs to the Graduate Coordinator, who works under the Graduate Adviser and GSSC. The Chair is the final authority on departmental administration. He assigns secretarial and shop staff, assigns offices (through the Operations Committee), approves budget transactions, and must approve all Requests for Travel Authorization (RTAs).

- **Department Chair**
  Professor Richard Hazeltine, RLM 5.206
- **Chair's Administrative Assistant**
  Carol Monette, Administrative Associate, RLM 5.204
- **Assistant Director for Administration**
  Mary Lindholm, RLM 5.214

2.2.2 Appointments

There are generally two types of appointments for graduate students in the Department: *teaching appointments* with titles such as Teaching Assistant (TA) or Assistant Instructor (AI), and *research appointments* with the most common title in this group being Graduate Research Assistant (GRA). (Please, bear in mind that the University itself makes a series of more complex distinctions). Details of the job duties associated with these titles will be discussed elsewhere (see Section 4.2). Depending on the nature of the appointment, the administrative processes are handled differently. TA and AI Appointments in the Department of Physics are handled in two offices. Matthew Ervin, the Graduate Coordinator (Section 2.2.3) initiates the assignment which is then processed as an appointment by the Assistant Director for Administration (RLM 5.214). Research appointments are handled by Linda Hallidy, the Chair's Assistant (RLM 5.204) or in the Organized Research Units (see Section 2.4). Any problems regarding the nature and time of appointment, benefits, and pay should be referred to these offices for TAs, AIs, and GRAs. Problems with appointments made for GRAs in centers should be referred to the respective center administration.

- **TA and AI Assignments**
  Matthew Ervin, Graduate Coordinator, RLM 5.224
- **TA and AI Appointments**
  Lisa A. Gentry, Undergraduate Coordinator, RLM 5.216
- **Research Appointments**
  Carol Monette, Administrative Associate, RLM 5.204

2.2.3 Graduate Affairs Office

For all matters concerning graduate students, the Department of Physics' Graduate Affairs Office is the first place to go. The Graduate Adviser, Professor John Keto, advises all graduate students on their courses of work, degree requirements, and academic progress. The

Graduate Coordinator serves as his support staff. All graduate students not yet admitted to Ph.D. candidacy (see Section 3.3.2) and students with special programs or requirements must be advised before registering for any courses.

- **GSC Chair**
  Professor Phil Morrison, RLM 11.222
- **Graduate Adviser**
  Professor John Keto, RLM 10.315
- **Graduate Affairs**
  Matthew Ervin, Graduate Coordinator, RLM 5.224

2.2.4 Undergraduate Affairs Office

The Undergraduate Affairs Office plays a similar role to the Graduate Office. Course scheduling and room reservations are coordinated here. Textbooks for faculty and TA's use in their classes are available here. Undergraduate students with a scheduling problem should be referred here. All course grades, graduate and undergraduate, are handled here. This office also has a compilation of course syllabi and first day handouts (see Section 5.1.2). All teaching personnel should supply this office with this material and give the times and location of their office hours (see Section 5.5). The Course Instructor Surveys for all Physics courses are available in the Undergraduate Office for pickup at the end of the semester.

- **Undergraduate Adviser**
  Professor Greg O. Sitz, RLM 10.313
- **Undergraduate Affairs**
  Lisa A. Gentry, Undergraduate Coordinator, RLM 5.216

2.2.5 Purchasing / Accounting

Purchasing and acquisition of materials and supplies at the University is a complex affair and has to be handled by trained personnel. In the case that you are required to purchase lab equipment or class supplies for a class in which you assist, process your request for class supplies through the Laboratory & Supply Office (Section 2.3.5) and all other purchases for departmental purposes through the Purchasing Office. Purchases for supplies for research centers are handled by each center's administrative office. Graduate students working for individual faculty members on grant support should process purchasing through the Purchasing Office.

- **Purchasing/ Accounting**
  Glenn Suchan, Purchasing/Accounting, RLM 5.218
  Dale R. Campbell, Accounting/Purchasing, RLM 5.208
  Mary Holt, Financial Analyst, RLM 5.218

2.2.6 Travel

Travel for official business should be arranged through the Travel Coordinator, Linda Hallidy. All travel while on appointment in any teaching or research title, whether for personal or for official business, must have prior approval. Requests for Travel Authorization (RTAs) are filed by this office. You must file an RTA for any travel during the period of appointment in any title. This includes time between classes. This includes travel supported by fellowship accounts. If the travel takes place when appointed as Graduate Research Assistant, the Administrator for your research supervisor files the RTA.

- **Travel Office**
  Dale R. Campbell, Travel Coordinator, RLM 5.208

2.2.7 Mail & Package Delivery

US mail, campus mail, and packages are delivered to the Department daily. The correct mailing address is:

Name of Recipient
Department of Physics
The University of Texas at Austin
1 University Station C1600
Austin, TX 78712-0264

This address also works for UPS, Federal Express, and Airborne and may require an additional physical building address of 2511 Speedway. The address for campus mail is:

Name of Recipient
Department of Physics
Campus Mail C1600

Graduate student mailboxes are located in the hall on the south wall of the fifth level of RLM between the Graduate Office and the Undergraduate Office. Package delivery and pickup is in RLM 5.208. Campus mail and US mail that is processed by the University is for *official business only*. Personal mail and packages of all kinds should be sent to your local home address. Personal mail cannot be sent through University mail but must be placed in mailboxes on the street outside the building.

- **Mail & Package Delivery**
  Eric Hayes Patkowski, Administrative Assistant, RLM 5.208

2.2.8 Office Assignments

Because graduate student demand for office space exceeds availability, all graduate student office assignments are made in the following priority: Graduate Research Assistants, Teaching Assistants with laboratory or discussion section teaching assignments, Teaching Assistants with grader assignments. In almost all cases, graduate students share an office space and are assigned a desk. In some cases, graduate students share a desk. Assignments are made by Ben Costello in the Laboratory and Supply Office, Section 2.3.5, on the 8th floor of RLM, Section 2.3.5. Assignments are approved by the departmental Space Committee, see Section 2.1.6.

- **Office Assignments**
  Ben Costello, RLM 8.306

2.2.9 Clerical, Fax, and Copying Services

Standard office support such as test preparation, special typing, fax machine (512) 471-9637, copying facilities, and web support are provided. Allow at least two days for copying of quizzes during the semester and at least five days (or more) for copying of final exams and mid-terms. Copying machines are available and can be used for official purposes. Personal copies can be made for a charge of $0.05 per page using the honor system. Preparation of the calendar of events is also carried out in this office. All events for the calendar should be submitted to Eric Patkowski by Thursday of the week prior to the event. Room reservations for events should be made through Eric as soon as you become aware of the need. Events scheduled by Eric include: qualifying exams, dissertation defenses, and guest lectures.

- **Copying, Web Support, & Calendar Coordination**
  Eric Hayes Patkowski, Administrative Assistant, RLM 5.208

2.3 Shops

2.3.1 The Mechanical Section

Machine Shop. The Physics Machine Shop provides support for faculty and students when machined and welded items are needed. The shop has the capability to produce almost any machineable item for materials such as stainless, copper, brass, aluminum and plastics. There are also computer controlled machine capabilities to produce the more complicated pieces. The shop location is RLM 3.206 and students, faculty, and staff can submit designs for construction to the shop supervisor in RLM 3.205

- **Machine Shop**
  Allan Schroeder, Shops Supervisor, RLM 3.205

Cryogenics Shop. Labs needing liquid nitrogen and helium along with compressed gases nitrogen, argon, carbon dioxide, hydrogen and helium can purchase these items here. Helium leak detection available for vacuum chambers and components requiring UHV. Vacuum pumps needing maintenance or repair are also handled here. Other services include metal evaporation. There are two technical staff members in the cryogenics shop RLM 3.104 to assist you.

- **Cryogenics Shop**
  Edwin Baez, Technical Staff Assistant V, RLM 3.104

Student Machine Shop. Students wanting to machine parts for their instruments can do so in the student shop (RLM 3.210). There is equipment available to machine most items along with a foot shear, pan break, punch press, roll, bead blaster and oxy-acetylene for soldering. Safety is the main concern for students operating equipment. A shop safety manual [7] along with shop rules must be read and understood before operating equipment, see Appendix A and B. Jack Clifford, the student shop supervisor, is available to help with design and operation of machinery. Students supply their own tooling which is available in the Physics Storeroom RLM 3.108.

- **Student Machine Shop**
  Jack Clifford, Student Shop Supervisor, RLM 3.210

2.3.2 Electronics

Electronics Repair. The UT Physics Department Electronics Repair Shop is responsible for the maintenance and repair of all electronic equipment in the Department with the exception of computers. Computer repair and maintenance is handles by the Computer Services Group, Section 2.3.4. In addition, if repair is not economical or prudent due to obsolescence, lack of documentation or unavailability of replacement parts, the shop will assist in the replacement of equipment. The shop stocks test instruments and some replacement parts for use by faculty and students in their limited storage space.

- **Electronics Test and Repair**
  Gary Thomas, Shop Supervisor, RLM 3.212

Electronics Design. The Department also supports a shop to design or assist in the design of electronic equipment. Instruction for construction of simple projects and engineering assistance is available for circuit design, troubleshooting and advice. There is a circuit board design capability for limited construction runs.

- **Electronics Design**
  Robert Hasdorff, Design Engineering, RLM 3.212

2.3.3 CNS [Computer] Help Desk

The College of Natural Sciences Office of Information Technology (CNS OIT) provides computer support for faculty, staff, and graduate students via the CNS Help Desk. The computer support includes networking within the physics domain, maintaining computers in the Physics MicroComputer Lab (PMCL) in RLM 7.306, departmental administration staff computers, computational machines, research group's computers as requested, provisioning of faculty and staff e-mail services, and other associated computer related services. The College supports the computer based homework and testing system called Quest. In Appendix C, are the frequently asked questions associated with the use of the services provided. Also visit the CNS OIT website at http://cns.utexas.edu/deans-office/information-technology/ or contact the help desk at http://www.cns.utexas.edu/help/.

2.3.4 Laboratory & General Supplies

Supplies for classrooms and laboratories, including lab manuals and grade books, are available in he Laboratory Supplies Room. All emergencies should be reported here: Fire extinguishers, first aid kits, a telephone, quick action, and assistance are available here. Students are expected to provide their own notebooks, lab manuals, and other expendable supplies such as film. These are available at the University Co-Op on Guadalupe Street or elsewhere. Other equipment is checked out by students from the Laboratories Supply Room.

- **Laboratory & General Supplies**
  Ben Costello, Shop Supervisor, RLM 8.306

2.3.5 Lecture Demonstrations

The Physics Lecture Demonstrations Office provides demonstration support for introductory Physics courses taught in Painter Hall. It provides web-based demonstration ordering. It utilizes the Physics Instructional Resource Association (PIRA) classification scheme. This office has also been the source of the world famous Physics Circus (begun in 1978), and the Traveling Physics Circus (which received the first ever College of Natural Sciences Outreach Award).

- **Lecture Demonstrations**
  Andrew Yue, Supervisor, PAI 2.48A

2.4 Centers and Research Groups

Research at the Department of Physics is organized around generally identified groupings and Centers. Centers are separate Organized Research Units (ORUs) generally with secretarial and other support staff. The following is a general description of the activities of the research being done in each group or Center. Within each group or Center, details of the research interests of individual faculty can be found by going to the Department of Physics web page at http://www.ph.utexas.edu/research.php.

2.4.1 Atomic, Molecular, and Optical Physics

Atomic, Molecular, and Optical (AMO) Physics deals with structure and dynamics of atoms and molecules and their interactions with the electromagnetic field. Research in AMO physics extends from the regime of extremely low temperature gases to the other extreme of high-field matter light interactions, spanning approximately fifteen orders of magnitude in energy. Current work in the AMO group is in the areas of ultra-cold atoms and Bose-Einstein condensates, atom optics, and quantum control, quantum optics, scattering of molecules from surfaces, neutrino rest mass from beta decay, molecular beam slowing, formation and study of nano-particles, molecular scattering and sonoluminescence, tabletop accelerators, laser fusion and relativistic shock waves. The research is inherently multi-disciplinary, and members of the AMO group have developed close collaborations with faculty in condensed matter physics, nonlinear dynamics, high energy physics, and plasma physics, and even beyond the physics department.

The group currently has eight faculty, five post-docs, and approximately thirty graduate students, and runs an active seminar series with coffee and donuts.

2.4.2 Condensed Matter

Condensed matter physics is mainly concerned with the properties of matter in the solid state. Much modern research focuses on the properties of artificial materials in which atoms are put together in new ways either at the atomic level or on nanometer length scales. Many properties of solids are associated with the quantum motion of electrons from atom to atom. Many of the most robust and dramatic properties are due to the grouping of many electrons into a rigid macroscopic degree of freedom that occurs, for example, in superconductors and magnets.

Problems currently being examined include the electrical transport proper-ties of carbon nanotube 'quantum wires', transport and magnetic properties of thin films of ferromagnets, magnetic properties of materials in non-equilibrium structures, magnetization reversal in nanometer scale magnets, scanning electron microscopy, high-sensitivity magnetometry and coherence effects in light-absorption in semiconductors with self-assembled quantum dots.

The group has eight faculty, six postdoctoral fellows, and approximately thirty graduate students and runs two active seminar series.

2.4.3 Particles and Fields

Both experimental and theoretical research is included in the work done by members of the Center for Particle and Fields. On the experimental side precision B meson physics, including CP violation, is done with the detector BaBar at the B-factory, PEP-II, at SLAC. The study o neutrino oscillation will be undertaken by MINOS, a long baseline experiment under construction at FermiLab and in the Soudan mine in Minnesota. A new faculty member who studies solar neutrinos at SNO in Ontario will be joining the group in Fall 2002. In addition an experiment to measure the neutrino mass directly is under construction in Austin. Theoretical work includes neutrino oscillations, unitarity in ordinary theories and in theories with extra dimensions, quantum computing, the quantum theory of quasi-stable states and the modification of Hilbert space in standard quantum mechanics.

The group has ten faculty members, five postdoctoral research associates, approximately thirteen graduate students, several undergraduate students and a laboratory manager.

2.4.4 Nonlinear Dynamics and Biophysics

Research in the Center for Nonlinear Dynamics concerns complex dynamics, instabilities, chaos, and pattern formation in systems driven far from thermodynamic equilibrium. Diverse systems exhibit remarkably similar, sometimes even universal behavior. Studies in the Center of solid, fluid, chemical, granular, low-temperature gas, chemical, and biological systems involve laboratory experiments, numerical simulations, and theoretical analyses. Problems currently being examined include instabilities at fluid interfaces, dynamics of fluidized beds, spatial patterns and shock waves in granular flows, pattern formation in chemical reaction-diffusion systems, internal waves, crack propagation in crystalline and amorphous materials, student flows, quantum chaos with ultra-cold atoms, nonlinear dynamics of bose condensates, general methods of laser cooling, biopolymer mechanics, Brownian motion, cell mechanics, molecular motors, intracellular transport, super-resolution microscopy, biofilm formation, bacterial competition and biological membranes.

The group includes six faculty members, four postdoctoral research associates, about thirty graduate students, and a dozen undergraduates. The nonlinear dynamics group meets together on Mondays and Wednesdays at 1 p.m.; on Mondays a seminar is presented, usually by a visitor, and on Wednesdays a student presents his or her research. These meetings are open to all and are listed on http://chaos.utexas.edu/talks.

2.4.5 Nuclear Physics

Our Relativisic Heavy Ion Physics (RHIP) group conducts experimental research using the STAR (Solenoidal Tracker At RHIC) detector at The Relativistic Heavy Ion Collider (RHIC) of the Brookhaven National Laboratory in New York. RHIC provides colliding beams of Au nuclei, each with kinetic energy of 100 GeV /nucleon, so that the total center-of-momentum kinetic energy is 40 TeV! A new generation of exciting and fundamental experiments are underway at RHIC.

Significant components of the STAR physics program include: a search for (1) a *color-deconfined state of matter*, (2) *evidence of chiral symmetry restoration*, and (3) the *study of matter as it may have existed during the early moments of the Universe*. The program is very interdisciplinary and spans cosmology, astrophysics, particle physics, nuclear physics, relativity, computer science, and mathematical physics. To learn more about STAR and RHIC go to http://www.rhip.utexas.edu.

Presently the group consists of two faculty, three senior research scientists, one engineer, and four graduate students.

2.4.6 Relativity

The Center for Relativity studies quantum and classical aspects of Relativity. The faculty consists of the Director, Richard Matzner, whose interests are in Relativistic astrophysics (cosmology, compact objects, gravitational wave production and detection), and in classical analytical Relativity. Professor Matzner works extensively on computational models applied to these subjects. Professor Larry Shepley (retired) studies classical analytical structures in Relativity, in gauge theories, and in symplectic systems (classical mechanics). Professor Cecile Dewitt (*emerita*) studies field theory in curved spacetimes, and formulations of path-integral approaches in general spacetimes.

The center typically has two to three post-docs and five to eight graduate students.

2.4.7 Plasma Physics

The Institute for Fusion Studies is a national center of excellence engaged in both theoretical and experimental research in a broad spectrum of topics within the field of plasma physics.

Theory Group: The theory group conducts research in theoretical plasma physics and fusion energy science, with studies of magnetic plasma confinement, basic plasma processes, and related issues. Particular emphasis is placed on fundamental issues of long-range significance. The theory research being pursued at IFS is diverse, including plasma macrostability, plasma turbulence and anomalous transport, energetic particle physics, numerical simulations, plasma-boundary interactions, and nonlinear plasma dynamics. The Institute also performs theoretical research in laser-plasma interactions (e.g., providing support for the Texas Petawatt laser project), plasmonics/photonics, and space plasma physics. Much of the research is interdisciplinary, involving such neighboring fields of research as astrophysics, fluid dynamics, statistical mechanics, high-performance computing, nuclear and aeronautical engineering, field theory, and modern optics.

Experimental Group: The experimental group supports a number of programs in experimental plasma physics. Historically, it has emphasized studies of transport and turbulence in fusion plasmas, but the range of work is expanding. The largest projects are collaborations on the C-Mod tokamak at MIT and the D-IIID tokamak in San Diego, with studies of electron thermal transport, turbulence, and related effects on both devices. A new on-campus experiment, the Helimak, is studying the basic predictions of plasma turbulence models and computer simulations. These projects offer numerous excellent dissertation topics and opportunities for research assistantships. The experimental group cooperates closely with the theory group in research, seminars, course offerings, and administrative support.

The IFS also serves as a center for fusion science information exchange, nationally and internationally, by arranging visitor programs, courses, conferences and workshops. As part of this effort, it is the principal site in the United States for the exchange activities of the US-Japan Joint Institute for Fusion Theory.

The IFS has an extensive academic program, involving student education (course work, seminars, thesis research) and postdoctoral training.

The present staff of the Institute comprises 25 Ph.D. scientists (including physics faculty, research scientists, and postdoctoral fellows) and approximately 25 graduate students, in addition to computational staff and administrative personnel. The IFS actively supports numerous research collaborations with laboratories and universities in the US and other countries. IFS scientists regularly collaborate with other Physics Department faculty as well as scientists in other departments at the University.

2.4.8 Complex Quantum Systems

Visit the center's website for more information on the Center for Complex Quantum Systems http://order.ph.utexas.edu/. The group holds a weekly seminar. It has eighteen faculty, seven postdoctoral fellows, and approximately fifteen graduate students .

2.4.9 Weinberg Theory Group

The Weinberg Theory Group is an Organized Research Unit engaged in a broad program of research in theoretical physics. It is directed by Professor Steven Weinberg, and currently includes Professors Willy Fischler, Jacques Distler, Vadim Kaplunovsky, Sonia Paban, and five postdoctoral fellows, six graduate students, three classified staff, plus Visiting Scholars.

The group's work spans the range from studies of physics at the most fundamental level to exploration of current issues in cosmology. On the more fundamental level work concentrates primarily on enlarging understanding of string theory and M-theory. Studies also include supersymmetric field theory, both its relation to string theory and its application to phenomenology.

The group welcomes students to its seminars; it holds three different types of talks weekly. The Theory Group Seminar (PHY 396U) features researchers from other universities resenting technical talks. The Brown Bag Meeting focuses on more informal talks on current research within the Theory Group. The Geometry and String Theory Seminar is jointly run by the group and the Department of Mathematics and presents talks by both Mathematicians and Physicists.

2.4.10 Texas Center for High Energy Density Science

High energy density (HED) physics is the study of matter at high temperature and density. There is one experimental program and a number of associated research groups in the Department that perform experiments and theory in high energy density physics.

The Center for HED Science: This is a newly formed Center in the College devoted to experimental and theoretical work in HED physics. The centerpiece research tool for CHEDS is the Texas Petawatt Laser, currently the highest power laser in the world. With this laser, and other associated high intensity lasers, the Center conducts research on the properties of high temperature, high density plasmas, often with astrophysical motivations. Novel methods of driving nuclear fusion are investigated as are plasma explosions that simulate supernovae. Methods to accelerate electrons and protons to very high energy over short distances are studied by CHEDS faculty. High pressure shock waves in materials can also be generated and studied with CHEDS lasers. CHEDS does work on very high magnetic fields and the evolution of high temperature plasmas in such fields as well.

CHEDS includes over 40 people including five faculty, numerous staff scientists, post-docs and a large contingent of graduate students. CHEDS has a sizable number of diverse projects which can lead to interesting dissertation topics and is actively seeking graduate students. CHEDS works closely with the plasma physics group especially the Institute for Fusion Studies. CHEDS also maintains a number of collaborations with national labs, particularly Sandia, Lawrence Livermore, and Los Alamos, so many opportunities for travel to use the facilities at these institutions also exist.

2.5 Other Academic Resources

2.5.1 PMA Library

The Physics-Mathematics-Astronomy (PMA) Library, located on the ground floor of RLM, is one of several branch libraries of the University's library system. The library's website, www.lib.utexas.edu. is your source for scholarly information for teaching and research. Holdings of all campus libraries are listed in UTNetCat, the online catalog available from the website. Many of the books and journals you will need are either housed in PMA or are available online from your home or office. Other branch libraries that you may find useful are the Geology Library in Geo 302, the Life Science Library in the Tower in MAI 220, the Chemistry Library in Welch Hall in WEL 2.132, and the Undergraduate Library in The Flawn Academic Center. The Main Library is the Perry Castaneda Library on 21st and Speedway. To use resources from off campus you must set up your browser to go through the library's proxy server. The library provides bibliographic databases for all areas of study, including IN SPEC for physics. The library system matches the University in size and complexity; it is useful to visit the RLM library for an orientation tour. PMA staff welcomes the opportunity to meet all new students and help with your information needs. Please visit or email pma@lib.utexas.edu.

- **Physics-Mathematics-Astronomy Library**
  Molly White, Librarian, RLM 4.200

2.5.2 Center for Teaching and Learning

The primary purpose of the Center for Teaching and Learning is to assist the teaching staff, both faculty and TAs, of The University of Texas at Austin in providing instruction services that improve teaching to transform learning. The Center integrates pedagogy, instructional technology, and assessment promoting effective and innovative instructional and evaluation practices in support of the University’s core purpose and values.

To accomplish this mission, the Center provides both basic and advanced information about the teaching/learning process through an array of formats, including group seminars, classes, self-study materials and individual consultation on specific questions. Special services for TAs and AIs are available through the Graduate Student Instructor Program, including a newsletter, special workshops, and the Graduate Student Instructor Program. Information about these special programs is available at http://ctl.utexas.edu/ctl/node/99.

- **Center for Teaching and Learning**
  Harrison Keller, Associate Vice Provost and Director, MAI 201
- **Graduate Student Instructor Program**
  Molly Hatcher, Co-coordinator

2.5.3 Information Technology Services [ITS]

Information Technology Services provides services and support to students, staff and faculty at UT Austin. Their mission is deliver secure, responsive, high-quality, customer-oriented services and support. Their division of User Services provides user support including technical support, training and consulting services. They operate the ITS Help Desk and the Student Microcomputer Facility, and the ID center. For more information visit http://www.utexas.edu/its/about/org/user_services.php.

2.6 Tuition Benefits

2.6.1 TA / AI & GRA Tuition Reduction Benefit

The Office of Graduate Studies administers the Tuition Reduction Program. It supports graduate students in their role as TAs and AIs. Under this program TAs and AIs receive Tuition Reduction indexed to the number of hours of their appointments. Award amounts for the 2014-2015 academic year and 2013 summer session are as follows:

- **Each Long Session**
  Appointed 20 hours or more: $3,784
  Appointed 10-19 hours: $1,892
  Appointed less than 10 hours: $0.00
- **Summer Session**
  Appointed 20 hours or more: $1,415
  Appointed less than 20 hours: $0.00
  (Maximum of $1,415 paid per individual per summer—regardless of session length or number of sessions/hours).

More information about the Tuition Reduction program is on The Graduate School website at http://www.utexas.edu/ogs/employment/tuition/.

2.7 Insurance

2.7.1 Graduate Student Academic Employment Insurance

Graduate students appointed to work in a student academic title for at least 20 hours a week for at least 4.5 months are eligible for the university's employee group insurance benefits. Detailed information on these and other benefits are provided through Human Resource Services' Graduate Student Employee Insurance Orientation. For more detailed information regarding insurance, please consult: http://www.utexas.edu/hr/

2.7.2 Summer Insurance Coverage for TAs and AIs

If you're a Teaching Assistant or Assistant Instructor who's appointed to work on a nine-month basis and you worked during the spring semester (January 16 through May 31), you're eligible for insurance coverage for the summer months of June, July and August.

The university will contribute its portion of premiums (premium sharing) to your summer insurance coverage. This means that the cost of your summer coverage is the same as the rest of the year. Any out-of-pocket costs you have for summer coverage will automatically be deducted from your June 1 paycheck. This means you'll prepay for your entire summer insurance coverage with your June 1 paycheck.

2.7.2 Summer Insurance Coverage for GRAs

If you're a Graduate Research Assistant or other academic graduate-student employee appointed on a 12-month basis, you're only eligible for summer insurance coverage if you're working in a benefits-eligible position during the summer months.

If you're not working in a benefits-eligible position during the summer months, you may be eligible for COBRA continuation coverage. See the Benefits section of the Human Resource Services website for details.

2.7.3 International Student Health Insurance

The University of Texas Board of Regents requires that all international students have medical insurance. For this reason, enrollment in the UT Health Insurance Plan is automatic at the time of registration, and the cost of the policy is included in the student's tuition and fee bill.

Students may be eligible to waive the cost of the student health insurance plan if they are able to present an alternative insurance policy that meets the basic requirements of the UT Health Insurance Plan. Insurance waivers are now administered online at: https://utdirect.utexas.edu/isss/waive_insurance.WBX.

Graduate students with a benefits-eligible TA/AI assignment in the Spring semester are provided with UT Select staff health insurance for both the spring and summer semesters.

Students with benefits-eligible GRA assignments are given UT Select staff health insurance for only that semester in which the student is employed.

If the hiring department has not begun to process your assignment by the 11th class day of the semester (3rd class day during the summer), your waiver will be voided and you will be billed for the UT Health Insurance Plan.

2.7.4 University Health Services [UHS]

University Health Services serves to keep UT students healthy. They offer clinical services including general medical care, urgent care, Women's Health, Sports Medicine, and Allergy/Immunization clinics. Nurses staff a Nurse Advice Line at 475-NURSE 24 hours a day. UHS also provides a Pharmacy to fill prescriptions and carries over-the-counter medications, snacks and drinks. To learn more about UHS visit their web site at http://healthyhorns.utexas.edu/.

2.7.5 Counseling and Mental Health Center

The Counseling & Mental Health Center (CMHC) helps students with their personal concerns so that they can meet the daily challenges of student life. Staffed by psychologists, psychiatrists, social workers, and other licensed mental health professionals, the Center is open to registered U.T. students between 8:00 a.m. and 5:00 p. m., Monday through Friday. Their office is located on the 5th floor of the Student Services Building. The telephone number is 471-3515. To learn more visit their web site at http://cmhc.utexas.edu/.

Chapter 3: Graduate Curriculum

3.1 Organization of the Graduate Program

The graduate program in Physics is under the control of the Graduate Studies Committee (GSC) in Physics. This Committee is composed primarily of the faculty of the department of Physics with faculty from other departments in science and engineering who have special interest in physics. This group is so large that a smaller group, the Graduate Studies Sub-Committee (GSSC) handles the policy issues (see Section 2.1.3). The chair of the GSSC is Professor Phil Morrison, the Graduate Adviser is Professor John Keto and the staff person that assists them is the Graduate Coordinator, Matthew Ervin (Section 2.2.3).

3.2 Graduate School Academic Policies

In addition to the policies set by the GSC in Physics, there are those established by the Graduate School that affect graduate students in their pursuit of master's and doctoral degrees. Some of the important ones are presented here. More details are available in the Bibliography located at the end of this manual [items 5 & 6].

3.2.1 Course Load

Maximum Course Load. The maximum course load for a graduate student is fifteen semester hours in a long-session semester or twelve semester hours in a twelve-week summer session. A heavier course load must have the recommendation of the graduate adviser and the approval of the graduate dean. It is permitted only under exceptional circumstances.

Full-Time Course Load. There is no minimum course load for graduate students; however, the Graduate School recognizes nine semester hours during a long-session semester and three hours during a summer session as minimum *full-time* course load. Individual graduate programs may require more.

Agencies that grant loans or provided for educational funding may establish different definitions of full-time status. The student should be familiar with the regulations of any agency to which he or she has an obligation.

Under various circumstances, graduate students must register for and must remain registered for a full-time load. The definition of a full-time load that is used in each case is given below.

> *Holders of Graduate School-administered fellowships and scholarships:* Nine hours each semester and three hours in the summer session (in any combination of summer-session terms).
>
> *Graduate student academic employees:* Nine hours each semester and three hours in the summer session (in any combination of summer-session terms). A "Graduate student academic employee" is a graduate student who is also employed by the University under one of the following titles; teaching assistant, assistant instructor, graduate research assistant, academic assistant, assistant (graduate), and tutor (graduate).
>
> *Students receiving certain student loans:* Nine hours each semester and three hours in the summer session (in any combination of summer-session terms).

Students living in University housing should consult the Division of Housing and Food Service for course-load regulations.

International students: Nine hours each semester. An international student must consult with International Student Scholar Services and must have the written permission of his or her dean to take fewer than nine hours. No minimum load is required in the summer. Some approved courses in English as a second language do nor carry University credit, but each course is considered the equivalent of a three-hour course for purposes of the course load requirement. Students may enroll in these courses with the approval of their graduate adviser.

Affiliated studies: Students enroll in affiliated studies (A S) when they participate in a study abroad program offered by an institution with which the University has an affiliation agreement. Students enrolled in affiliated studies are considered full-time students. More information about affiliated programs is given in General Information.

International study and research: Students may enroll in international study and research (ISR) when they conduct research or student independently abroad. A student enrolled in international study and research is considered a full-time student. Doctoral candidates may not use registration in ISR to circumvent the continuous registration requirement described on page 20. When a doctoral candidate receives approval to enroll in ISR, however, that enrollment is an acceptable substitute for registration in dissertation hours, except in the final semester, when enrollment in the dissertation writing course (X99W) is required. More information about international study and research is available from the Study Abroad Office.

3.2.2 Warning Status and Academic Dismissal

To continue in the Graduate School beyond the first semester or summer session, the student must maintain a graduate grade point average of at least a B (3.00). A graduate student whose grade point average falls below 3.00 at the end of any semester or summer session will be warned by the Office of Graduate Studies that his or her continuance in the Graduate School is in jeopardy. The student must attain a graduate grade point of at least 3.00 during the next semester or summer session he or she is enrolled or be subject to dismissal; during this period, the student may not drop a course or withdraw from the University without the approval of the Graduate Adviser and the Graduate Dean.

3.2.3 The Fourteen-Semester Rule

This is a very important and strictly enforced rule that should be kept in mind: Graduate students may be employed in the following titles for a maximum of 14 long semesters: Assistant Instructor (0045); Teaching Assistant (0063); Teaching Assistant, no student contact (0062); Graduate Research Assistant (0090); Academic Assistant (0065); Assistant (0071); and Tutor (0064).

In fall 2007 the Graduate Assembly passed legislation which allowed, for the first time under very strict criteria, exceptions to the fourteen-semester rule. The full description of the criteria for exceptions is included here. Petitions for exception to the fourteen-semester limit on student academic employment may be submitted under either of the following conditions and will be granted for one or two long semesters only after the student completes his or her fourteenth semester of employment.

Detailed information on exceptions to the rule and Formal Review process can be found online at: http://www.utexas.edu/ogs/employment/14_semester_rule.html

3.2.4 The 99-Hour Rule

This is the rule that students at UT Austin with over 99 doctoral hours may be subject to the payment of nonresident tuition. The rule affects graduate students entering in Fall 1999 or later. The doctoral hours are credit hours acquired by a student reaching a certain stage in his or her studies. This stage is reached by (1) acquiring a Master's Degree (from UT or elsewhere) or (2) completing 30 hours of graduate work at the University, whichever comes sooner. A student will be able to study at UT Austin as a full-time student for seven complete academic years, including summers, before being affected by the 99 hour rule. For students staying beyond seven years there are a few exemptions given if the reason for going beyond 99 hours was programmatic.

3.2.5 English Certification Program for International TAs and AIs

The State of Texas requires that all public universities in Texas provide a program to ensure that courses are taught clearly in English. In order to comply, UT Austin and the Texas Intensive English Program (TIEP) conducts the International Teaching Assistant (ITA) English Certification for TAs and AIs required of all International students who will hold positions with student contact. The English Certification process includes an Oral English Assessment and an ITA Teaching Workshop. In addition, some individuals may be required to take an ESL course, for details see the ITA web page at http://world.utexas.edu/esl/ita

3.3 Department Policy

3.3.1 Registration Processes

The registration schedule and courses offered for each semester are given in the Course Schedule available on the Registrar's website.

Registration for new graduate students is online using UTDirect. Students may register after mandatory advising by the Graduate Adviser in the Graduate Office, RLM 5.224. The Department places an Advising Bar on the record of all Pre-Candidacy students, this bar prevents you from registering until it is cleared by the Graduate Coordinator following your completion of advising.

All Pre-Candidacy graduate students must also be advised before registering. Regular advising is held in the middle of each long semester before the first registration access period. A sign up sheet is posted outside RLM 5.224 and an email sent out to the Gradlist detailing the advising schedule. After being advised (and having their advising bar lifted), the student can register through the Registrar's online service via UTDirect. Details of time and procedures can be found at www.utexas.edu/student/registrar/registration/. A student's specific registration window(s) can be found on the Registration Information Sheet (R.I.S.) available from the same website. Students must register for the courses and times that were approved at advising and any changes from the advised course schedule must have the prior approval of the Graduate Adviser and be communicated to the Graduate Coordinator.

Graduate students admitted to Ph.D. Candidacy can register without advising, though it is recommended that, as their Dissertation Defense approaches, they verify the completion of the requirements laid out on their Program of Work with the Graduate Adviser.

3.3.2 Graduate Degree Requirements

The Department offers three graduate degrees: a Master of Arts (M.A.) in Physics, a Master of Science (M.S.) in Applied Physics, and a Ph.D. in Physics. The requirements for these graduate degrees follow:

Master of Arts in Physics. The Master's degree requires 30 semester-hours work, including 6 hours of thesis coursework (PHY 698A & 698B). The remaining 24 hours of technical courses must include at least 18 hours of physics and at least 6 hours of supporting work (usually outside the Department). The courses must generally be graduate courses taken for a grade, but up to 6 hours may be taken credit/no credit, and a maximum of 9 hours may be upper-division undergraduate courses provided no more than 6 of the hours are in one category, physics or supporting work. The Physics Department does not generally approve seminar, research (390/690), or advanced topics courses for a master's program beyond three hours of PHY 386N "Technical Seminar", and PHY 390 "Graduate Research", required when taking PHY 380N "Experimental Physics" during the Long Session. All work must be completed within a six- year period.

Master of Science in Applied Physics. This program was introduced in 1995 and is designed to provide students with a broad background of graduate-level courses in physics and related fields with an emphasis on those aspects of the science most often found in an industrial setting. In addition to the requirements for a M.A. in Physics, this degree requires specific coursework: PHY 380N "Experimental Physics", PHY 387K "Electromagnetic Theory I", PHY 389K "Quantum Mechanics I", PHY 386K "Physics of Sensors", and PHY 386N "Technical Seminar". A thesis is also required. The supporting work must be in engineering, chemistry, or geological sciences.

In the case of both the M.A. in Physics and M.S. in Applied Physics: At the beginning of the semester in which you plan to graduate, you must have your Program of Work approved (if the student has not done so earlier) and apply for a degree with The Graduate School. Both tasks are accomplished online, the Program of Work must be filled out by the Graduate Coordinator.

Ph.D. in Physics. There are three steps in the program leading to the Ph.D. degree. The first is the Qualifying Process, the second is Admission to Ph.D. Candidacy, and the last step is the preparation of a dissertation based on original research and its approval followed by a Final Oral Examination/Defense. The details of each step follow:

Qualifying Process [Step 1]. Prior to being admitted to Candidacy for the Ph.D. degree, the student must fulfill the following three requirements: (1) fulfill the Core Course requirement described below; (2) show evidence of exposure to modern methods of experimental physics; this exposure may have been gained in a research type senior-level laboratory course taken by the student as an undergraduate and approved by the Graduate Adviser, or by previous participation in an experimental program, or in PHY 380N, and (3) fulfill the oral examination requirement described below.

Core Course Requirement. During the first two years of graduate study, the student must complete four core courses: PHY 385K "Classical Mechanics", PHY 385L "Statistical Mechanics", PHY 387K "Electromagnetic Theory I" or PHY 387L "Electromagnetic Theory II", and PHY 389K "Quantum Mechanics I" or PHY 389L "Quantum Mechanics II". The student must earn a grade of at least B- in each course and a grade point average of at least B+ (3.33) in the four courses. The student may ask for the grade he or she earns in PHY 380N to be substituted for the grade in one of the core courses when the average is computed. A well-prepared student may seek to fulfill the Core Course Requirement by taking only the final examinations and earning the grade of at least B- for one or two of these courses rather than by registering for them; however, in this case, the student does not receive graduate credit for these courses and the grade is not counted toward the formal graduate G.P.A. The student may only attempt the exam for a particular course once.

The Oral Qualifying Examination. After satisfying the first two requirements above and within twenty-seven months of entering the program, the student must take the Oral Qualifying Examination. This examination consists of a public seminar presented before a committee of four Physics faculty members, one of whom is a member of the GSSC (see Section 2.1.3). It is followed by a private oral examination. The student chooses the topic of the seminar. The seminar need not present original work; he or she is expected only to demonstrate sufficient command of a specialty to begin original research in that area. The topic is usually that which will become your dissertation. As part of the examination, the student will generally be expected to indicate a problem whose solution would be a satisfactory dissertation. The questions are directed toward clarifying the presentation and helping the committee determine whether the student has a solid grasp of the basic material needed for research in his or her specialization. The student passes the examination by obtaining a positive vote from at least three of the four faculty members on the committee.

Preparation for the Oral Qualifying Examination and the "Pizza Seminar". Students are strongly encouraged to explore specialties in which they might pursue dissertation research. The "Pizza Seminar", held weekly in both the fall and spring semesters, is designed to assist students in choosing their research topics and supervisors. Faculty from all research groups (see Section 2.4) will talk about their research interests as well as discuss possible research topics suitable for students. The atmosphere is informal; pizza is served to all attendees. The pizza seminar is offered as a regular graduate course PHY 396T "Particle Physics: Introduction to Research". In addition, individual faculty list information on research interests on the web.

For most areas, certain advanced courses (see Section 3.3.3) are necessary to reach the level required for the qualifying examination. These courses and their prerequisites are also principal considerations in scheduling your courses during the first two years.

Admission to Candidacy [Step 2]. After passing the Qualifying Examination, students must apply for Candidacy before the end of the following semester. Formal admission to Ph.D. Candidacy consists of the submission and approval of the following:

1. *Program of Work*. The Program of Work comprises a list of courses that meets the requirements given below, and the prospective dissertation title. The Graduate Adviser must approve the Program of Work. The Program of Work for the Ph.D. is a paper form available on the Department's website.

   In addition to the core courses, each Program of Work for the Ph.D. degree must include at least four advanced physics courses (with a letter grade of at least B), at least one of which must be in a specialty other than that of the student's dissertation. A list of acceptable advanced courses is available at the Physics Graduate Office, on the Department's website, and in Section 3.3.3 below. The Program of Work must also include three courses outside the student's area of specialization. One of these must be an advanced physics course; another must be outside the Department of Physics; the third may be either an advanced physics course or a course outside the Department of Physics. The courses outside the Department may be taken credit/no credit. All these required courses and the dissertation courses must be listed on the Program of Work.

2. *Dissertation Committee.* The membership of the Dissertation Committee, proposed by the student with the approval of the Graduate Adviser, is

submitted to The Graduate School for approval by the Graduate Dean through the Online Application for Candidacy available through The Graduate School's website. The Dissertation Committee consists of at least five members, one of whom must be from outside the major program. The chair of the Dissertation Committee ordinarily serves as the supervisor of research. When the research supervisor is not a member of the Physics GSC, one such member should be appointed as co-chair of the Dissertation Committee. If the supervisor is not a member of the Department of Physics faculty, a majority of the committee should be.

3. *Dissertation Proposal.* A brief statement of the proposed dissertation must be submitted. (This statement is submitted as part of the Online Application for Candidacy described above.)

The Dissertation and Final Oral Examination [Step 3]. Once advanced to candidacy, the student must maintain continuous registration (including the "Dissertation" course) during the long semesters, but advising is no longer required to register. The dissertation research course (X99R) must precede the dissertation writing course (X99W). X99R need only be taken during the first semester following the student's advancement to Candidacy. The student has three years to complete the dissertation and take any courses remaining on his or her Program of Work. If you have not completed the requirements within three years, further registration depends upon the recommendation of your Dissertation Committee and the Physics Department. If the Dissertation Committee finds that the student is making good progress towards the degree, an additional year of Candidacy is commonly granted. Beyond that, however, candidacy will be extended only with specific argument and special circumstances.

At the beginning of the semester in which the student expects to graduate, he or she must apply for graduation. There are multiple deadlines associated with graduation, among these is the Request for Final Oral Defense of the dissertation which requires the final abstract of the dissertation, drafts for the committee members, and signatures of the entire committee. The form must be filed with The Graduate School at least two weeks in advance of the Defense. There is also a deadline for submitting the dissertation, including signatures of each committee member, in the exact form dictated by The Graduate School. Be sure to review all the requirements carefully and confer with the members of your Dissertation Committee to confirm that they will be available when needed. If you have not taken all the courses listed in your Program of Work, but have taken equivalent courses instead, you must formally request a change in your Program of Work. If you encounter or anticipate any problems, please see the Graduate Coordinator as soon as possible to explore possible actions. Many of the forms are now available online. To learn more, please visit The Graduate School's website at http://www.utexas.edu/ogs/pdn/index.html#df.

Milestones Agreements. The graduate school has implemented an online advising tool so that Ph.D.-seeking graduate students can keep track of deadlines for degree requirements. Each Ph.D. program, will have a unique Degree Plan ID. The unique Degree Plan ID will be used to link a student to a degree plan and its timeline and degree requirements. Each entering Ph.D. student will be assigned to a Degree Plan ID and each Degree Plan ID will have associated with it a set of advising aids that will specify the timeline for meeting the major milestones for the degree and a checklist of specific degree requirements. An electronic signature page will verify that the student and Graduate Adviser have reviewed the milestones materials.

Each student will be assigned to a Degree Plan ID. The Graduate School will keep records that will show, a) that the student has confirmed that he/she has been advised of the requirements for their degree and the estimated timeline for completing the degree milestones, and b) a list of dates when they meet each milestone. The Graduate School will provide information on how graduate students can access this information.

The milestone forms used with the graduate school's advising tool are attached. They mirror the requirements for the PhD listed at the department's web site at http://www.ph.utexas.edu/grad-degree-req-phd.php. We will review your progress in completing the milestones annually. To view your individual progress on milestones you can check at http://www.utexas.edu/ogs/admissions/milestones/access.html. This page also contains Step-by-Step instructions for fulfilling this requirement.

3.3.3 Physics Graduate Courses

Physics graduate courses may be categorized into four types: regular (including the Core and Advanced Courses), special topics, seminar, and research courses. The regular courses are lecture-type courses whose topics are more or less fixed. The special topics courses are lecture-type courses on the most advanced current topics and thus vary from time to time. The seminar courses are comprised of weekly seminars organized by each of the various research groups. These special topic and seminar courses are specified by the letter T, U, or S, respectively, attached to the end of the course number, such as "PHY 396T". The seminar courses are offered every semester, while the special topics courses are offered whenever faculty are available to teach a needed course.

There are three types of research courses; PHY X90 (X=1,2,3, or 6 hours) "Graduate Research," PHY 698A&B "Thesis", and PHY X99R&W (X=3,6 or 9 hours) "Dissertation". PHY 698A&B are for the Master Thesis (when taken in sequence, the total number of course credit hours is six and NOT twelve), while PHY X99 are for the Ph.D. dissertation (see Section 3.3.2). The Graduate Research course, PHY X90, can be taken anytime by a student and is thus appropriate to the preparation for his/her Oral Qualifying Examination. It does not count for the Ph.D. but can be counted for the M.A. if taken in conjunction with PHY 380N (see Section 3.3.2). To take an X90 course, the student and his or her supervisor must fill out the Department's X90 Graduate Research Form available both online and in the Graduate Affairs Office. The form includes a description of the research project to be undertaken and must be turned into the Graduate Coordinator before you are allowed to enroll in the course, no exceptions are made to this requirement.

The regular graduate courses other than the four core courses, PHY 385K, PHY 385L, PHY 387K and PHY 389K, can further be divided into two sets, Advanced Courses and the rest. The following are the courses presently approved by the Physics GSC.

Advanced Courses: The advanced courses are designed to prepare students for specialization as well as to provide students outside their specialty with challenges to other fields of physics. Each student is required to take four advanced courses with no letter grade below B-. Current Advanced Courses and their schedule follow (Note, however, the schedule often changes.), organized by field:

Atomic, Molecular, and Optical Physics

PHY 395 Survey of Atomic & Molecular Physics; approx. once every three years.
PHY 395K Nonlinear Optics and Lasers; approx. once every two years.
PHY 395M Laser Physics

Condensed Matter

PHY 392K Solid State Physics I; every spring semester.
PHY 392L Solid State Physics II; every fall semester.
PHY 392N Many-Body Theory; once every two years.

Cosmology & Strings (The Weinberg Theory Group)

PHY 396K Quantum Field Theory I; every fall semester.
PHY 396L Quantum Field Theory II; every other spring semester.

PHY 396P String Theory I; every other spring semester.
PHY 396Q String Theory II; every other fall semester.

High Energy Physics
PHY 396J Introduction to Elementary Particle Physics; not offered regularly.

Nonlinear Dynamics and Biophysics
PHY 382M Fluid Mechanics; every other fall semester.
PHY 382N Nonlinear Mechanics; every other spring semester.
PHY 382P Biophysics I; every other fall semester (alternating with 382Q).
PHY 382Q Biophysics II; every other fall semester (alternating with 382P).

Nuclear Physics
PHY 397K Introduction to High Energy Physics & RHIC I; not regularly offered.
PHY 397L Introduction to High Energy Physics & RHIC II; not regularly offered.

Plasma and Fusion
PHY 380L Plasma Physics I; every fall semester.
PHY 380M Plasma Physics II; every spring semester.

Relativity and Gravitation
PHY 387M Relativity Theory I; every fall semester.
PHY 387N Relativity Theory II; not regularly.

Non-Specialized[3]:
PHY 380N Experimental Physics; every fall and summer semester.
PHY 386K Physics of Sensors; every semester.[4]
PHY 387L Electromagnetic Theory II; every spring semester.
PHY 389L Quantum Mechanics II; every spring semester.
PHY 381N Methods of Mathematical Physics II; not regularly.

3.3.4 PHY 398T "Supervised Teaching in Physics"

PHY 398T is a course in instructional methods and prior completion or concurrent registration of this course is required for appointment as a TA or an AI. It is departmental policy to have each TA enroll in PHY 398T during the first year of appointment. PHY 398T covers current methods of physics teaching with emphasis on laboratory teaching. Part of the course is a critical examination of your teaching techniques, with presentations by the TAs in laboratory and other teaching situations (for example, it provides some practice in preparing and giving a seminar).

3.3.5 Career Guidance and Professional Development Program

The Department offers PHY 386N "Technical Seminar", for career guidance, particularly for industrial careers. In addition, the Graduate School offers several cross-disciplinary courses focusing on topics such as teambuilding and collaboration, academic and professional (grant) writing, teaching, ethics, consulting, technology, communication, networking, and entrepreneurship.

[3] The courses under this category cannot be used as an Out-of-Field Advanced Course by anyone.
[4] Only students in Cosmology & Strings and Biophysics may take this course as an Out-of-Field Advanced Course.

Chapter 4: Job Responsibilities

4.1 Nature of the Teaching and Research Positions in the Department

4.1.1 Teaching

Before reviewing job responsibilities, it will be worthwhile to outline the types of teaching done by the Department. There are three general categories of courses offered by the Department: service, majors, and graduate courses. In each category there are laboratory, recitation or discussion sections and lecture classes. Another level of classification is whether the course is required for some degree plan.

The service courses are for non-majors and generally have an introductory sequence of two semesters and most have an accompanying laboratory class which is a required co-requisite. Most of these courses are required for some major or meet an area requirement in the Bachelor of Arts degree. There is an introductory major's set of courses, a three-semester sequence. The first two semesters are also required for several other science majors. These courses also have a co-requisite laboratory course. The service courses constitute the major part of the Department's teaching duties and are the primary source of work for TAs as either graders of homework or teachers of discussion sections or laboratory instructors. Among the service courses that are not required for any degree are the Physical Sciences classes. These are small enrollment laboratory courses that introduce physics through discovery techniques. These courses are generally taught by AIs (Section 4.2.2)

The upper-division major's courses are generally required for the B.S. or B.A. degree. These are lecture and laboratory format courses. The major tasks for Teaching Assistants are grading homework and quizzes or supervising and grading laboratories.

Graduate courses require assistance for grading of homework and quizzes. Graders for graduate courses must have completed the course before qualifying to grade that course.

The Department also provides a coaching service for all our courses. At tables located in the corridor on level 5 of RLM, Teaching Assistants are available all day to assist students in a physics course with their class work. The primary users of this service are students in the service courses. Coaching is an unusual teaching format and how it operates is described in Section 5.8.

4.2 Job Duties of Graduate Student Assistants

4.2.1 Teaching Assistants

There are two types of duties assigned to TAs. TAs may be assigned to work with a faculty member grading or performing related work assisting the faculty member in teaching their courses. Another assignment for TAs is the teaching of laboratory courses or discussion sections in the service and major's courses. Some lab TAs are also required to coach as part of their duties.

The criterion for deciding which of these types of assignment a TA will receive is based on several factors. When applying to TA, you may indicate a preference. All past performance as a TA are also evaluated by either the students via the Course Instructor

Survey and/or by the faculty supervisor. This is determined primarily by English language proficiency. All international students are tested for English language skills and Teaching Assistants with a deficiency will not be allowed to have duties that require formal contact with undergraduate students. It is important that all Teaching Assistants work to remove any language deficiencies as soon as possible (see Section 3.2.6). International students will not be hired in their second year if they fail to acquire fully certified status on the English assessment within their first year.

TAs must be graduate students in good academic standing (Section 3.2.2). Teaching Assistants may not be the instructor of record in any course and a TA's teaching is under the supervision of a faculty member (Section 4.3.1).

4.2.2 Assistant Instructors

Assistant Instructor, AI, is a title reserved for more senior graduate student instructors. Assistant Instructors, although supervised by faculty, can be the instructor of record in a class. In the Department of Physics, AIs teach the Physical Science classes or are head TA's of several sections of laboratory courses. To become an AI, a graduate student must be in good standing, with no incompletes, must have completed the hours equivalent to a Master's degree, and successfully taken the PHY 398T course (Section 3.3.4) or have equivalent experience.

4.2.3 Graduate Research Assistants

Graduate Research Assistants are graduate students paid from contract funds to support a research project. These are generally advanced students, second year and further, and most students become Graduate Research Assistants before completing their Ph.D. Often the research is an important part of the graduate student's thesis or dissertation.

4.3 Supervision of Graduate Student Assistants

Student assistants are assigned to various duties such as laboratory teaching, grading or support of research. A student assistant may have more than one of these assignments at the same time. In each of these assignments, the student assistant will have supervision and thus an assistant with more than one assignment may have more than one supervisor. Of course, overall supervision rests with the Department Chair.

4.3.1 Supervision of Teaching Assistants

In all cases, a TA is directly supervised by a faculty member. If the assignment is a laboratory section, a particular faculty member is assigned to coordinate all the laboratories within the same course and this faculty member is the supervisor of all student assistants working on that course. In courses with many sections, a head TA may assist the faculty supervisor in these duties. Assistants assigned to teach a laboratory section, should get the name of the faculty supervisor for that section and contact him/her immediately about the first contact for the assistants in that course. All laboratory teaching assistants meet on Friday afternoons to coordinate their sections. This meeting is compulsory and all assistants should keep their time clear on their schedule to attend these meetings.

If the assignment is a discussion section, the assistant should immediately go to the web site: https://quest.cns.utexas.edu/. In addition, the assistant should contact the faculty supervisor of the assigned discussion section to make sure that his assignment is correct.

There are two types of grading assignments. For most graders, the duties consist of grading of homework or quizzes for a specific course. For TAs assigned to course grading assistance, the faculty member teaching the course is the assistant’s supervisor. As soon as the course grading assignment is settled, the student assistant should contact the faculty member teaching the course to get the details of the job (see Section 5.7). Some graders are assigned as computer assistants for the Department of Physics homework service. The

Department has a large database of problems and computer generated homework and quiz generation service. Students assigned to assist with the computerized homework service work under his or the faculty member that he designates supervision.

4.3.2 Supervision of Assistant Instructors

Although the Assistant Instructor can be the instructor of record in the class in which he/she is assigned, the Physical Science classes are coordinated and supervised by Professor Austin Gleeson. Also, since the course is laboratory based, each class period operates on the same schedule of material and uses the same pedagogical approach, discovery teaching. All sections of the course also use the same text material, a laboratory manual [8] and the book by Hewitt [9]. Meetings every Friday afternoon are required for anyone assigned to teach a Physical Science class.

4.3.3 Supervision of Graduate Research Assistants

Graduate Research Assistants are supervised by the faculty member or senior research staff member who is the Principal Investigator of the research project which supports the student.

Chapter 5: Teaching Tips

5.1 Classroom Procedure and Operation

There are three general teaching environments for graduate students in the Department of Physics: laboratory instruction, discussion section instruction, and grading. In all cases there will be a faculty member who supervises the instruction and that faculty supervisor is directly responsible for setting laboratory or classroom procedures, and these comments do not supersede these instructions. The guidelines described below should be followed unless directly countered by the faculty supervisor.

5.1.1 Before-Semester Procedure

All new TAs must attend the College of Natural Sciences orientation during fall registration. This three-hour session is designed to welcome new TAs and outline general administrative and personnel policies of the University. In addition, all new TAs should meet with the Graduate Coordinator during fall registration. This meeting is primarily administrative in purpose. We review departmental procedures and initiate the appointment and class assignment paperwork. In all cases, you should meet with your faculty supervisor before classes begin. For TAs assigned to discussion sessions for the introductory physics courses, there is a set protocol that is described in: https://quest.cns.utexas.edu/.

Laboratory and Discussion Sections. For those assigned to laboratories and discussion, there are generally no meetings with students the first week of classes, but whenever the first meeting occurs, you are to explain absence and grade policy, describe manuals and materials needed for labs, and generally introduce lab objectives.

Before meeting a class for the first time, an instructor must set the course objectives, prepare a syllabus, and guarantee that equipment, text materials, and space are available. For TAs, the Lab Supervisor is responsible for these procedures, although each TA is required to draw up a First Day Handout based on the syllabus (see Section 5.1.2). [N.B., per State Law a copy of your First Day Handout including your syllabus MUST be turned in to the Undergraduate Affairs Office on or before the 7th Day of Class].

Although AIs are responsible in their courses for setting objectives, etc., in practice they follow established guidelines.

In the first meeting with your Supervisor, you are to make sure you understand the course objectives, how students are to meet them, and the level of ability expected of the students. As the labs develop and student work is graded, report any problems in meeting the standards or objectives to the Lab Supervisor.

Before the first class meeting: Check the classroom and the Lab Supply Room on the 8th floor. Locate the nearest phone, and make sure emergency numbers are posted on it. Know where to find fire extinguishers, fire blankets, and chemical showers. Know how to cut electrical power for classroom circuits. Know how to get help in an emergency. Understand equipment checkout and return procedures, know who is liable for damage and how damage is assessed. Get a copy of the Lab Manual and a grade book from the Lab Supply Room. Review the semester calendar, the lab schedule, drop and add deadlines, and how make-ups and grades are to be handled. Prepare a First Day Handout.

5.1.2 First Day of Class

At the first class meeting: Distribute a written First Day Handout containing the rules and syllabus for the class. This handout is required. Review every item on it with the class. On the board, write your name, office, office hours, and phone number; the same information for the Lab Supervisor; the course name and unique number; and your grading policy. (This information must also be on the handout.) Inform students of the most effective way to get in touch with you. Take attendance, whether a roster is available or not. Review proper format, content, and style of lab write-ups. Explain how lab notebooks will be handled, graded, and returned. Explain your procedures for computing final grades (be sure you and your know what they are!). Explain your make-up policy for missed labs. Review the academic calendar, noting drop deadlines and when all lab work is to be completed and handed in. Discuss lab safety. There must be no fooling around with dangerous equipment such as lasers, electrical equipment, etc. A safe lab is your responsibility. Inform the students about lab clean-up. Returning equipment does not end the cleaning chores. Loose paper and Polaroid film packs must be cleaned up before the next class. If the students do not clean up, you are responsible for cleaning up. Eating, drinking, and all use of tobacco are prohibited in labs and classrooms.

5.1.3 Classroom Procedures

Your Supervisor and Head TA are the best sources for the most effective methods for the particular course you teach. However, your ideas and suggestions are most welcome! For the sake of consistency, you are required to discuss any format which is different from the one described below or recommended by the Supervisor with the Supervisor and other TAs. Do not deviate markedly from the following format unless you and your Lab Supervisor have a clear picture of the alternative procedures and purposes and only if your Lab Supervisor approves.

Generally, start a lab session with a very brief (5-15 minutes) lecture-demonstration. Prepare it carefully; at the weekly lab meeting, be sure to review what portions of the experiment the Supervisor wants emphasized. The lecture is to be built around the equipment, and you should show clearly how it works. Discuss clearly any procedure which may be hazardous. Do not emphasize the physical theory behind the experiment. Often the laboratory exercise will precede the theoretical development in the lecture portion of the course. The laboratory lecture emphasizes observations and measurements; only theory essential to the development and reduction of results from observations is to be covered. If a student wishes to know more of the physical background theory, encourage him or her to read the text or other books and to see you during office hours.

After the lecture, your job begins! You circulate; you ensure that students are performing the exercises; you answer questions; you pose questions; you point out effects. At no time should you be seated or reading. Data taking will usually be completed prior to the end of the class time. Students are not to be dismissed or allowed to leave early. Students who finish early are to prepare the write-up or to study for the following week's lab. Be available for questions about these tasks.

5.2 Teaching Tips

A university is a place of learning. Your duty is to aid in the learning process. Good learning goes hand-in-hand with enthusiasm. You are fortunate to be able to help students learn ideas that are especially interesting. Moreover, you will learn physics from your students. Before going into class, review why that day's work is important and exciting, why it is beautiful and vital. Communicate this excitement to students. Help them see why physics is such a wonderful subject!

Each course and each session has a goal or objective. After consultation with the Lab Supervisor write down these educational objectives. Refer to these objectives often and have the students carry out only those activities which contribute to meeting these objectives. Discuss only items related to these goals or general class administration. Don't waste time displaying your knowledge or complaining. Revision and expansion of the objectives are to be done before the class begins, with the Supervisor and other TAs.

Uninterrupted lecture is terrible. Keep your lectures short; invite questions or ask the students questions; involve the students; demonstrate equipment; and remember, students learn about three or four new things in one sitting. Speak slowly and carefully, especially if you do not have a Texas accent. Write on the blackboard: Write neatly, and as you write, SPEAK ALOUD WHAT YOU ARE WRITING.

Demonstrate equipment, using large, well-marked versions of the same equipment the students use. Emphasize proper care and handling, and always discuss safety. As you circulate, ask questions, demonstrate interest, and point out observational oddities. Communicate your excitement about physics to the class.

5.3 Grading

Review the required format, content, and style of lab reports, and general grading criteria in the first-day handout and lecture. Criteria should be concise and clear, and you are to grade according to those standards. Be sure to sign the pages on which each day's data are recorded, and insist that data be recorded in ink. Allow for some flexibility in grading, but always require that students turn in all lab reports.

Promptly return graded lab reports to provide feedback and motivational stimulus: Return each graded lab report before the next report is due. Most labs require one report and one week for each experiment; some labs require that write-ups be done in the lab, while others permit students to work on the report out of the lab. All labs require that reports be submitted in some standard form, established by you and other TA / AIs with the Lab Supervisor.

On the first day of lab, you may want to hand out an example of a well-done write-up. You should emphasize the introductory sections and the importance of completing or planning them before coming to class. You may require items to be written before lab but, if you do, make sure that other TAs in the course do also. (Some labs use a two-notebook procedure.) You should make clear how long students are expected to work on write-ups.

Sometimes the course policy is to supplement lab report grades with quizzes, but quizzes should be given consistently by all TAs in the course if given at all. Quiz only on laboratory related objectives: laboratory skills, measurements, or observations. Don't set a classroom problem, and don't repeat the same quiz in different sections. Don't allow cheating.

Late lab write-ups are a constant source of difficulty. Policies can vary from not accepting late reports without a signed excuse to giving students partial credit for late work. The lateness policy must be consistent among all TAs in a lab course. Be sure that your students are constantly aware of it.

Indicate grades and comments in the notebooks. Maintain a record of attendance and all grades in a separate grade book (available from the Laboratory Supply Room, See Section 2.3.5). At the end of the semester, return or make available all class material. You must retain any course work not returned to the students for one semester.

At first it may seem that an excessive amount of time is spent in grading. The workload formula does allow ample grading time, and as you become experienced, your grading will become efficient. Do not spend too much time agonizing over grades. Many items must be assessed, and you should use a relatively coarse measure. But be sure to write thorough and clear comments.

5.4 Final Grades

Each student whose name appears on the grade sheet at the end of the semester will receive a letter grade, a symbol, or a "never attended" comment. A case of a student who attends but is not on the class roster should be reported to the physics Undergraduate Office (see Section 2.2.4) as soon as possible, early in the semester.

The Department requires that you report grades on a normed and distributed scale: Students in all of your sections form a single population. Calculate the T-Scores for each student; it is important that student scores be distributed on the basis of performance, or else this mechanism will only introduce noise into the process. TAs assign letter grades in consultation with their Lab Supervisor; each AI assigns his or her own letter grades, assuming the class is average unless there are contrary indications.

The symbol X indicates a temporary delay in a grade, and the student must complete any course requirements within a stated period (about one semester) or the X becomes an F. The X symbol is only allowed in the following circumstances: (A) The student is compelled to miss a final examination because of illness or other nonacademic imperative reason, verified by a physician's statement or by other adequate verification. (B) The student has not been able to complete all the required assignments for reasons not attributable to lack of diligence. The student must have a passing average on already completed work and must have passed the final exam. (C) The student has failed the final exam but has at least a C average in all other work. In this case, the student may be permitted to take a reexamination at the discretion of the instructor. The new grade will be substituted for the original grade if the student earns at least a C; if the re-exam grade is less than a C, a final course grade of F must be recorded. Prior approval from your Lab Supervisor is always required, and you and the Supervisor must agree on how the X will be cleared. This information must be filed with the student office.

The symbol CR is given only to an undergraduate student officially registered on a Pass/Fail basis as indicated on the grade sheet, and only if the student has made a D or better in the course. If the student has not made a D or better, the grade F is to be assigned.

Symbols assigned by the Registrar: The # symbol means that the Registrar was unable to assign a grade (report any mistakes to the physics undergraduate office; if the student's registration is questionable, send the student to his or her academic Dean). The symbols Q (drop without penalty) and W (withdraw from school) are assigned after a student has gone through proper channels. An instructor may not assign a W or Q unless the student obtained an approved drop or withdrawal after grade sheets were printed and the instructor receives the official withdrawal or drop notice from the Registrar.

Final lab grades are reported using eGrades, the online reporting system http://registrar.utexas.edu/staff/grades. Lisa Gentry from the Undergraduate Office (see Section 2.2.4) will email TAs regarding due dates for your online grade reports. You must set deadlines for the students to submit all their work so that you will have ample time to grade and to consult with the Lab Supervisor. A student may obtain his or her grades using UTDIRECT. You should not post individual grades on paper listings because the information needs to remain secure. You may want to post the grade distributions.

5.5 Office Hours and Communication

You are required to post and observe office hours. A 20-hour appointment includes two hours weekly for office hours. These hours are as great a responsibility as assigned classroom meetings. Office hours are beneficial: Students know that they can be sure to find you; you are protected from constant interruptions; and they provide a limit to the time spent with students. A convenient time for office hours is in the late afternoon, when most students don't have class conflicts. Office Hours MUST NOT be held in the Coaching Area or the Kodosky Reading Room. If you need a suitable location for Office Hours, contact the Undergraduate Affairs Office to schedule a room.

You must leave your local address, phone number, and schedule with the Physics Main Office and the Undergraduate Affairs Office. You may or may not choose to permit the Department to release this information. You may include your home phone number on the first class day handout. We suggest that you do not do so, but some TA/AIs do. Every graduate student in Physics has a mailbox, located on the 5th floor of RLM, across from the graduate office. This is the principal means by which the department and other students communicate with you. It is important that you check your mailbox every day. In addition, email is an efficient and useful technique of communication. You will get a Physics email account from the Computer Services Group. In addition, there is a listserv, the Gradlist, that supports communication with graduate students in the Department of Physics. You will be subscribed to it when you open your Physics e-mail account. You should check your email several times a day. You should also keep your address information with the University current by updating here: https://utdirect.utexas.edu/utdirect/bio/address_change.WBX

5.6 Graderships

The primary assignment of many TAs is to grade and to assist a faculty member in class. Most grading involves three types of papers:

> *Homework papers.* Primarily answers to problems. Some faculty allow students to work together, but some do not. Be sure that you know what the homework assignments are, when they are due, and whether students must work separately on the assignments.
>
> *Term papers.* Faculty members usually give rather general instructions. Usually, such essays must be the sole work of the student; in a few cases collaboration may be allowed. Grade for content; comment on style if the faculty member directs you to.
>
> *Exams.* Consisting of problems and essay questions. Discuss grading criteria with the faculty member in charge. Be sure you know how to solve each problem before starting to grade; students will have a wide variety of correct (and incorrect!) ways of answering a given problem.

There are several other requirements:

> In order to grade a graduate course, you must have previously made an A in the course.
>
> International students must be certified or conditionally certified in the English proficiency assessment in order to have contact with students.
>
> If you are allowed to have contact with students, you will typically be required to hold office hours, one per week for each 10 hours of appointment. You may not hold office hours at locations off campus or at the Union. If you need a space in which to hold office hours, please contact the Undergraduate Affairs Office to schedule a room.

The instructor for whom you work may require you to attend specific class sessions, to return homework and exam papers to the students, to write up answer keys (with the aid of the instructor, especially for exams) and make them available to students, or to do other tasks related to the course.

Meet with the instructor as early as possible in the semester to find out your obligations. It is a good idea for you know what your obligations are. At the end of the semester the Instructor will let me know how you performed and this information is kept in your employment file. Their review of your work can affect the priority and placement given to you in re-appointing you.

Every grader is obligated to:

grade papers accurately, write full comments on the papers, keep full and accurate records of grades, and make sure the instructor has a copy of these grades.

keep a copy of your grades for one year after the course has ended.

At the end of each semester, be sure that the instructor has a copy of your grades and that all your obligations have been satisfied. Do not leave town until all your duties have been fulfilled and, if your departure is before the end of your pay period, you must file a Request for Travel Authorization (RTA), see Section 2.2.6, and have obtained the approval of your supervisor.

5.8 Coaching

Coaching is an important general service for all undergraduate courses, and students and faculty depend on this service. TAs are often assigned to coach as part of their duties. The coaching facility is in the hall on the 5th level of RLM, and coaching takes place Monday through Thursday, 9:00-6:00 and Friday 9:00 to noon. You must sign up in the Graduate Office for specific coaching hours once your course and teaching schedules are set. Coaching begins the first week of classes and goes through to the last class day.

Coaching is subtle and difficult, but it can be very rewarding. Coaching is one-on-one teaching, restricted to monitoring the student's progress toward problem-solving. It involves helping students with lecture, lab, text, or homework. Restrict aid on homework to answering questions about specific problems. Do not solve problems, but provide direction toward solutions. Do not lecture; if a student has no awareness of the subject matter, point out the appropriate passages in the text. Above all, encourage the student to find a solution, and instill self-confidence. A good coach can monitor the progress of several students working different problems. Maintain a good self-image. Admit when you don't know an answer, and seek someone who does. Students appreciate honesty.

Office Hours MUST NOT be held in the Coaching Area or the Kodosky Reading Room. If you need a suitable location for Office Hours, contact the Undergraduate Affairs Office to schedule a room.

5.9 Ethics

5.9.1 The University Honor Code

The University's Honor Code reads as follows: *The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness and respect toward peers and community.*

5.9.2 The University's Non-Discrimination Policy

As lain out by *The Revised Handbook of Operating Procedures*:

> It is the policy of The University of Texas at Austin to provide an educational and working environment that provides equal opportunity to all members of the University community. In accordance with federal and state law, the University prohibits unlawful discrimination, including harassment, on the basis of race, color, religion, national origin, gender, including sexual harassment, age, disability, citizenship, and veteran status. Procedures for filing discrimination complaints on the basis of gender, including sexual harassment, are addressed by HOP 4.B.2. Pursuant to University policy, this policy also prohibits discrimination on the basis of sexual orientation, gender identity, and gender expression.

This policy applies to visitors, applicants for admission to or employment with the University, and students and employees of the University who allege discrimination by University employees, students, visitors, or contractors.

Definitions

1. **Discrimination**, is defined as conduct directed at a specific individual or a group of identifiable individuals that subjects the individual or group to treatment that adversely affects their employment or education because of their race, color, religion, national origin, age, disability, citizenship, veteran status, sexual orientation, gender identity, or gender expression.
2. **Harassment** as a form of discrimination is defined as verbal or physical conduct that is directed at an individual or group because of race, color, religion, national origin, age, disability, citizenship, veteran status, sexual orientation, gender identity, or gender expression when such conduct is sufficiently severe, pervasive or persistent so as to have the purpose or effect of interfering with an individual's or group's academic or work performance; or of creating a hostile academic or work environment.
3. **Verbal conduct** is defined as oral, written, or symbolic expressions that:
   - **personally describe or is personally directed at a specific individual or group of identifiable individuals; and**
   - **is not necessary to an argument for or against the substance of any political, religious, philosophical, ideological, or academic idea**

Constitutionally protected expression cannot be considered harassment under this policy. (See Section 13-204 of the *Institutional Rules on Student Services and Activities* [Appendix C to the *General Information Catalog*] for further information concerning harassment; and Sec. 11-501(b) for information concerning enhanced student penalties for offenses motivated by race, color, or national origin.)

5.9.3 Relationships with Students

General. Social interactions with students enrolled in your classes in which you have either an instructional or grading role should be very limited. Be friendly but firm: students appreciate firm and fair standards which are kept to. They develop good working and learning habits if taught by someone they respect. If special counseling is required, do not attempt to do it but direct the student to their academic dean's counseling office or the Counseling and Mental Health Center (Section 2.5.4). You are not permitted to use your position to intimidate a student nor to further a romantic intention. Nor should you allow a student to try to influence your grading through personal or social involvement.

Sexual Harassment. Sexual harassment is defined as either unwelcome sexual advances or other verbal or physical conduct, when: (1) Submission by a student is made explicitly or implicitly a condition for academic opportunity or advancement; (2) submission to or rejection of such conduct by a student is made a factor in academic decisions affecting that student; or (3) the intended reasonably foreseeable effect of such conduct is to create an intimidating, hostile, or offensive environment for the student. Sexual harassment is expressly prohibited, and offenders are subject to disciplinary action. However, the interaction of faculty and students, where harassment or conflict of interest is not a factor, is to be encouraged. To repeat: It is inappropriate for an instructor to form romantic or sexual relationships with students working under the instructor's direct supervision. Do not date or attempt to date students in your class.

5.9.4 Students with Disabilities

On occasion, a student with special learning or access needs will be among your students. It is University policy to provide special accommodation to meet these student's needs. The University provides screening for students in this category. If a student requests accommodation, they must produce a letter from the Dean of Students indicating what the nature of their disability and suggesting appropriate accommodation. You should honor this student's request and provide a situation that as closely as possible meets the suggestion but is still appropriate to your class' circumstances.

5.9.5 Religious Holidays

Students at the University of Texas are diverse and participate in a broad range of religious practices. Generally, the University holiday schedule allows for most Christian religions. In any case, the University supports students in the expression of their beliefs and encourage all faculty to accommodate legitimate requests for arrangements that allow for recognized religious practices.

5.10 Two Week Rule

If a student fills out a TA/AI Application and subsequently is offered a GRA position, they have until 5:00 p.m. two weeks before the First Class Day to withdraw that Application. After that day the student is obligated to serve as a TA or AI as assigned by the Graduate Coordinator. There are NO EXCEPTIONS to this rule.

Appendix A: Student Machine Shop Safety Manual

A.1 General

1. Approved eye protection must be worn at all times in the shop area.
2. All injuries must be reported to the shop supervisor immediately.
3. Appropriate clothing is also required in the shop and when using shop equipment. Sandals and open toed shoes are prohibited. In addition, long sleeves are required when welding or observing someone weld. Loose clothing or long hair must be confined to prevent becoming entangled in the machines.
4. If you break a piece of tooling, discover broken tooling or machinery that is not operating correctly, notify the supervisor immediately. Students must comply with this rule in order to prevent injuries caused by broken or malfunctioning equipment. Hiding or concealing broken tooling only slows the replacement of that piece of tooling.
5. Tools and materials should not be left hanging over the edge of work benches or machinery because they may be knocked off causing injury or damage.
6. Hands are to be kept clear of moving parts while equipment is in motion. Machines must be completely stopped before handling moving parts or the work piece.
7. The safety guards are to be kept in place at all times, unless the shop supervisor gives you permission to remove them.
8. Only one person will operate a machine at anyone time.
9. You may not wear gloves while operating machinery. Holding objects with a rag near moving machinery is also not permitted. Gloves, rags, etc. can be easily caught in machines that are in motion, pulling the operator into the equipment.
10. Machinery may not be left running unattended. You must be at the controls of the machine you are using whenever it is in motion.
11. Clean machines, benches and work areas immediately after each use. Use a brush to clean up chips; then use a vacuum, followed by a rag if needed to clean up the remaining small particles. .
12. Ensure the safety of yourself and others by being aware of your surroundings. If you see someone committing an unsafe act, report it to the supervisor immediately. As the machine operator you are responsible for the safety of the people in your immediate area. It is your responsibility to look around and be sure that everyone within your range is wearing safety glasses. Likewise a welder must be sure not to start welding if people without welding helmets are watching him.

13. Keep the floor around your work area clean of cuttings and fluids such as cutting oil or water as to prevent slipping. If you spill any fluid you must clean it up immediately.
14. All chemicals brought into the shop must have a "Material Safety Data Sheet", which must be provided to the supervisor for the shop MSDS file.
15. All containers must be labeled as to their contents. Unlabeled containers of chemicals will be removed and disposed of. No chemicals or hazardous materials will be used until such usage meets all Office of Environmental Health and Safety regulations and also has approval of the shop supervisor.
16. Dispose of all chemicals and hazardous materials on job completion as required by the OEHS. Contact the Environmental Safety Office for disposal assistance at (471-3511).
17. If you have any questions about safety or the correct setup of any piece of equipment, do not hesitate to ask the supervisor for assistance.
18. Observers must not distract the operator of a machine as this may cause serious injury to the operator or the observers.
19. Observe the limitations of all machines.
20. Dirty shop rags must be placed in the red, covered metal container provided in the shop. Oily or otherwise contaminated rags littered around the shop are a fire hazard.
21. The machine shop is for physics projects and other departmental related projects only.
22. Whenever cutting or trying to clamp round stock in place, always use V-blocks and a vice in order to securely grip the material.

A.2 Hand Tools

1. Clean grease and oil from hands before using tools to prevent slipping.
2. To prevent injury or damage to your project use only tools that are in good condition.
3. Wear a face shield when using a chisel, and be sure no one is in the area where chipped material will be flying.
4. Use tools only for the job that they were designed for. Screwdrivers are for turning screws; hammers are for striking objects; parallel bars are for holding material in place until clamped; etc....
5. A chisel or punch head that becomes mushroomed should be given to the supervisor for repair. Mushroomed heads can chip off and cause injuries.
6. Cut away from your hands and body when using a knife or sharp object.
7. Check the hammer or mallet handle before using to be sure the handle fits tightly into the head of the hammer.
8. Use a wrench on nuts and bolts, not pliers.
9. Use open-end or adjustable wrenches that fit the nut snugly to prevent slipping and injuring fingers or damaging parts.
10. Use the correct size tool for the job. That includes screwdrivers.
11. All power tools must be turned off and have come to a complete stop before they can be set down by the operator. NO EXCEPTIONS.

A.3 Metal Working Tools

A.3.1 Drill Press

1. Check the drill press head and table for security and condition before starting.
2. A center punch will help locate the hole to be drilled in the correct place.
3. Select the correct speed for the material and size drill being used.
4. REMOVE THE CHUCK KEY IMMEDIATELY AFTER TIGHTENING OR REMOVING A DRILL. Leaving it in the chuck can injure someone if the machine is turned on.
5. All work pieces must be held securely for drilling by using either a drill vise or C-clamps. A work piece that moves when being drilled can break the drill, and injure the operator and destroy the work piece. Large work pieces must be set firmly against the left side of the drill press column so that if the drill "grabs" the work piece can not spin and cause injury to the operator or others. If the drill grabs the work piece and it is yanked loose of the clamps and begins to spin, maintain downward pressure with the press and turn off the power. Do not retract the drill as this would allow the work piece to be thrown from the press and may cause serious injury.
6. Hands are to be kept clear of the revolving spindle, chuck, drill and chips.
7. Always ease up on the feed or drill pressure as the drill begins to break through the work piece. Heavy feed pressure will cause the drill to dig in, and could damage the material being drilled, break the drill, or cause the work piece to spin.
8. Drilling soft materials such as brass, copper, or plastic is done with a drill ground differently than drills used for steel.
9. When drilling large holes drill a pilot hole with a small drill such as 1/8 inch and then step up in size to prevent drill chatter.
10. Be sure the drill press is stopped before removing the work piece, chips or cuttings.

A.3.2 Electric Drill (Hand Held)

1. Center punch the hole to be drilled.
2. Tighten the drill using the chuck key and remove the chuck key immediately.
3. Hold the drill motor firmly, and keep hands away from the revolving spindle and drill.
4. Use a larger drill if a larger hole is needed. Using side pressure on the drill to "wobble" out the hole to increase the diameter will only damage the drill and cause it to break.
5. Apply straight and steady pressure on the drill, and ease up on the pressure as the drill begins to break through the material.
6. With the motor still running back out the drill as soon as the hole is drilled.
7. Turn off the drill and hold firmly until it comes to a complete stop before laying it on the work bench.

A.3.3 Bench Grinder

1. Adjust the work rest to within 1/16 inch of the wheel face.

2. Stand to the side of the grinder, not in line with the wheels, turning on a grinder and while the wheels are accelerating, this is the most common time for a damaged wheel to fly apart.
3. Do not allow hands to come in contact with the grinding wheel while it is in motion.
4. Dress the grinding wheel when it is worn uneven or out or round.
5. Hold the work firmly, and make grinding contact without bumping or impacting the grinder.
6. Use only enough pressure to assure grinding, but not heavy pressure as this will only cause overheating and grinder damage. If the work piece begins to get warm, quench it in water.
7. Grind only on the face of the wheel. Grinding on the side can cause the grinder wheel to explode due to heat stress buildup.
8. Keep the work piece in motion across the face of the wheel.
9. Stone type grinding wheels are not for grinding aluminum, brass, or copper because the soft metal becomes embedded in the stone, overheats, and can explode.

A.3.4 Friction Saw

1. The work piece must be securely clamped. NO EXCEPTIONS.
2. The friction saw, like the grinder, is for steel only. Aluminum and other soft metals will build up on the blade and cause it to overheat and explode.
3. Supervisor must be present while operating.

A.3.5 Disc Grinder - Portable

1. You must wear a face shield as well as safety glasses when using the disc grinder.
2. Always be aware of the direction you are throwing the stream of sparks. It is your responsibility to be sure you are not throwing them on other people, in the vicinity of those without eye protection, or on potentially flammable items.
3. Like all other hand tools, the disc grinder must be stopped (not moving) before it can be set down.

A.3.6 Buffer (Wire or Cloth)

1. Hold the work piece firmly with both hands.
2. Keep hands away from the buffer while it is in motion.
3. Hold the work piece below center (horizontal axis) of the wheel.
4. Apply buffing compound sparingly to cloth buffers.
5. Using excessive pressure will cause the work piece to overheat and damage the surface.

A.3.7 Micro Flat

1. NEVER use the micro flat as a table, chair or workbench. It is a precision measuring device and should be treated as such.
2. Always keep the flat covered unless it is in use.

3. Before use, wipe the dust and grit off the flat with your hand, not a rag, a brush, etc. Your hand can feel the grit and whether you have cleared all of it from the surface.
4. While using the flat, do not place any objects or tool besides the height gauge and/or the work piece on the flat. Other tooling could chip the flat if set down roughly or at the edge.

A.3.8 Engine Hoist

1. NEVER work under anything hanging from a crane, or on a jack. Use jack stands capable of supporting the amount of weight necessary.
2. You must ask the supervisor for permission to use the engine hoist.

A.3.9 Bandsaw - Vertical

1. Use only the correct blade for the material being cut (fine blade for steel, coarser one for aluminum).
2. CAUTION: Stand to one side while doing power-on testing of blade tracking. Should the blade come off the wheels or break, it could cause serious injury.
3. Adjust the blade guides and rollers properly, and adjust the speed. The upper saw guide should be 1/4 inch or less above the work piece.
4. Check the work piece to be sure it is free of defects (i.e. broken off tool bits, etc).
5. Plan the cut so as to prevent backing out of a cut, as this will pull the blade off the wheels. Make relief cuts as needed.
6. Holding the work piece firmly, feed the work piece at a moderate rate.
7. Use a push stick when sawing small pieces.
8. When feeding a work piece into the bandsaw blade, your fingers should not be in line with the blade in case the work piece cuts faster than you expected.
9. A minimum of three teeth must be engaged in the work piece at all times or the teeth will be torn off the blade.

A.3.10 Bandsaw - Horizontal

1. All work pieces must be secured in the machine's clamp.
2. The movable jaw of the machine's clamp pivots about its center. Thus if your work piece extends less than half way through the jaws of the clamp, you must use a spacer on the other side of the pivot in order to prevent slipping.
3. Do not allow the machine to drop rapidly causing the blade to impact the work piece. Slowly lower the saw and let it gently engage the work piece.
4. A minimum of three saw teeth must be engaged in the work piece at all times. If less teeth are engaged then the force per tooth is so great that the teeth will tear off the blade.
5. Control the decent of the blade through the entire cut, do not allow it to cut through the material as fast as it can possibly go.
6. The horizontal bandsaw is a flood coolant machine; the fluid that flows over the blade is recirculated. If the fluid is not flowing, then inform the supervisor immediately and it will be refilled.

A.3.11 Engine Lathe

1. Roll up loose sleeves, and do not wear loose clothes such as sweaters or neckties while operating the lathe.
2. Be certain the work piece is set up securely and tightly when using chucks and collets.
3. REMOVE THE CHUCK KEY IMMEDIATLY AFTER EACH USE. If the lathe were accidentally activated while the chuck key was still in the chuck, the key would become a very fast moving projectile and possibly cause serious injury.
4. Keep hands on the controls or at your side while the lathe is running.
5. Keep hands away from chips as they are very sharp and possibly hot.
6. Complete cuts that are close to the chuck or against a shoulder by hand feeding to prevent machinery or work piece damage.
7. Remove the tool holder and tool post before filing or polishing.
8. Never move the speed selector controls while the spindle is rotating.
9. Never push the reverse switch while a chuck is moving forward as this could cause the chuck to unscrew itself and fall off and cause serious injury.
10. Regulate the depth of cut according to the size and type of material.
11. Use tools that are properly ground for the particular job.
12. You may never check measurements or surface finishes of the work piece while it is spinning.
13. After you have chucked up your work piece and completed your tool setup, you must spin the chuck by hand to ensure that the jaws of the chuck and the work piece will not hit the carriage of the lathe or the tool rest.
14. Between Centers Turning.
    (a) Use the safety dog to drive work piece.
    (b) Clamp the tailstock securely.
    (c) Use only a live center
    (d) Counterbalance work piece on the faceplate if it is irregular in shape.
    (e) Stand to one side of the revolving faceplate to avoid being hit by flying objects.

A.3.12 Milling Machine

1. The milling machine is a precision piece of equipment so it is important not to damage the table. The table is not a workbench or a place to put tools.
2. Be sure you know how to stop the milling machine quickly before operating the machine.
3. Be sure the power feed controls are in their "Neutral" position before turning on the machine.
4. Handle cutters carefully. They are sharp. If they can cut metal, they can cut you.
5. Use a soft hammer or mallet to seat the work piece against the parallel bars or bottom of the vice.
6. Secure the work piece firmly in the vice or with appropriate clamps.
7. Check the work piece, milling machine table, and holding device for clearance of the quill during the cutting.

8. Set the machine for the proper depth of cut.
9. Select the correct spindle speed for the type of material and the cutter being used.
10. Select the proper direction of rotation for the cutter.
11. Feed the work piece against or opposite the direction of rotation of the cutter.
12. Keep hands on the controls while the machine is running.
13. Never try to feel the finished surface while the cut is being taken.

A.3.13 Sheet Metal Shear

1. Follow the manufacturer's specifications as to gauge the sheet metal that can be safely cut. Our sheer can cut up to .060 inch steel sheet or .080 inch aluminum sheet.
2. Keep fingers and measuring scales out of the way of the blade.
3. Do not cut round stock or anything except sheet metal in the sheer.
4. Place the sheet against the guide and then clamp it in position with the clamp on the machine.
5. The treadle is operated with one foot, and the other foot must be kept clear as the treadle comes down.
6. Return the treadle to the up position slowly with foot pressure. Do not let it make a rapid return.
7. Pick up the scrap pieces when you have completed cutting.

A.3.14 Sheet Metal Brake

1. Bend only sheet stock in the brake. No round stock.
2. Adjust the clamping bar correctly to suit gauge of metal being formed, and stand clear of all moving parts.

A.3.15 Throatless Cutter

1. Keep fingers clear of the cutter, and handle cut material carefully as it may have sharp edges.
2. Do not cut round stock with this cutter.
3. Pick up waste once you have completed your cut.

A.4 Welding Tools

A.4.1 Oxygen (Acetylene Welding)

1. Cylinders must always be fastened with a chain or other suitable device as a protection against falling or rolling.
2. Keep the welding equipment free of oil and grease, and away from oily rags. When oil comes in contact with oxygen it will explode.
3. If leaks are detected in the equipment, they are to be reported immediately to the supervisor.
4. Adequate ventilation is needed in the welding area before beginning.
5. Keep ALL flammable material away from the work area.
6. Wear the appropriate welding goggles. Assistants and observers must also wear welding goggles.

7. Release the regulator pressure screw and open the cylinders slowly.
8. Open the acetylene cylinder 1/2 turn maximum.
9. The normal pressure setting for acetylene is 5 psi with a maximum of 15 psi.
10. The oxygen cylinder valve should be opened all the way as it is a double seating valve.
11. The normal pressure setting for oxygen is 10 psi with higher settings used for torch cutting.
12. Point the torch away from yourself and observers before lighting the torch.
13. Use a friction torch lighter (flint striker) to ignite the torch.
14. Close the acetylene valve first if the torch backfires.
15. Keep sparks and flames away from the gas cylinders and hoses.
16. Close both cylinder valves and then release the pressure from the lines when you have finished the job.
17. Hot metals are to be quenched rather than left lying on the table hot, or mark with chalk the word 'HOT' if air cooling is desired.
18. Clean your work area when completed and put scrap metals in the appropriate container.

A.4.2 Electric Welding

1. Proper welding helmet, long sleeves or leather apron, long pants and leather gloves (or cotton gloves if TIC welding) are required to protect the welder and observers from eye and skin damage due to the intense ultraviolet (UV) radiation that emanates from the arc.
2. Do all welding in the welding area if at all possible. Shields and fire hazard precautions will need special attention if welding in other areas.
3. Check for adequate ventilation before welding.
4. Before you begin welding, you must set up the welding shields to protect others from the effects of the UV radiation on their eyes and skin. The shields are to be erected across the entrance to the welding area if the welding is being done in the welding area. If the work piece cannot be brought into the welding area then the shields must be encircling the welding being done.
5. Welding on zinc plated metals is hazardous to your health, and can be fatal. Do not weld on zinc plated metal (galvanized metal).
6. For assistance in setting up the welding equipment ask the supervisor.
7. After your weld is complete, quench the work piece in water or mark it "HOT." if an air cool is necessary.

A.4.3 Spot Welding

1. Open the water coolant valve to maintain a slow water flow.
2. Wear welding gloves and face shield when using the spot welder. Observers must be protected from flying sparks.
3. Prevent excessive "explosion" by proper preparation of work, correct setup, and operation of the spot welder.
4. Handle completed spot welded objects carefully as they may be hot and sharp.
5. The electrodes are hot and cool slowly after they have been used.

6. The electrodes should not be brought together unless a piece of stock is between them.
7. Should the electrodes need cleaning, ask the supervisor for help. Do not use a file.

A.5 Wood Tools

Before using any wood tools you must inspect your material for foreign metal objects, such as nails, screws, staples, etc.

A.5.1 Router (Portable)

1. Wear a face shield when operating the router.
2. Make certain the router bit is tightened before using the router.
3. The router cutter must be completely stopped before laying the router down on its side.
4. Do not stand the router on the cutter end when not in use.
5. Hold the router firmly with both hands before turning on the power.
6. Feed the router at a moderate rate; too slow a feed rate will cause burning of the wood, too rapid a rate will produce a rough splintery surface.

A.5.2 Saber Saw

1. Select the proper blade for the material to be cut, and secure the blade in the saw before plugging in the electric cord.
2. Use a relief cut on corners to prevent binding or pinching the blade which will cause the blade to break.
3. Hold the saber saw firmly against the work piece to prevent vibration or injury.
4. The saw should be placed on its side on the workbench when not in use.

A.5.3 Portable Belt Sander

1. Place the sander on its side before plugging the power plug into the outlet
2. Securely clamp the work piece before sanding.
3. Start the sander before touching it to the surface to be sanded.
4. Disconnect the power plug before changing the sanding belt.
5. The weight of the sander will apply adequate pressure to the sanding surface in most cases. Do not apply pressure that causes the sander to slow down.

A.5.4 Disk / Belt Sander

1. Check the belt or disk to make sure it is in good condition and not torn. The shop supervisor will replace worn belts or disks.
2. Keep fingers and hands clear of the moving or rotating surface.
3. Hold the work piece securely and use only moderate pressure.
4. Sand only on the downward motion side of the disk sander.
5. Move the work piece side to side on the sanding surface to prevent rapid wear of the belt or disc.

A.5.5 Table and Radial Circular Saw

1. You must ask the supervisor's permission to use the radial arm saw or the table saw.
2. Unplug the machine before handling or changing the blade.
3. Select the proper blade for the cut to be made. Check the blade to be free of cracks or nicks, and that it is sharp.
4. Limit the blade extension to ~ inch through the piece being sawed.
5. Use the ripping fence or the cutoff gauge when cutting material.
6. Keep a push stick immediately available and use it to keep fingers away from the saw blade.
7. Feed the work piece at a moderate rate, but not so fast the motor slows down.
8. When using the fence to rip cut a work piece the operator and all observers must not stand in line with the work piece because it can get pinched between the spinning blade and the fence causing it to kick back (be fired strait back out of the saw at a very rapid rate).
9. When cutting large or long pieces on the table saw, use an assistant to SUPPORT the edge or end of large or long pieces being sawed. The assistant does not "feed" the material into or pull it through the saw. This can cause the operator to loose their balance if the work piece moves more rapidly then they anticipated and the operator can fall into the saw.
10. Make sure the table saw has a blade guard, splitter, and anti-kickback device installed and operational before using the saw. Exceptions may be made for specialty cuts (e.g., dados). Check with the shop supervisor before disengaging or removing these guards.
11. You may not cut any work piece on the radial arm saw that is less than 12 inches in length.
12. The table and radial arm saws are for cutting wood materials only.

A.5.6 Jig Saw

1. Select the proper size and type of blade for the material to be cut.
2. Cut only stock that is flat on at least one side.
3. See the technician about setting the proper blade tension.
4. The jig saw foot should apply pressure to the work piece. The foot holds the work piece down on the table.
5. Turn the machine through by hand to check for proper operation before turning on the power.

A.5.7 Jointer

1. All guards will remain in place and properly operating before using the jointer.
2. Stand to the side of the machine when in operation.
3. Limit the depth of the cut to 1/16 inch maximum; the jointer is intended for light finish cuts only.
4. Use a push stick, and do not feed material less than 12 inches long through the jointer.

5. Never allow hand pressure on top of the work piece to be directly over or just past the cutter. If kickback should occur with the hand over the cutter, serious injury will result.
6. The work piece must be pushed far enough past the cutter knives before picking it up to allow the guard to return.
7. Feed the work piece at a constant moderate rate and into the rotation of the cutter.

A.6 Other Tools

A.6.1 Sand Blaster

1. All work pieces must be clean (free of grease, oil, etc) and dry.
2. You must ask the supervisor's permission to sand blast.
3. Discontinue use and inform the supervisor if the sand blasting machines gloves develop cracks, tears or holes.

A.6.2 Compressed Air

1. Wear safety glasses, goggles, or face shield when using the blow gun.
2. Blowing compressed air at your skin or that of others can inject air bubbles into the blood stream and cause death.
3. You are responsible for insuring that your use of the air hose does not injure others, (i.e., do not blow chips at someone without eye protection). LOOK FIRST.

A.6.3 Solvent Tank

1. Use of the rubber gloves provided is strongly recommended but not required.
2. Pre-clean the parts to remove excess grease, oil and other foreign substances so that the solvent is not instantly too contaminated to use. Note: the solvent is recirculated continuously.
3. When not in use the lid is to remain closed and not used as a table.
4. No additional solvents may be added to the solvent tank.
5. The supervisor is responsible for replacing the solvent.

A.6.4 Spray Painting

1. No spray painting will be done in this shop. It does not meet the Air Pollution Control District or OSHA regulations and requirements.
2. Check with the supervisor for alternatives if painting is required to complete your project.

A.6.5 Hydraulic and Arbor Press

1. Make certain work is solidly supported on the table and is aligned with the ram.
2. Make certain that accessories, ram or arbor, are properly positioned so as to prevent parts from slipping out when under pressure and endangering yourself or observers.

Appendix B: Student Shop After Hours Policy

B.1 Rules for Student Machine Shop for after hours and weekends

1. All shop safety rules will be strictly adhered to, see Appendix A.
2. Only physics approved students, working as part of an official physics department group, are allowed in the shop. Each individual must provide, on the sign-up sheet, his or her name and an emergency contact (this will include the name, relationship, and phone number of a responsible party in the event of an accident).
3. No machinery will be operated and no work will be done unless there are two student members physically present in the shop. This will allow, in the event of an injury, for the second person to call for help by using the EMERGENCY PHONE and then render aid. See EMERGENCY PROCEDURES below.
4. Any breach of safety procedures will result in the loss of shop privileges.
5. Faculty sponsor must approve after hours work and provide a means of contact for the group.
6. Leave doors open while working in student machine shop.

B.2 Minor Emergencies

If treatment is required for minor accidents, University Health Services or any ERT can be contacted. Telephone numbers and locations will be posted on the door by sign-in sheet.

B.3 Emergency Procedures

In the event of a serious accident the second person performs procedures listed below:

1. Press the RED button on the EMERGENCY PHONE located on the left side of the doorway and under the large RED sign. This will put you in direct contact with the University of Texas Police Department (UTPD). This will also give UTPD the exact location (Robert Lee Moore/RLM) and the room number (3.210/student shop).
2. Explain the nature and severity of the emergency and if Emergency Medical Services (EMS) and/or the fire department are needed.
3. Render aid until emergency response teams arrive. The FIRST AID KIT is located on the wall by the sink.
4. Contact the faculty supervisor.
5. Ask EMS personnel which hospital the individual will be transported to.
6. Faculty Supervisor: Phone the emergency contact (from sign-up sheet) and tell them which hospital the student will be taken to.
7. Contact the student shop supervisor, Jack Clifford at 380-0670, and the shop supervisor, Allan Schroeder at 281-3261.
8. E-mail Allan Schroeder at als@physics.utexas.edu a detailed report covering the accident and procedures followed including as many names as possible.
9. Secure all shop entrance doors before leaving.

Appendix C: FAQs about Computer Support

Who provides computing support for Physics?

Answer: The College of Natural Sciences Office of Information Technology (CNS OIT) provides services via the CNS Help Desk. CNS OIT is a service group dedicated to supplying computing support for the college. In addition, some groups within Physics may have their own local support staff to help members of their groups. More information about the services provided by the CNS OIT are found here: http:/cns.utexas.edu/deans-office/information-technology/.

How do I get a Physics account for web, computation, or general use?

Answer: We provide Linux accounts which can be used for computation, personal web pages, and general computing use. Pick up a new user account form from Matthew Ervin, Graduate Coordinator. Fill out the form and have the associated research sponsor, Matthew Ervin, or Department Chair sign the form. After having the form signed, please bring the form with correct identification to RLM 7.126. Unless there is a problem with your form, your account will be set up within one business day, often within about 15 minutes.

How do I get a Physics e-mail account?

Answer: We no longer provide physics e-mail accounts for students. Students should get a UT Mail account by going to: http://utmail.utexas.edu/.

How do I subscribe to the Physics department graduate email list?

Answer: You may sign up for this list by going to: https://utlists.utexas.edu/sympa/info/gradlist.

What computers are available for use?

Answer: Your LINUX account will work for accessing our 15 LINUX machines named linux1.ph.utexas.edu through linux15.ph.utexas.edu. The same account also works for publishing your own webpages.

You may access all the LINUX machines remotely via SSH. You can also directly access a few of these machines in the PMCL [Physics Micro Computer Lab] in RLM 7.306, and in the Graduate Lounge in RLM 9.236.

You may also use the Windows machines in the PMCL in RLM 7.306 if it is not busy. Undergraduates get first priority to the PMCL Windows machines, and graduate students may only use them when the lab is not busy. The Windows-based machines use your UT EID (not your physics Linux account) for access.

Printing is available in RLM 9.326 for the LINUX machines, and in RLM 7.306 for the PMCL Windows machines. Note that printer usage is monitored for abuse.

See http://pmcl.ph.utexas.edu/ for additional information.

How do I make a request for help in a computer related matter?

Answer: Go to the website http://www.cns.utexas.edu/help/.

How do I access the homework server machine?

Answer: Go to http://quest.cns.utexas.edu/.

How do I setup a personal web page?

Answer: Go to: http://www.ph.utexas.edu/~help/homepages.php. Under the Information and Help section you will find the link called "Setting Up Your Home Page on our Unix Systems" click on this link for detailed information about setting up your personal web page.

What software is available from the Physics Department?

Answer: The department has many software packages available for use via the Graduate Computer Lab Linux machines. See: http://www.ph.utexas.edu/~help/software.php for details.

What other software is available to me?

Answer: The University provides software to students free and at greatly reduced prices. For more information go to: http://www.utexas.edu/its/products/. You will find information about the following topics supported by University Texas's Information Technology Resource Central: UT EID, Bevoware, Blackboard, Campus Computer Store, Microsoft Windows and Office products, Mac OS software and much more.

Appendix D: Sample Forms & Documents

[1] Advising Form

[2] Degree Planning Checklist

[3] TA/AI Application

[4] Every Semester To Do List (Registration, Advising, and Tuition Bill Payment)

[5] Oral Qualifying Examination Form

[6] Ph.D. Program of Work

Today's Date: 8/17/2047

Advising Sheet for Fall 2047 Registration

Fill in the sheet (please print) and turn it in to Dr. Keto during your advising time. Keep a note for yourself of the courses you will register for since you will be handing in this form. If you make a change in registration for a core course or degree-required course you should inform Dr. Keto of the change via email, immediately. PLEASE WRITE CLEARLY, thank you.

Name: KEVIN SMITH **EID: clerks2**

Address: 12344 Organa Street; Capital City, Alderan 02000

Phone: 867-5309 **Email: k-dog@physics.austin.us**

Name of Supervisor (leave blank if you do not have one): Yoda

Field of Interest: Fundamental Theory

Proposed Course Work for Fall 2011*

Course #	Unique #	Title of Course	Instructor
PHY 385K	10000	Classical Mechanics	Skywalker
M381D	60000	Complex Analysis	Weil
PHY 398T	00300	Supervised Teaching in Physics	Coker

*Courses are listed on the back of this form. If you are taking PHY 390 or 690, please write in the name of the faculty member who will supervise your research. [You will also need to fill out a 390/690 Form, have it signed by the faculty member and return it to Matt].

After you have registered, check your schedule on UTDirect to make sure you are in the correct courses. The letter "Z" next to the course indicates that you are registered on a Credit/No Credit basis (some courses are only offered on this basis). You should not take any core or required course on the Credit/No Credit basis. Report any errors in registration immediately to Matt. You have until the 4th Class Day (22 January 2010) to make changes to your schedule freely (to add or drop a class), between the 4th and the 12th Class Day (3 February 2010) you will need Professor Keto's signature as well as that of the course's instructor. If you are in candidacy, you must be continuously registered in 399, 699, or 999 (you register for the class ending in "R" in your first semester of candidacy, and the one ending in "W" thereafter).

I have read and understand the preceding notices/policies: __________ (initial)

Graduate Adviser's Approval: ______________________________

Course Offerings Fall 2047

COURSE #	UNIQUE	TITLE	TIME	ROOM	INSTRUCTOR
PHY 380L	57150	PLASMA PHYSICS I	TTH 3:30 to 5:00	RLM 5.114	SHVETS, G
PHY 380N	57155	EXPERIMENTAL PHYSICS	TTH 2:00 to 3:30	RLM 5.114	RAIZEN, M
PHY 382Q	57157	CELL AND MOLECULAR BIOPHYSICS [BIOPHYSICS II]	MWF 11:00 to 12:00	RLM 6.122	SHUBEITA, G
PHY 382S	57160	SEMINAR IN NONLINEAR DYNAMICS	MWF 1:00 to 2:00	RLM 11.204	FLORIN, E
PHY 385K	57165	CLASSICAL MECHANICS	MWF 10:00 to 11:00	RLM 6.120	NIU, Q
PHY 385L	57170	STATISTICAL MECHANICS	TTH 8:00 to 9:30	RLM 7.104	MACDONALD, A
PHY 385S	57175	SEMINAR IN STATISTICAL PHYSICS: STATISTCAL MECHANICS	TTH 3:30 to 5:00	RLM 5.104	REICHL, L
PHY 386K	57180	PHYSICS OF SENSORS	TTH 11:00 to 12:30	RLM 5.114	LANG, K
PHY 387K	57185	ELECTROMAGNETIC THEORY I	TTH 11:00 to 12:30	RLM 5.124	DOWNER, M
PHY 387M	57190	RELATIVITY THEORY I	TTH 2:00 to 3:30	RLM 5.118	MATZNER, R
PHY 388M	57195	GRADUATE COLLOQUY	W 3:00 to 6:00	RLM 4.102	RAIZEN, M
PHY 389K	57200	QUANTUM MECHANICS I	TTH 9:30 to 11:00	BEN 1.126	BOHM, A
PHY 391S	57230	SEMINAR IN PLASMA PHYSICS	F 2:00 to 4:00	RLM 11.204	BENGTSON, R
PHY 391T	57235	PLASMA PHYSICS: HIGH ENERGY DENSITY PHYSICS	TTH 12:30 to 2:00	RLM 5.120	DITMIRE, T
PHY 391U	57240	SEMINAR IN PLASMA THEORY	TTH 4:00 to 5:30	RLM 11.204	BERK, H
PHY 392L	57245	SOLID-STATE PHYSICS II	MWF 2:00 to 3:00	RLM 6.126	CHELIKOWSKY, J
PHY 392S	57250	SEMINAR IN SOLID-STATE PHYSICS	TTH 1230 to 200	RLM 7.104	DEMKOV, A
PHY 392S	57255	SEMINAR IN SOLID-STATE PHYSICS: CONDENSED MATTER	F 12:00 to 1:30	RLM 13.202	SHIH, C
PHY 393S	57265	SEMINAR IN RELATIVITY	TTH 3:30 to 5:00	RLM 6.124	MATZNER, R
PHY 395S	57270	SEMINAR IN ATOMIC AND MOLECULAR PHYSICS	F 4:00 to 7:00	RLM 5.104	FINK, M
PHY 396K	57275	QUANTUM FIELD THEORY I	TTH 3:30 to 5:30	RLM 5.116	KAPLUNOVSKY, V
PHY 396S	57280	SEMINAR IN PARTICLE PHYSICS	MF 4:00 to 5:30	WEL 3.260	DICUS, D
PHY 396T	57285	PARTICLE PHYSICS: INTRODUCTION TO RESEARCH	T 5:00 to 6:30	RLM 7.104	COKER, W
PHY 396U	57290	THEORY GROUP SEMINAR	TTH 2:00 to 3:30	RLM 7.104	PABAN, S
PHY 397S	57295	SEMINAR IN NUCLEAR PHYSICS	MF 4:00 to 5:30	RLM 5.124	HOFFMANN, G
PHY 398T	57310	SUPERVISED TEACHING IN PHYSICS	M 3:00 to 6:00	RLM 6.126	RILEY, P
PHY 190	57210	GRADUATE RESEARCH			
PHY 290	57215	GRADUATE RESEARCH			
PHY 390	57220	GRADUATE RESEARCH			
PHY 690	57225	GRADUATE RESEARCH			
PHY 698A	57300	THESIS			
PHY 698B	57305	THESIS			
PHY 399R	57315	DISSERTATION			
PHY 699R	57320	DISSERTATION			
PHY 999R	57325	DISSERTATION			
PHY 399W	57330	DISSERTATION			
PHY 699W	57335	DISSERTATION			
PHY 999W	57340	DISSERTATION			

Degree Planning Checklist
Ph.D. in Physics

The Core Courses:

No grade below B- and an average grade of B+ is required for The Core. Up to two Core Courses may be fulfilled by taking the Final Exam, however, the grade on the final does not factor into the required average and the exam may only be attempted once. (Only one attempt is allowed for each course, and the examination must be taken no later than the third semester to leave time to take the course within the two-year period.)

- ❑ PHY 385K Classical Mechanics [Grade: ________]
- ❑ PHY 385L Statistical Mechanics [Grade: ________]
- ❑ PHY 387K Electromagnetic Theory I [Grade: ________]
- ❑ PHY 389K Quantum Mechanics I [Grade: ________]

The Modern Methods of Experimental Physics:

You must demonstrate acquaintance with modern methods of experimental physics. Physics 380N meets this requirement, as does laboratory work done while a graduate student. Other acceptable evidence must be considered individually. PHY 380N is required of all theorists. Experimentalists may use their grade in PHY 380N to replace a low grade in one of The Core Courses (in this instance 380N must be done outside your advisor's lab).

- ❑ PHY 380N Experimental Physics [Grade: ________]

OR ❑ Participation in Experimental Program (for experimentalists)

The Oral Qualifying Examination, Program of Work, & Application for Candidacy:

See separate page of instructions.

The Advanced Courses & Supporting Course Work:

Four Advanced Courses (see reverse for full listing):

- ❑ In-Field Advanced Courses: ______________________________

  ____

  ____

Supporting Work (see reverse for guidelines):

- ❑ Out-of-Field Advanced Course: ______________________________
- ❑ Out-of-Department Course: ______________________________
- ❑ Additional Supporting Course: ______________________________

The Dissertation & Its Defense:

Upon Advancing to Candidacy, you must be continuously enrolled in one of the following: PHY 399, 699, or 999. The first semester of candidacy you must be enrolled in the "R" version of the course (PHY 399R, 699R, or 999R); <u>R must not be repeated</u>. Thereafter, you must be enrolled in the "W" version of the course (PHY 399W, 699W, or 999W). Extensive information regarding both the final preparation and defense of the dissertation is available on The Graduate School's website.

- ❑ PHY X99R
- ❑ PHY X99W

Advanced Courses

Atomic, Molecular, and Optical Physics

PHY 395 Survey of Atomic & Molecular Physics
PHY 395K Nonlinear Optics and Lasers
PHY 395M Laser Physics

Condensed Matter

PHY 392K Solid State Physics I
PHY 392L Solid State Physics II
PHY 392N Many-Body Theory

Cosmology & Strings (The Weinberg Theory Group)

PHY 396K Quantum Field Theory I
PHY 396L Quantum Field Theory II
PHY 396P String Theory I
PHY 396Q String Theory II

High Energy Physics

PHY 396J Introduction to Elementary Particle Physics

Nonlinear Dynamics and Biophysics

PHY 382M Fluid Mechanics
PHY 382N Nonlinear Mechanics
PHY 382P Biophysics I
PHY 382Q Biophysics II

Nuclear Physics

PHY 397K Introduction to High Energy Physics & RHIC I
PHY 397L Introduction to High Energy Physics & RHIC II

Plasma and Fusion

PHY 380L Plasma Physics I
PHY 380M Plasma Physics II

Relativity and Gravitation

PHY 387M Relativity Theory I
PHY 387N Relativity Theory II

Non-Specialized*:

PHY 380N Experimental Physics
PHY 386K Physics of Sensors**
PHY 387L Electromagnetic Theory II
PHY 389L Quantum Mechanics II
PHY 381N Methods of Mathematical Physics II

*The courses under this category cannot be used as an Out-of-Field Advanced Course by anyone.
**Only students in Cosmology & Strings and Biophysics may take this course as an Out-of-Field Advanced Course.

Supporting Courses

Supporting Courses must be drawn from courses offered *outside* the Department of Physics, including, but not limited to, courses offered in: Astronomy, Biological Sciences, Chemistry, Engineering, Geological Sciences, and Mathematics. *All* such courses *must be technical* in nature.

PHY 381M (Methods of Mathematical Physics I) may be taken as a Supporting Course if (and *only if*) it is taken under its co-listing as CAM 381M.

Fall/Summer 2051 TA/AI Application

Appointments require 9 hours of registration. While a graduate student, you can only be appointed for a maximum of 14 semesters in a student title (AI, TA, or GRA) not including summer semesters. **PLEASE WRITE CLEARLY, thank you.**

Name: KEVIN SMITH **EID:** clerks2

Phone: 867-5309 **Email:** k-dog@physics.austin.us

In addition to class times, do you have any other obligations during the semester that limit when you can teach (seminars, meetings you will attend, etc.)? Please explain:

N/A

Have you completed PHY 398T: ❒ Yes ❒ No, currently enrolled (Spring 2010) ❒ No, will enroll (Fall 2010)

Do you have any incomplete (Xs) courses from past semesters?*: ❒ Yes **OR** ❒ No

FALL 2011

Position(s) for which you are applying, please circle your answer(s) and indicate past experience (the course number and semester), if any, in the spaces provided below each option:

AI**	Lab TA	Discussion TA	Grader/TA
	103N (2 semesters)		

Hours: ❒ 20-hour/week position **OR** ❒ 10-hour/week position

If 10 hours, will you have a second appointment? What will it be?

Preferred work assignment? (leave blank if you have no preference)**:** NONE

SUMMER 2011

Position(s) for which you are applying, please circle your answer(s):

Lab TA	Discussion TA
20 hrs/wk for 2 month's salary June 2 – July 26	30 hrs/wk for 2 month's salary June 2 – July 26

There are no summer grader positions. AI positions have already been assigned by Professor Gleeson.

FOR INTERNATIONAL STUDENTS ONLY:

To be eligible for a TA appointment with student contact (the majority of our appointments require student contact), you must receive a score of 230 or higher on the Oral English Proficiency Assessment. If you are Conditionally or Not Certified you will be considered lower in priority for a position. If you do not pass the assessment and do become "fully certified" within your first year of graduate school we will not hire you for the 2nd year in a TA position.

What is your current status for the Oral English Proficiency Assessment? (Choose One):

❒ Fully Certified or Exempt ❒ Conditionally Certified*** ❒ Not Certified (did not pass)***

*You are allowed one incomplete (X) and one Permanent I from a previous semester. An incomplete must be cleared up by the end of the following semester or it will become a Permanent I.

**To be considered for an AI position, you must have 30 hours of graduate-level coursework at UT, including PHY 398T, and have teaching experience as a TA.

***Contact Matt as soon as your status changes.

Every Semester To Do List
(Registration, Advising, and Tuition Bill Payment)

1) Check the Academic Calendar available on the Registrar's website. Note important deadlines and due dates.
2) Pre-Candidacy Students:
    a. Sign up for an advising time on the sheets posted outside RLM 5.224.
    b. Check your Registration Information Sheet (R.I.S.) on the Registrar's website for your registration access time.
    c. Look over the Course Offerings in the *Course Schedule* located on the Registrar's website.
    d. Pick a few classes you need to take.
    e. Show up 5 minutes early to your assigned advising time.
    f. Meet with the Graduate Adviser.
    g. Register/Pre-Register online via UTDirect.
3) Candidates
    a. Check your Registration Information Sheet (R.I.S.) on the Registrar's website for your registration access time.
    b. Look over the Course Offerings in the *Course Schedule* located on the Registrar's website.
    c. Pick a few classes you need to take in consultation with your Ph.D. Program of Work.
    d. Register/Pre-Register online via UTDirect.
4) Tuition Waivers
    a. Apply for an Out-of-State Tuition Waiver based upon your employment at the University at: https://utdirect.utexas.edu/acct/fb/waivers/index.WBX.
5) Apply for an International Student Insurance Waiver via the International Office's website at: https://utdirect.utexas.edu/isss/waive_insurance.WBX.*
6) Confirm your registration via UTDirect
7) Ensure that your Tuition Bill has a zero balance prior to the deadline by either paying for the remaining bill out-of-pocket or by taking one of the University's Tuition Loans via UTDirect.
8) Pay off the remaining balance on your Tuition Loan (if you took one).

***International Students Only.**

Instructions

Fill in lines 1, 2 and 3 on the Qualifying Examination Form.

For #3, you will need to reserve a room, please see Eric Patkowski in 5.208 after you have set a time with your committee. Also check-in with Eric a week and a half or so before the Examination so that he may include your talk in the weekly Physics Events Calendar.

#4. Fill in your examining committee:

- One member of this committee needs to be from the GSSC. The list can be found at http://www.ph.utexas.edu/grad_committees.html or on the bulletin boards outside RLM 5.224. Place an asterisk (*) by the GSSC member's name.

#5 & #6. Matt can help you fill in your grades and Physics Subject Test Score. Please, be sure to include pluses and minuses.

For #7, One of the three items needs to be checked. If you took PHY 380N write in your grade for the course here.

Submit the completed form to Dr. Keto for his signature at least **one week** before you give your exam. Make one copy for Matt and 4 copies for your committee members; please make the copy of page 2 and page 3 on one page if possible (eg. 2 pages to one or duplex printing). Matt can make the copies if you do not have access to a copier. Give the copies to your committee members when you give your talk. Please, attach a copy of your abstract to Matt's copy.

QUALIFYING EXAMINATION FORM

1. Student's Name: KEVIN SMITH

2. Title of Presentation: "Stuff About Stuff, and the Other Stuff In Between"

3. Time, Date and Place of Exam: 11/18/2049: RLM 4.120

4. **EXAMINING COMMITTEE**

SUPERVISOR: Master Yoda*

Mace Windu

Leia Solo

George Lucas

*Member of GSSC

5. Core Course Grades:

385K Classical Mechanics	B+
385L Statistical Mechanics	A-
387K Electromagnetic Theory	B
389K Quantum Mechanics	A+

6. Physics GRE Score: 950

7. Experimental Physics:

Senior-Level Laboratory	
Participation in Experimental Program	
Physics 380N	A

The Oral Qualifying Examination. Within twenty-seven months of entering the program, the student must take an oral qualifying examination. The examination consists of a presentation before a committee of four physics faculty members, one of whom is a member of the Graduate Studies Subcommittee. The presentation is open to all interested parties. It is followed by a question period restricted to the student and the committee. The questions during this session are directed to clarifying the presentation and determining whether the student has a solid grasp of the basic material needed for research in his or her specialization. The student passes the examination by obtaining a positive vote from at least three of the four faculty members on the oral qualifying committee.

Graduate Adviser ____________________ Date ____________

I judge the candidate's performance in this presentation and subsequent oral examination to be:

Satisfactory ____________________ Unsatisfactory ____________________

Remarks:

Educational Assessment
(For committee members)

An educational goal of the Physics Graduate Program is the knowledge presented in the core courses. We are requesting that the examining committee ask specific questions in electromagnetism, statistical mechanics, and quantum mechanics:

1) Was the student capable of correctly answering one guided electromagnetism question from among the three topics: electric/magnetic boundary-value problems; waves and waveguides; or electromagnetic radiation? Rate the student as [good, adequate, or poor.] (Circle one).

2) Was the student capable of correctly answering one guided statistical or quantum mechanics question from among the three topics: theory of spin and orbital angular momentum; statistical physics of solids; quantum approximation techniques? Rate the student as [good, adequate, or poor.] (Circle one).

3) We are also being asked to assess the student's ability to communicate. Were the student's oral and graphical skills "Satisfactory"?

4) Was the student's ability to present a plan for original research "Satisfactory"?

Date: 5/15/2050

Physics Department
Program of Work for Ph.D. in Physics

SMITH, KEVIN clerks2

Name Last First Middle EID

11/18/2049

Previous Degree(s) and Date(s) Awarded Date Qualifying Exam Passed

"Physics and Stuff: Fresh Perspectives on Optical Illusions, Lasers, and Other Stuff"

Approximate Title of Dissertation or Treatise

List Major work below:

Semester/Yr.	Unique #	Course	Course Description	Professor	Grade/Status
[The Core]					
Fall 2047	10000	PHY 385K	Classical Mechanics	Skywalker	B+
Spring 2048	22222	PHY 385L	Statistical Mechanics	Vader	A-
Fall 2048	12121	PHY 387K	Electromagnetic Theory I	Windu	B
Spring 2049	30003	PHY 389K	Quantum Mechanics I	Yoda	A+
[Advanced Courses]					
Fall 2050	44544	PHY 389L	Quantum Mechanics II	Yoda	A-
Fall 2051	09000	PHY 396K	Quantum Field Theory I	Lucas	B
Spring 2052	06000	PHY 396K	Quantum Field Theory II	Lucas	B+
[Dissertation Hours]					
Fall 2050	23332	PHY 399R	Dissertation	Yoda	
Spring 2051 & Thereafter	34444	PHY 399W	Dissertation	Yoda	

(See back to list Supporting work)

List Supporting work below:

Semester/Yr.	Unique #	Course	Course Description	Professor	Grade/Status
[Out of Field Advanced Course]					
Spring 2051	86753	PHY 382M	Fluid Mechanics	Solo	A+
[Out of Department Supporting Class]					
Fall 2047	60000	M 381D	Complex Analysis	Weil	A-
[Out of Department or Out of Field Supporting Class]					
Fall 2051	89988	M 380D	Algebra	Liebniz	CR

AUTHORIZATION OF PROGRAM: GRADUATE ADVISOR

I have reviewed and approve the Program of Work proposed. I recommend admission to candidacy for the doctoral degree.

____

Signature of Graduate Advisor

Bibliography

[1] *Regents' Rules and Regulations* (reissued 12/2004)
http://www.utsystem.edu/bor/rules/homepage.htm

[2] *Revised Handbook of Operating Procedures*
http://www.utexas.edu/policies/hoppm/tochop2.html

[3] *General Information Catalog 2010-2011*
http://www.utexas.edu/student/registrar/catalogs/gi10-11/index.html

[4] *The Undergraduate Catalog 2008-2010*
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[5] *The Graduate Catalog 2009-2011*
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[6] The Graduate School Student Services Office Academic Policies
http://www.utexas.edu/ogs/student_services/academic_policies/

[7] *Shop Safety Manual* (updated April 2002)
Hardcopy: Available in every lab in RLM and see Appendix A.

[8] Physical Science Laboratory Manual
AI's teaching PS courses get manual from Lab Supply, RLM 8.306

[9] Conceptual Physics by Hewitt, 10th ed.
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