HANDBOOK

FOR

GRADUATE STUDENTS

Department
of
Physics and Astronomy

MICHIGAN STATE UNIVERSITY

August 11, 2010

This handbook contains a description of the policies concerning graduate study and programs which are available in our department.

HANDBOOK FOR GRADUATE STUDENTS

Department of Physics and Astronomy

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I. POLICIES GOVERNING GRADUATE STUDIES

In the hierarchy of policies and requirements that govern graduate studies in the MSU Physics and Astronomy, there are: (1) The MSU Graduate School policies; (2) The policies of the Physics and Astronomy (PA) Department, and; (3) The requirements set down by the student's Guidance Committee (in the case of a M.S. with thesis candidate or a Ph.D. candidate). The graduate school policies may be found at the first link given in Section XI of this document. Many of the important graduate school policies and regulations will be included in what follows, though many of the details are not covered. Any change to the requirements described below must be approved by the PA faculty. The teaching assistants are governed by the MSU/GEU contract (http://grad.msu.edu/geu/agree.pdf)

Full time status: Full time status for doctoral students is defined as a minimum of 1 credit for those students who:

a. Have successfully completed all comprehensive examinations and are actively engaged in dissertation research; OR

   Are doing department-approved off-campus fieldwork related to preparation of their dissertation. AND

b. Have completed 24 credits of PHY 999 credits.

II. GRADUATE PROGRAMS IN PHYSICS/ASTRONOMY

The following degree programs are offered by the Physics and Astronomy Department at Michigan State University

- The M.S. and Ph.D. in Physics
- Interdisciplinary Ph.D. in Physics
- The M.S. and Ph.D. in Astrophysics and Astronomy
- Ph.D. program with dual majors in Physics and Mathematics

In addition, the course requirements for interdisciplinary Ph.D. research in Physics and Biochemistry are slightly different than that of the regular Physics Ph.D., and should be discussed with the Director of Graduate Studies. Physics students may have joint advisors in other departments at MSU or at laboratories outside MSU, as negotiated with the Director of Graduate Studies.

III. ACADEMIC ADVISING

All incoming graduate students may seek advice from any faculty member. The Director of Graduate Studies is also available for consultation and discussion. Once a student has formed his/her Ph.D. Guidance Committee (see Sec. VII) the Guidance Committee members serve as additional sources of advice.

IV. DEGREE REQUIREMENTS

IV. A. Ph.D. in Physics

To receive the Ph.D. in Physics a student must:

1. Pass the Qualifying Examination (see Sec. V) on undergraduate physics at the Ph.D. level (grade of A) before the end of the student's first semester of the second year. A maximum of three tries is allowed on this exam. Alternatively, a student may qualify for the Ph.D. program by taking a sequence of undergraduate courses approved by the graduate advisory committee, and by achieving at least a 3.5 average on these courses, with no course grade below 3.0. As a second alternative, students can score an average of 3.5 on three subject exams during their first year. Students who have not satisfied their requirement above by the end of their first year of graduate studies will have reduced priorities for receiving TA/RA support for the following year.

2. Complete a program of basic coursework. Graduate students must maintain at least a 3.0 GPA in their coursework and satisfy the other Graduate school requirements concerning grades. The following courses must be completed for the Ph.D. in physics, provided they have not been completed at another accredited graduate school. Further, students must earn a minimum of a 3.0 grade in each of the following core courses:

   Methods of Theoretical Physics, PHY 810 (Fall)
   Classical Mechanics, PHY 820 (Fall)
   Statistical Mechanics, PHY 831 (Fall)
   Quantum Mechanics I, PHY 851 (Fall)
   Quantum Mechanics II, PHY 852 (Spring)
   Electrodynamics I, PHY 841 (Spring)
   Electrodynamics II, PHY 842 (Fall)
   Frontiers in Physics, PHY 901 (Spring)

3. DF-Deferred grades: The required work must be completed and a grade reported within 6 months with the option of a single six-month extension. If the required work is not completed within the time limit, the DF will become a U-Unfinished and will be changed to DF/U under the numerical and Pass-No Grade (P-N) grading systems, and to DF/NC under the Credit-No Credit system. This rule does not apply to graduate thesis or dissertation work.

4. Satisfy the Ph.D. Comprehensive Exam Requirement which in PA is fulfilled through a series of Subject Exams (see Sec. VI). The requirement must be completed by the end of the first semester of the third year of a student's Ph.D. program. A student will be given two attempts at each of the parts of this requirement.

5. In addition to the basic courses listed above, the student's Ph.D. Guidance Committee may prescribe advanced courses, in consultation with the student and the student's research advisor. These courses will be principally from the student's area of research specialty. In addition at least two two-credit courses (or regular courses) outside of the student's specialty are recommended. This breadth requirement may also be satisfied by courses taken at other universities.

6. Form a Ph.D. Guidance Committee (see Sections VII and VIII) no later than six months after fulfilling the Comprehensive Exam Requirement. The Guidance Committee must meet with the student at least once every year. Prior to the formation of their Guidance Committee the students are mentored by the Director of Graduate Studies and by the Graduate Advising Committee. Each interest group also has two faculty advisors.

7. Write a dissertation on original research, followed by an oral examination based on the dissertation and related material. A student's research program is determined in consultation with the student's research advisor and guided by the student's Ph.D. Guidance Committee.

8. Register for a minimum of 24 credits of doctoral dissertation research (PHY 999).

9. The Department of Physics and Astronomy has no foreign language requirement.

10. The student should serve as a Teaching Assistant for at least one semester. This requirement may be satisfied by prior TA work at other universities. In order to be a TA international students who are not native English speakers must pass the SPEAK test at the appropriate level (see Sec. XII)

11. Students in the Virtual University VUBeam Ph.D. program are exempt from enrolling in the core courses mentioned in (2) at MSU and acquire the corresponding knowledge through equivalent studies and courses at local universities. They also do not have to satisfy the requirement (10). All other requirements, in particular concerning the qualifier and the subject exams covering the core courses, hold unchanged. Written exams can be administered by mutually agreeable local proctors upon prior arrangements with the Director of Graduate Studies. The final student thesis defense must be at MSU.

12. For the Doctor of Philosophy degree, all of the comprehensive examinations (subject exams) must be passed by the first semester of the third year after beginning the Ph.D. program. All remaining requirements for the degree must be completed within eight years from the time when a student begins the first class at Michigan State University that appears on his/her doctoral program of study. Application for extensions of the eight year period of time toward degree must be submitted by the department/school for approval by the dean of the college and the Dean of the Graduate School. Upon approval of the extension, doctoral comprehensive examinations must be passed again.

IV. B. M.S. in Physics

To receive the M.S. in Physics, a student must:

1. Pass the Qualifying examination (see Sec. V) on undergraduate Physics at a M.S. level (a grade of B or above), before the end of the student's first semester of the second year. A maximum of three tries is allowed on the exam.

2. Earn 30 credits with a grade point average of at least 3.0 and satisfy the other graduate school requirements concerning grades. The 30 credits are subject to the following requirements:
   - A minimum of 16 credits must be at the graduate level (800- and 900-level courses).
   - Up to 14 credits of undergraduate senior level courses may be counted in the total of 30 credits needed for the M.S., provided these courses have not been used previously in the credit total toward another degree. Senior level courses include all of the Physics and Astronomy courses with course numbers in the 400-499 interval.
   - In addition to Physics and Astronomy courses, with specific approval by the Director of Graduate Studies or his/her designated representative, mathematics courses at the 400-level and above, some Engineering, Biophysics and Geology courses may be included in the 30-credit total.
   - A maximum of 9 semester credits may be transferred from other accredited graduate schools.

3. If the student chooses Plan A (with thesis), 4 to 10 credits of thesis research, PHY 899 are to be included in the total of 30 credits. Students choosing Plan A must form a Guidance Committee of three regular faculty members, including the student's Master's thesis advisor. This committee will meet with the student yearly and will act as examiners of the student's thesis and oral defense (see form in Appendix E).

4. In Plan B (without thesis) PHY 899 does not count towards the 30 credit requirement. S/he will still need to have accumulated 30 credits with 16 of the credits at the 800-900 course level.

5. Research credits (PHY 800) may also contribute toward the degree. 3 credits per semester up to a total of 6 credits can be counted towards the 30 credits necessary for the M.S. degree in physics.

6. The Department of Physics and Astronomy has no foreign language requirement.

7. Students in the Virtual University VU Beam M.S. program have to satisfy the same requirements as other M.S. students. Usually the bulk of the credit requirements are satisfied via the VU Beam on-line courses PHY 861 and PHY 961 through PHY 964. The Qualifying Examination can be administered by a mutually agreeable local proctor upon prior arrangements with the Director of Graduate Studies.

8. Unless otherwise specified, the time limit for the completion of the requirements for the master's degree is six calendar years from the date of enrollment in the first course included for degree certification.

IV. C. Ph.D. in Astrophysics and Astronomy

The Astrophysics Ph.D. program is structured (1) to provide students with a thorough grounding in the tools of astronomy and the underlying physics used in astronomy, through a sequence of graduate level courses; but also (2) to stress an early entry of the student into research. The evaluation of students for advancement to candidacy for the Ph.D. will place significant weight on their potential as research scientists.

To receive the Ph.D. in Astrophysics and Astronomy a student must:

1. Pass the Qualifying Examination on undergraduate Physics at a Ph.D. level (grade of A), before the end of the student's first semester of the second year. A maximum of three tries is allowed on this exam. Alternatively, a student may qualify for the Ph.D. program by taking a sequence of undergraduate courses, based on discussions with the graduate advisory committee, and by achieving at least a 3.5 average on these courses.

2. Pass the core physics or their subject exams and the core astronomy courses with a grade averaged over all core courses of 3.375. The core courses are described below.

3. Complete the two-semester AST 805 research project satisfactorily at the Ph.D. level. The research project would be graded by a committee consisting of two members of the astronomy group and one faculty member from outside the astronomy group, who would examine the student on the research and on general knowledge pertinent to the research project. This oral examination will serve as the student's comprehensive examination. A Record of Completion Form (see Appendix F) must be signed by the committee at the end of the oral examination. A proposal for this research project must be approved by the astronomy group by the end of the first year of graduate study.

4. All Astrophysics Ph.D. students must complete the following courses. This normally will take two years.

   Core physics courses:
   Classical Mechanics - PHY 820 (Fall)
   Statistical Mechanics - PHY 831 (Fall)
   Classical Electrodynamics I - PHY 841 (Spring)

   Core astronomy courses (taught alternate years, with only 2 or 3 of these courses offered in any one year):
   Stellar Atmospheres, Structure, and Evolution (AST 840)

Radiation Astrophysics (AST 810*)
Galactic Astronomy (AST 825**)
Extragalactic Astronomy and Cosmology (AST 835 or AST 830)
Nuclear Astrophysics (PHY 983)

Elective Courses:

The core courses do not cover all areas of astronomy and physics to which graduate students ought to be exposed. Additional topics will be offered from time to time in elective courses, or in the Special Topics Seminars. Among these additional topics are (1) Observational Techniques in Astronomy. (2) Numerical Techniques, and (3) General Relativity.

5. Form a Ph.D. Guidance Committee (see Sections VII and VIII) no later than six months after fulfilling the Comprehensive Exam Requirement. The Guidance Committee must meet with the student at least once every year. Prior to the formation of their Guidance Committee the students are mentored by the Associate Chair for graduate studies and the Graduate Advising Committee.

6. Write a dissertation on original research, followed by an oral examination based on the dissertation and related material. A student's research program is determined in consultation with the student's research advisor and guided by the student's Ph.D. Guidance Committee.

7. Register for a minimum of 24 credits of doctoral dissertation research (AST 999).

8. The Department of Physics and Astronomy has no foreign language requirement.

9. The student should serve as a Teaching Assistant for at least one semester. International students who are not native English speakers must pass the SPEAK test (see sec. XII) in order to be a TA.

10. For the Doctor of Philosophy degree, all of the comprehensive examinations must be passed within six years and all remaining requirement for the degree must be completed within eight year from the time when a student begins the first class at Michigan State University that appears on his/her doctoral program of study. Application for extensions of the eight-year period of time toward degree must be submitted by the department/school for approval by the dean of the college and the Dean of the Graduate School. Upon approval of the extension, doctoral comprehensive examinations must be passed again.

* called AST 820 in Fall 2001

**called AST 820 in Spring 2003

IV. D. M.S. in Astrophysics and Astronomy

Many of our Ph.D. students obtain a M.S. degree during the course of their studies. However, students will not normally be accepted into the Astrophysics graduate program unless their ultimate goal is to obtain a Ph.D. degree. To obtain a M.S. degree, students must take the same courses as for the Astrophysics Ph.D. degree. This includes taking the two-semester research course described for the Ph.D. program.

The requirements for the M.S. degree are:

1. Complete a total of 30 credits that satisfy either Plan A (with thesis) or Plan B (without thesis) of the general university requirements for a Masters degree.

2. Pass the Qualifying Exam on undergraduate Physics at the M.S. (with a grade of B or above) level before the end of the student's first semester of the second year. A maximum of three tries is allowed on this exam.

3. Pass the core physics and astronomy courses with an average grade of 3.0 or better.

4. Under Plan A: complete 4 - 10 credits of AST 899 Master's Thesis Research, and pass a final oral examination in defense of the thesis; or, under Plan B: complete 6 credits in AST 805 Research Project and pass the examination on the research course at least at the M.S. level. Students choosing Plan A must form a Guidance Committee of three regular faculty members, including the student's Master's thesis advisor. This committee will meet with the student yearly and will act as examiners of the student's thesis and oral defense (see form needed – Appendix E).

5. The Department of Physics and Astronomy has no foreign language requirement.

6. Unless otherwise specified, the time limit for the completion of the requirements for the master's degree is six calendar years from the date of enrollment in the first course included for degree certification.

IV. E. Interdisciplinary Ph.D. in Physics

Many topical research areas lie at the boundary between physics and another discipline. Examples include biological physics, quantum optics electrical and computer engineering (ECE), materials science and nuclear chemistry. Students working in these areas may request to have their Ph.D. subject exam and course requirements modified in order to accommodate an increased course load in other disciplines. In some cases the students complete a Dual Ph.D., which requires that the student satisfy all of the requirements in each discipline. However this can be overly burdensome, so that the PA department has the option of an Interdisciplinary Ph.D. in which the student completes at most 120% of the normal required course load (including courses outside physics). Specific agreements exist with the departments of Biochemistry and ECE. The requirements for the Interdisciplinary Ph.D. are:

1. Pass the Qualifying Examination on undergraduate Physics at a Ph.D. level (grade of A) before the end of the student's first semester of the second year. A maximum of three tries is allowed on this exam. Alternatively, a student may qualify for the Ph.D. program by taking a sequence of undergraduate courses, based on discussions with the graduate advisory committee, and by achieving at least a 3.5 average on these courses, with no course grade below 3.0.

2. Complete a program of basic coursework. Graduate students must maintain at least a 3.0 GPA in coursework. The required courses for the physics component are (provided they have not been completed at another accredited graduate school):

   Methods of Theoretical Physics, PHY 810 (Fall)
   Classical Mechanics, PHY 820 (Fall)
   Statistical Mechanics, PHY 831 (Fall)
   Quantum Mechanics I, PHY 851 (Fall)
   Electrodynamics I, PHY 841 (Spring)
   Electrodynamics II, PHY 842 (Fall)

   Interdisciplinary Ph.D. students must also complete at least 9 credits of graduate coursework outside of physics, in areas relevant to their research project.

3. Satisfy the Ph.D. Comprehensive Exam (Subject Exam) requirement by the end of the first semester of the third year after beginning the Ph.D. program. A student will be given two attempts at each of the parts of this requirement. For the interdisciplinary programs, the student should pass three exams in Physics, with an average grade of at least 3.33. In addition to this, the student should satisfy the comprehensive exam requirements of the other department, as well. In the case where the parent departments are not physics, then the student should pass two exams in physics instead of four, with an average grade of at least 3.25.

4. In addition to these basic courses, the student's Ph.D. Guidance Committee may prescribe advanced courses, in a consultation with the student and the student's research advisor.

5. Form a Ph.D. Guidance Committee no later than six months after fulfilling the Comprehensive Exam Requirement. The Guidance Committee must meet with the student at least once every year. The makeup of the Guidance Committee for Interdisciplinary Ph.D. students is described in Section VIII.

6. Write a dissertation on original research, followed by an oral examination based on the dissertation and related material. A student's research program is determined in consultation with the student's research advisor and guided by the student's Ph.D. Guidance Committee.

7. Register for a minimum of 24 credits of doctoral dissertation research (PHY 999).

8. The Department of Physics and Astronomy has no foreign language requirement.

9. The student must serve as a Teaching Assistant for at least one semester. In order to be a TA, an International Student must pass the SPEAK Test with a score of 50.

10. For the Doctor of Philosophy degree, all of the comprehensive examinations must be passed within six years and all remaining requirements for the degree must be completed within eight years from the time when a student begins the first class at Michigan State University that appears on his/her doctoral program of study. Application for extensions of the eight-year period of time toward degree must be submitted by the department for approval by the dean of the college and the Dean of the Graduate School. Upon approval of the extension, doctoral comprehensive examinations must be passed again.

For a Ph.D. in Physics or Astrophysics and Astronomy the committee consists of usually five members with at least four being regular faculty members of the Physics and Astronomy department. Additional members can be from outside the department. The normal makeup of the committee is three members from the same interest area as the student and two from outside the student's interest area.

In the case of the Interdisciplinary Ph.D. students with physics as the parent department, at least three members will be from the PA department and two members from the non-physics departments participating in the interdisciplinary program (e.g. Biochemistry). If the parent department is not physics then at least two members should be from the PA department.

IV. F. Ph.D. with dual major in Physics and Mathematics

Students in the Ph.D. program with dual major in Physics and Mathematics satisfy symmetric requirements in Physics and Mathematics in which the students complete at most 120% of the normal required course load (including courses outside physics), but the requirements in Physics and Mathematics carry equal weight. The requirements for the dual Physics/Mathematics Ph.D. are:

1. Pass the Qualifying Examination on undergraduate Physics at a Ph.D. level (grade of A) before the end of the student's first semester of the second year. A maximum of three tries is allowed on this exam. Alternatively, a student may qualify for the Ph.D. program by taking a sequence of undergraduate courses, based on discussions with the graduate advisory committee, and by achieving at least a 3.5 average on these courses, with no course grade below 3.0.

2. Complete a program of basic coursework. Graduate students must maintain at least a 3.0 GPA in coursework. The required courses for the physics component are three of the following (provided they have not been completed at another accredited graduate school)

   Methods of Theoretical Physics, PHY 810 (Fall)
   Classical Mechanics, PHY 820 (Fall)
   Statistical Mechanics, PHY 831 (Fall)
   Quantum Mechanics I, PHY 851 (Fall)
   Electrodynamics I, PHY 841 (Spring)

   In addition, dual Ph.D. students must also complete at least half of a normal course load in mathematics.

3. Satisfy the Ph.D. Comprehensive Exam requirement by the end of the first semester of the third year after beginning the Ph D. program. A student will be given two attempts at each of the parts of this requirement. To satisfy this requirement, students in the Dual Mathematics and Physics Ph.D. program must pass in two instead of four Physics subject exams (see Sec. VI) and two instead of four mathematics subject exams.

4. In addition to these basic courses, the student's Ph.D. Guidance Committee may prescribe advanced courses, in a consultation with the student and the student's research advisor.

5. Form a Ph.D. Guidance Committee (see Sections VII and VIII) no later than six months after fulfilling the Comprehensive Exams Requirement. The Guidance Committee must meet with the student at least once every year. The Guidance Committee for mathematics/physics PhD students contains at least three physics faculty and two mathematics faculty.

6. Write a dissertation on original research, followed by an oral examination based on the dissertation and related material. A student's research program is determined in consultation with the student's research advisor and guided by the student's Ph.D. Guidance Committee.

7. Register for a minimum of 12 credits of doctoral dissertation research (Physics 999) and 12 credits of doctoral dissertation research (Mathematics 999).

8. All dual major doctoral programs must be approved by the Dean of the Graduate School. A request for the dual major degree must be submitted within one semester following its development and within the first two years of the student's enrollment at MSU. A copy of the guidance committee report must be attached with this request. For more details see "Dual Major Doctoral Programs" in Academic Programs (http://www.msu.edu/academics/#officialcatalogs

9. For the Doctor of Philosophy degree, all other comprehensive examinations (non-Physics) must be passed within six years and all remaining requirements for the degree must be completed within eight years from the time when a student begins the first class at Michigan State University that appears on his/her doctoral program of study. Application for extensions of the eight-year period of time toward degree must be submitted by the department for approval by the dean of the college and the Dean of the Graduate School. Upon approval of the extension, doctoral comprehensive examinations must be passed again.

V. QUALIFYING EXAMINATION

When Offered
Before the start of each semester of the academic year.

Who Is Required To Take It
All incoming students will take the Qualifying Examination upon arrival.

Content of Exam
This examination will cover undergraduate E & M, Mechanics, Thermodynamics, and some topics from Quantum Mechanics such as are covered in a Modern Physics course or the early parts of an undergraduate Quantum Mechanics course. Sample problems and a list of study materials are available in room 1312 BPS.

Purpose of the Exam
To test the level of a student's understanding of basic undergraduate physics material and problem-solving skills. For entry into the Ph.D. program, all students must pass this examination at the Ph.D. level. This examination also serves as the M.S. degree Qualifying Examination.

Time limit and number of tries
The Qualifying Examination requirement must be completed before the end of the student's first semester of the second year. A maximum of three tries is allowed on this exam. Grade of A is required for the Ph.D. program and at least a grade of B is required for the M.S. degree.

For incoming students the examination also serves as a diagnostic tool to be used by the Academic Advisory Committee in making course placement recommendations for the student's first year. Based on the performance on that examination, a student may be advised to take the standard set of first semester graduate courses or, to take some senior undergraduate courses, such as PHY 481 (E & M I), PHY 471 (Quantum Physics I), and PHY 422 (Classical Mechanics II) in the Fall and PHY 482 (E & M II), PHY 472 (Quantum Mechanics II), and PHY 410 (Statistical Physics) in the Spring. Students taking undergraduate courses will be admitted to the M.S. program and on completion of their qualifier requirements will be admitted to the Ph.D. program. The time limitation on the subject exam (see Sec. VI) begins once the student enrolls in the Ph.D. program.

VI. COMPREHENSIVE EXAM REQUIREMENT (SUBJECT & ORAL EXAMS)

Michigan State University requires all students pursuing a Ph.D. program to pass a Comprehensive Examination. For the Physics Ph.D. Programs, the comprehensive examination requirement is satisfied by satisfactory completion of a set of subject exams.

For the Physics Ph.D. program, students are examined at the end of the following courses:

1. Classical Mechanics, PHY 820
2. Statistical Mechanics, PHY 831
3. Electrodynamics I, PHY 841
4. Quantum Mechanics sequence, PHY 851 and 852

The Final Examinations for these courses act as both the final exam for the course as well as one of the Subject Examinations that contribute to the Comprehensive Examination.

Students in the Physics Ph.D. program must complete these four examinations with an **average** final examination grade of 3.375 or better with no grade lower than a 3.0 in order to satisfy the Physics Ph.D. Comprehensive Exam requirement. In case of the Interdisciplinary Ph.D. in Physics the number of required physics subject exams is three instead of four. The students in the Ph.D. with a dual major in Physics and Mathematics take 2 subject exams in Physics and 2 in mathematics. Note that the physics subject exam average is taken over the best score in each of the subject exams which a student takes. In all cases, excepting the Interdisciplinary Ph.D. in Physics, an average of 3.375 or better (over four Subject Exams), must be achieved. In the case of the Interdisciplinary Ph.D. in Physics; because there are only 3 instead of 4 Subject Exams, the average should be 3.33 or better. The subject exam in each course is set and then graded anonymously by a committee of three faculty members, including the instructor of the associated graduate course.

The subject exam requirement must be completed by the end of the first semester of the third year of the Ph.D. program. A student will be given two attempts at each of the subject examinations. The subject exams are offered at the beginning and end of the associated graduate courses. The subject exam given at the beginning of a graduate course may be cancelled if there are not enough students signed up for taking the exam. The exams occur as follows:

- Classical Mechanics (PHY 820): September and December
- Quantum Mechanics (PHY 851, PHY 852): September and May
- Electricity and Magnetism (PHY 841): January and May
- Statistical Mechanics (PHY 831): September and December

In addition, students are required to pass an oral examination, which is administered as part of their first guidance committee meeting. A presentation should be given about the student's research project, a project that the student worked on not directly related his/her research

project or a literature study about a topic related to the students' research. The presentation is open and will be advertized within the department. It should last approximately 25 minutes and with an additional period for questions by the audience. The presentation is followed by a private session with members from the guidance committee, who can ask further questions and determine the grade. A grade of 3.5 or higher is required to pass the exam. The grade is based on the content of the presentation, the quality of the presentation and the mastery of the material presented.

VII. SELECTION OF THESIS/DISSERTATION ADVISOR

Graduate students are assigned a Temporary Advisor (Graduate Program Director or one of the members of the Graduate Program Committee) when they are accepted into our program. The graduate student should choose their Major Professor before the end of their second academic year in the program; this requires mutual consent between the professor and the student, and many factors go into this important decision. It is the collective responsibility of our faculty to advise graduate students in their research and professional development. If the student has trouble in finding a willing faculty member to serve as the Major Professor, he/she should consult the departmental Graduate Director and/or the Departmental Chair to help find a suitable match.

The Major Professor will be the chair of the student's Ph.D. guidance committee (Sec. VIII) and with the help of this committee advise and mentor the student in his/her research and professional development.

The Major Professor should be a regular faculty member of the Department of Physics and Astronomy at Michigan State University. However, in some cases adjunct faculty will be given approval by the Departmental Chairperson to serve as the Major Professor. In this case, the adjunct faculty must be approved by the College and the Dean of the Graduate School.

If the Major Professor leaves Michigan State University before the student completes his/her degree program the student should consult the Graduate Director and the Departmental Chairperson to identify a suitable Major Professor. It is the joint responsibility of the student and the Departmental Chairperson to make arrangements for the completion of the degree, and it requires mutual consent between the student and a Major Professor.

The Major Professor and the members of the student's Ph.D. Guidance Committee are officially required by the University to submit the *Report of the Guidance Committee*, which has to be approved by the Departmental Chairperson. The time line for submission of this report is discussed in Sec. VIII.

After submitting the *Report of the Guidance Committee*, if the student desires to change his Major Professor for any reason, the change should be requested as early as possible in the graduate training program. Any plans for changing to a different Major Professor should be discussed with the Graduate Program Director, the Department Chairperson, the current Major Professor and the student's prospective Major Professor (not necessarily together) prior to the initiation of any change. Before relations with the Major Professor are severed, the student should make sure that another faculty member (regular or approved adjunct faculty) will serve in that capacity. Research Assistantships are normally associated with specific research programs and are not automatically transferable from one faculty member to another.

VIII. PH.D. GUIDANCE COMMITTEE

Students must form their Ph.D. Guidance Committee no later than six months after completing the comprehensive exam requirement. The student's Ph.D. Guidance committee serves as the examination committee for the student's Ph.D. dissertation and must be chaired by a regular, temporary or adjunct faculty member of the Physics and Astronomy department at MSU. Usually the chair of the committee is the student's Ph.D. thesis advisor. Any Guidance Committee members who are either temporary or adjunct faculty, need to be approved by the graduate school. The Guidance Committee has to be approved by the Chair of the Physics and Astronomy Department and must adhere to the graduate school guidelines. (see http://www.reg.msu.edu/read/UCC/Updated/gradeddoctoral.pdf)

For a Ph.D. in Physics or Astrophysics and Astronomy, the committee consists of five members with at least four being regular or temporary faculty members of the Physics and Astronomy department. Additional members can be from outside the department. The normal makeup of the committee is three members from the same interest area (Astronomy & Astrophysics, Condensed Matter, Nuclear, Particle) as the student and two from outside of the student's interest area. A sixth member may be added with the approval of the Director of Graduate Studies.

In the case of the Interdisciplinary Ph.D. in Physics and the Dual Ph.D. in Mathematics and Physics, at least three members of the Ph. D. Guidance Committee will be regular or temporary PA faculty department and two faculty members from the non-physics departments participating in the program (e.g. Biochemistry or Mathematics).

The student must arrange to have a Guidance Committee meeting once a year. The student's progress and research plans are to be discussed and the Progress Report form must be signed by the committee members. The contents of the report are discussed with the student who receives a copy of the completed and signed form. The progress of the student will be assessed according to the following criteria; (i) performance in advanced courses in the department or outside the department as determined by the committee, (ii) progress in research, (iii) appreciation of the broader context of his/her research program, (iv) successful communication of research results, orally and through written documents, and (v) interacting with his/her colleagues and faculty members in a collegial and professional manner. If progress is not satisfactory the student receives a warning at this time. Any conflicts are resolved by the procedure outlined in Sec. XIII. Copies of the blank forms (first meeting and subsequent meetings) are given in Appendix G and H and can be downloaded at the web site: http:/www.pa.msu.edu/grad/.

IX. DISSERTATION DEFENSE, FINAL ORAL EXAMINATION AND FINAL TERM ENROLLMENT

To give the Ph.D. candidate's Guidance Committee and the faculty time to study the dissertation, it is the candidate's responsibility to circulate a final printed copy of the dissertation at least ten days prior to the date of the dissertation defense. At this time a printed copy must be given to each member of the Guidance Committee, to the Physics & Astronomy Graduate Office and to the National Superconducting Cyclotron Laboratory (NSCL) Library. The final dissertation defense and examination will then be scheduled for a date of ten or more days after the examination copies have been distributed.

The dissertation examination shall be open and all faculty, staff and students shall be welcome to attend and participate in questioning the candidate on the dissertation. However, the final deliberation of the guidance committee shall be held in private. If the student fails the thesis examination there is a possibility of remediation in consultation with the Guidance Committee. In this case, the student will be required to submit a new thesis and undergo an examination based on the new thesis. If the student passes the dissertation examination but corrections or additions to the thesis are required, the student must provide a corrected copy of the thesis to the members of the Guidance Committee for approval. In cases of significant corrections, the student may be required to present a short oral defense of the corrected thesis.

Published papers cannot substitute for the thesis. The form of the thesis must conform to the guidelines set forth by the Graduate School.

Once the oral dissertation is completed and approved, the student is responsible for binding his/her thesis and giving a bound copy to the graduate school, the PA department, and to the chairperson of his/her committee. The student should contact the Graduate Office about the precise format of the thesis.

Final term enrollment. Normally students who are defending their thesis in Fall, Spring, or Summer terms must enroll with a minimum of 1 credit during the term they are planning to defend and submit their thesis. However, for students who were enrolled in the Spring and are defending their dissertations during the immediate Summer Semester, the department can request a waiver of the requirement that the student be enrolled for at least 1 credit the semester of the defense. These requests are to be directed to the Graduate School and must be endorsed by the student's department and college.

X. GRADUATE SCHOOL FUNDING AND DISSERTATION PUBLICATION

There are several sources for funding graduate studies such as Fellowships, AAGA, Summer Acceleration, etc. For more details of the impact of Proposal 2 visit: http://president.msu.edu/prop2response/faqs/index.php?faqs

Receipt of externally funded fellowships by students who have written their own grant applications and worth at least $20,000 (direct costs) now makes the students eligible for in-state tuition rate. The in-state tuition rate applies only to the semesters during which the student is supported by the fellowship. This policy applies only to grants funded through a competitive process by a US institution/agency/foundation. Funds obtained through non-competitive processes (e.g., need-based fellowships) or from international sources do not qualify the students for in-state tuition rates. For more information contact Melissa Del Rio (mdelrio@msu.edu) in 110 Linton Hall.

The new publishing agreement for thesis/dissertations with ProQuest now provides an "Open Access Publishing Option" as an alternative to the traditional publishing option available to our students. The Open Access option gives ProQuest the authorization to make the electronic version of the document accessible to all via the internet, including the selling of the document by commercial retailers and the accessibility to the work via search engines. A student selecting the Open Access option will not be eligible to receive royalties. The pros and cons of selecting this new option differ significantly across disciplines and the graduate handbook could be a way to inform students of benefits and problems associated with each option. For more information visit: http://proquest.com/products_umi/dissertations/epoa.shtml

XI. DEPARTMENTAL POLICIES: INTEGRITY AND SAFETY

IN RESEARCH AND CREATIVE ACTIVITIES

Each faculty advisor and graduate student should be aware of the document *Guidelines for Integrity in Research and Creative Activities (*http://grad.msu.edu/staff/mentoreport.pdf)

Graduate students working in the lab must complete the Office of Radiation Chemical and Biological Safety (ORCBS) Hazardous Waste Safety Training before they start working in the laboratories. They must also complete a refresher course each year. Information on safety training and regulations can be found at: http://www.orcbs.msu.edu/

Further safety training may be required by the particular lab that the student does research in, whether on rotation or as a regular member of the laboratory. If unsure, the student should ask the faculty member in charge of the lab as to what additional safety training is required.

Criteria for dismissal due to unethical or dishonest behavior is described in *Guidelines for Integrity in Research and Creative Activities (*http://grad.msu.edu/staff/mentoreport.pdf)

XII. GRADUATE STUDENT TRAVEL

If you are traveling to attend a meeting or workshop, please ask your advisor about a travel authorization. If you are traveling abroad to attend a meeting/workshop:

a. Check with the MSU Travel Clinic! They will let you know of any health risks or immunizations. http://www.travelclinic.msu.edu/

b. Check the International Studies and Programs website for issues related to safety around the world. http://keywords.msu.edu/viewpathfinder.asp?id=31

c. Apply for assistance with travel funding via the Graduate School. If the Graduate School provides funding, they will also provide a MEDEX emergency card.

XIII. DEPARTMENTAL POLICIES: ACADEMIC PERFORMANCE

When a student is admitted into our graduate program it is with the full expectations that they will not only survive, but thrive academically as scholars and developing scientists. However, sometimes a student's academic performance does not meet the expectations that the student and our faculty have. This section deals with problems and standards for academic performance.

A 3.0 cumulative grade point average (GPA) is the minimum University standard. Research credits are not considered in determining the GPA. Attainment of the minimum GPA, is however, an insufficient indicator of potential for success in other aspects of the program and in the research field. The student's Guidance committee is responsible for evaluation of the student's competency and the rate of progress.

The accumulation of grades below 3.0 in more than three courses of three or more credits or "deferred" in more than three courses of three or more credits at any given time, or a combination of the above in excess of four courses automatically removes the student from candidacy for the degree. Until the first official Guidance Committee report is filed, all courses on the student's record are considered part of the required program.

To remain in good standing the student also needs to follow Departmental as well as University rules for completing their degree requirements in a timely manner. If a student is not making timely and reasonable progress towards his/her degree in terms of completing coursework or taking necessary exams, within 30 days following their annual meeting with the Director of the Graduate Studies, the student should receive a letter from the Department Chair specifying deficiencies and describing the exact steps, with a time table, to get back to good standing. There will be a space on this letter for the student to respond in writing if they disagree either with the deficiencies listed or with the steps and time table for remediation. These responses will be a part of the student's file.

It is a disservice to permit a student to continue toward the advanced degree without the necessary qualifications for retention, including a high level of motivation, commitment, and aptitude. Judgment regarding retention is made by the student's Major Professor and/or the Guidance Committee, in consultation with the Graduate Program Director and if needed the Department Chairperson. If a majority of the Guidance Committee (or the examining committee for the AST 805 in case of Astronomy and Astrophysics graduate students) decides that a student lacks such standards, he/she may be asked to withdraw according to the procedures as defined in the Graduate Student Rights and Responsibilities document which can be obtained at www.msu.edu/students/Splife/gradrights.html

The student has a right to receive a warning when academic performance is judged to be unsatisfactory (see the document Graduate Students Rights and Responsibilities (GSSR) section 2.4.8.1 and 2.4.8.2). The student has a right to access their educational records including the academic file the department keeps on them (GSSR 3.2.3). Request to view and/or copy the file should be made through the department Graduate Secretary.

If the student does not satisfy the Qualifying exam requirement (see Sec. V) he/she will not be allowed to proceed towards the M.S./Ph.D. degree. If after successfully completing the

Qualifying exam the student fails to pass in the Ph.D. Comprehensive examination (see Sec. VI), he/she will be dismissed from the program. The Oral examinations for the Master's and Ph.D. degrees are pass/fail. A student who fails the Master's Dissertation Defense or Ph.D. Dissertation Defense will be given one opportunity to repeat the examination within six months (to be decided by the Guidance Committee). If the student fails the exam a second time, he/she will be dismissed from the program.

Further information on rights and responsibilities of graduate students can be found at the website of the Office of the Ombudsman, http://www.msu.edu/unit/ombud/.

XIV. POLICIES GOVERNING TA AND RA APPOINTMENTS

Most Ph.D. students are employed by the Physics and Astronomy department, either as assistants in our teaching programs (TA's) or as assistants in one of the research groups within the department (RA's). Professional behavior is expected from students in these positions and students in our program carry out their duties at a high level of performance. The TA's are governed by the MSU/GEU contract (http://grad.msu.edu/geu/). Incoming students are usually supported first by a TA and then by a RA and are most often supported throughout their Ph.D. program.

International students who are not native speakers of English must take the **SPEAK** test and pass the examination at the required level in order to be appointed as a TA. Students must have a score of at least 50 or waiver approval following an interview to satisfy the SPEAK test requirement.

Decisions on TA appointments are made by the director of graduate studies. Students will be informed at the end of March whether they will have a TA position for the following academic year, subject to continued progress in their Ph.D. program, subject to continued adequate performance of their TA duties and subject to the budgetary considerations.

Important factors in making these decisions are:

- Progress through the core physics or astronomy/astrophysics courses
- Professional and courteous performance of TA duties
- Identifying research opportunities and making adequate progress towards their degree

Decisions on RA appointments are made by individual faculty or by faculty groups involved in group research projects. Students will be informed by the end of March whether their RA will be continued for the following academic year, subject to satisfactory performance of their RA duties and subject to the budgetary considerations.

Students should seek an advisor with a RA opening before the end of their second year in the program.

If students are sick or otherwise unable to complete their TA or RA duties, they must inform their TA or RA advisor immediately. Students who fail to carry out their duties and who fail to give an adequate reason for their absence will be sent a warning letter immediately. If the student fails to respond appropriately, the student's stipend will be stopped 10 days after the warning letter is sent.

The students who are appointed as a TA or a RA are expected to devote their time to their academic studies and to their TA/RA responsibilities. No outside work for pay can be undertaken without discussing with Director of Graduate Studies (in the case of TA's) or with their research advisors (in the case of RA's).

Tutoring. Tutoring can benefit you intellectually as well as financially. It can help solidify your ideas about physics or chemistry and make you a better teacher. You should discuss the decision to tutor with your advisor. Tutoring should not interfere with your research duties

and thesis completion. As such, tutoring should be kept to a minimum, not to exceed an average of 5 hours per week.

If you are a TA, you are not allowed to act as a paid tutor for a student in the course you are assigned to. Such behavior would constitute a conflict of interest because you are being paid by the Department to provide office hours and direct contact support (recitation, lab, etc.) to students for that course. You may act as a paid tutor for any course to which you are not assigned as a TA in any given semester.

XV. POLICIES GOVERNING STUDENT RESPONSIBILITY, CONDUCT AND CONFLICT RESOLUTION

There are several departmental, college level and university level deadlines. It is the responsibility of the students to find out about these deadlines from the Graduate Secretary and/or the Graduate Program Director and make sure that these deadlines are met.

Graduate students are an integral and highly valued part of the department's research and teaching programs. Professional behavior is expected from all students and it is expected that students in our program to carry out their duties at a high level of performance. Departmental resources provided to the students for studying, teaching and research (e.g. computers, office supplies, copying etc) cannot be used for personal purposes.

Occasionally problems involving students, teaching assistants, research assistants and faculty do arise. Many of these problems are resolved by informal discussions with the associate chair for graduate studies or with the department chair. In rare cases, the issues remain unresolved and the department's procedure to handle such grievances is as follows: All formal grievances must be submitted in writing to the Director of Graduate Studies. The grievance will then be formally submitted to the Graduate Program Committee and to the Department Chair. The Graduate Program Committee will act as the grievance committee and make a decision on the grievance. If the problem is not resolved by this process it will be referred to College/University grievance system. The PA grievance procedure will conform to the guidelines of the University Ombudsman (http://www.msu.edu/unit/ombud/)

XVI. LINKS TO UNIVERSITY RESOURCES

- *MSU graduate school regulations concerning Ph.D. and Master programs*
  http://www.reg.msu.edu/read/UCC/Updated/gradeddoctoral.pdf
  http://www.reg.msu.edu/read/UCC/Updated/gradedmasters.pdf
- *Academic Programs*
  http://www.reg.msu.edu/ucc/ucc.asp

Graduate Students Rights and Responsibilities (*GSRR*)
http://www.vps.msu.edu/SpLife/default.pdf

- *MSU/GEU Contract*
  http://grad.msu.edu/geu/agree.pdf
- *Guidelines for Graduate Student Advising and Mentoring Relationships*
  http://grad.msu.edu/dtaff/mentoreport.pdf
- *Guidelines for Integrity in Research and Creative Activities*
  http://grad.msu.edu/staff/mentoreport.pdf
- *Office of the Ombudsman*
  http://www.msu.edu/unit/ombud/

APPENDIX A

SUGGESTED COURSE SEQUENCE FOR PHYSICS GRADUATE STUDENTS

1st Fall Semester:

Physics 810 (3 credits)	Methods of Theoretical Physics	
Physics 820 (3 credits)	Classical Mechanics	SUBJECT EXAM
Physics 851 (3 credits)	Quantum Mechanics I	

1st Spring Semester:

Physics 852 (3 credits)	Quantum Mechanics II	SUBJECT EXAM
Physics 841 (3 credits)	Classical Electrodynamics I	SUBJECT EXAM
Physics 901 (1 credit)	Frontiers in Physics	

1st Summer Semester:

Physics 800 (3 credits)	Research Experience

2nd Fall Semester:

Physics 831 (3 credits)	Statistical Mechanics	SUBJECT EXAM
Physics 842 (3 credits)	Classical Electrodynamics II	

2nd Summer Semester:

Physics 800 (3 credits)	Research Experience

SUGGESTED COURSE SEQUENCE FOR ASTRONOMY AND ASTROPHYSICS GRADUATE STUDENTS

The core courses for the Astronomy and Astrophysics Ph.D. students are:

Classical Mechanics - PHY 820 (3 credits)
Statistical Mechanics - PHY 831 (3 credits)
Classical Electrodynamics I - PHY 841 (3 credits)
Stellar Atmospheres, Structure, and Evolution - AST 840 (3 credits)
Radiation Astrophysics - AST 810 (3 credits)
Galactic Astronomy - AST 825 (3 credits)
Extragalactic Astronomy and Cosmology - AST 835 (3 credits)
Nuclear Astrophysics - PHY 983 (3 credits)
Research Project - AST 805 (6 credits)

The courses are normally completed in two years, following a schedule determined by consultation with the faculty.

APPENDIX B

SYLLABI FOR REQUIRED PHYSICS COURSES

The following short syllabi sketch the core material which is covered in the subject exam courses and other required physics courses. The instructor is free to select additional topics as well as to change the order in which the topics are taught. In QM and EM the subdivision into two semesters can also vary.

METHODS OF THEORETICAL PHYSICS (PHY 810)
Scalar and vector fields, vector calculus. Basics of transformation groups. Complex calculus. Analiticity and singularities, residue calculus, conformal mapping. Fourier and Laplace transformations. Distributions and delta-function. Linear spaces. Operators, eigenfunctions, eigenvalues and diagonalization, orthogonal and unitary transformations. Differential equations of mathematical physics: wave equation, Laplace and Poisson equation, diffusion equation, Schrodinger equation, Helmholtz equation. Methods of solution: use of symmetry, separation variables, Sturm-Liouville problem, Fourier and Laplace transformations, boundary value problems, Green's function, variational methods. Special functions: orthogonal polynomials, spherical harmonics, cylindrical functions.

CLASSICAL MECHANICS (PHY 820)
Calculus of variations and the least action principle. Lagrange equations. Hamilton equations. Symmetry and conservation laws. Motion with a central force. Kepler problem. Scattering problem, cross section. Small oscillations, resonance effect. Theory of normal modes. Rotation of a rigid body, inertia tensor. Chaos and introduction to phase space methods.

QUANTUM MECHANICS (I + II) (PHY 851/852)
Limits of classical physics. Free motion, wave packets and uncertainty relations. Schrodinger equation, time-dependent and stationary, general properties; continuous and discrete spectra. General structure of quantum theory, Hilbert space and operators. One-dimensional problems including harmonic oscillator. Three-dimensional problems. Central fields and orbital momentum. Hydrogen atom. General theory of angular momentum. Spin ½. Addition of angular momenta. Symmetry and conversation laws. Selection rules. Variational methods.
Stationary perturbation theory including degenerate case. Stark effect. Electron in a magnetic field. Landau levels, Zeeman effect, spin dynamics. Scattering theory, phase analysis and Born approximation. Time dependent perturbation theory, golden rule. Sudden and adiabatic approximations. Interaction with the radiation field, absorption, spontaneous and induced radiation of light. Many-body systems, Bose and Fermi statistics. Main properties of atomic and molecular spectra.

CLASSICAL ELECTRODYNAMICS I (PHY 841)
Review of electrodynamics at the undergraduate level, 4-dim space-time and Special Relativity, Motion of charges in constant electric and magnetic fields, Field equations and energy momentum tensor, Fields generated by simple sources; Multipole expansion, Electromagnetic wave in vacuum; Polarization, Fields of moving charges and radiation, Scattering of charged particles; Synchrotron radiation, Brief description of radiation reaction

CLASSICAL ELECTRODYNAMICS II (PHY842)
Electrostatics of conductors, Electrostatics of dielectrics, Microscopic models of dielectric media, Magnetostatics., Para-, dia-, and ferromagnetism., Quasistationary fields, skin effect, Electromagnetic waves in material media, propagation, reflection, refraction and polarization. Waveguides and resonant cavities. Scattering and diffraction. Electrodynamics of special media (plasma, superconductors). Energy loss by charged particles, Cherenkov radiation.

STATISTICAL MECHANICS (PHY831)
Probabilistic description. Thermodynamic equilibrium and the second law. Thermodynamic limit, extensive and intensive quantities. Equilibrium Gibbs ensembles (microcanonical, canonical, grand canonical), thermo-dynamical potentials and identities. Classical limit. Maxwell-Boltzmann gas. Fermi and Bose statistics. Perfect gas, applications (metals, stars, nuclei). Gas of wave quanta. Black body radiation. Phonons in solids. Bose gas. Bose-Einstein condensation. Mean field theory, magnetism. Phase transitions of first and second order.

APPENDIX C

INTRODUCTION TO RESEARCH
ASTRONOMY 800 OR PHYSICS 800

All incoming graduate students, unless otherwise involved in a research program, may enroll in Physics 800 or Astronomy 800 (3 credits), "Introduction to Research". The first summer in the graduate program is a convenient time to take this for the first time. Some students who, for some reason, will not be taking the standard first year courses, may take this course earlier. Others, who wish to speed up their participation in research, may take this course in addition to the standard courses. Informal research activity is also encouraged for first year students.

The general procedure is that each student, who has no particular research preference, will spend each of two semesters in different major areas of Physics represented in the department. After two such semesters, the student should thereby get an intelligent view of what goes on in these areas. However, if a student has a strong preference for a particular area, his/her early deeper involvement with the research in that area should certainly take precedence over getting a quick and broad view of everything. This procedure will (1) assist Ph.D. candidates and faculty to get better acquainted with each other before making long term commitments, (2) solve the problem of how to get Ph.D. students involved with research early, and (3) give M.S. students that modicum of research experience that may make them more employable.

The Physics-Astronomy Department Graduate Student Organization (PGO) has available a booklet in which are listed brief summaries of what is happening in the various laboratories and what research the faculty are currently involved in. (This booklet is currently being revised.)

A student enrolling for Physics or Astronomy 800 for the 3 credits per semester will spend a minimum of 10 hours per week in the laboratory of a faculty member, learning all that (s)he can by just being there, learning from the more advanced graduate students, assisting in data taking, computer work, etc. Interested students should make contact with faculty members before enrolling for the course, and make the necessary arrangements for the affiliation. Physics 800 is offered only on the Pass-No Pass (P-N) grade basis.

APPENDIX D

PHYSICS GRADUATE STUDENT BYLAWS

I. Nature, Name and Purpose

A. The graduate students of the Physics Department comprise a group to be called the Physics Graduate Organization (PGO)

B. The elected representatives of the PGO constitute a body called the Physics Graduate Council (PGC). Their principal function is to represent the views of the physics graduate students to the administration of the department, college and university, and to inform their constituents of their own representative actions and administrative decisions that affect graduate students.

II. Composition of the PGC: Duties and Prerogatives

A. The PGC shall be composed of eight members:

1) *President*, who shall also be a representative to the Advisory Committee.
2) *One Representative*, to both the Council of Graduate Students and the Advisory Committee.
3) *One Representative*, to both the Graduate Course and Program, and the Graduate Admissions Committee.
4) *One Representative*, to serve on three committees: Teaching Assignment, Educational Policies, and Service Course. This person should have at least one year of teaching experience.
5) *One Representative*, to both the P-A Shop and related technical services, and the Space Utilization and Remodeling committees.
6) *One Representative*, to both the Library and the Publicity committees.
7) *One Representative*, to the Graduate Student Council of the College of Natural Science.

B. The same person may not simultaneously fill the positions of President of PGO and Council of Graduate Students representative.

C. The members of the PGC shall be nominated and elected in an ordinary meeting of the PGO. They may be recalled in any meeting of the PGO.

D. The PGC may submit statements that represent graduate student opinion to departmental and ad hoc committees with the understanding that these statements will be considered.

E. The representatives shall have power to initiate and second motions and to vote in the committees on which they sit. They shall, at the same time, be ready to assume committee work.

F. The President, in consultation with the Council of Graduate Students representative, shall make or delegate decisions and responsibilities of routine nature or minor importance.

G. The Council of Graduate Students representative shall have power to represent the physics graduate students at meetings of the Advisory Committee.

III. Meetings

A. Meetings of the PGO shall be of two kinds:

1) *Ordinary* An ordinary meeting of the PGO shall be called in the Spring of the year by the president for the purpose of electing representatives to the standing committees of the department (named in Section III), a representative to the Council of Graduate Students, a representative to the Graduate Student Council of the College of Natural Science, and a new President of PGO.

2) *Extraordinary* For matters of great importance a meeting of the PGO must be called by the president. (S)he must also do so upon the written request of at least five graduate students.

B. Meetings of the PGC are called by the president when (s)he deems necessary or upon the request of at least two members of the PGC, but no less than once a semester.

C. Robert's Rules of Order shall be observed at meetings of the PGO. These rules may be suspended by unanimous vote.

APPENDIX E

Department of Physics and Astronomy

M.S. THESIS COMPLETION FORM

Student's Name: _____

Thesis Title:

_____

_____

_____

Thesis has been: _____ Accepted _____ Rejected

_____ Accepted subject to revisions (beyond minor editorial changes)

Oral Examination in defense of the thesis was conducted on:

_____

EXAMINING COMMITTEE:

_____ _____
Committee Chairperson Date Department Chairperson Date

_____ _____
Date Dean Date

_____
Date

APPENDIX F

ASTROPHYSICS COMPREHENSIVE EXAM COMPLETION FORM

Student's Name: _____

Thesis has been: _____ Accepted _____ Rejected

_____ Accepted subject to revisions (beyond minor editorial changes)

Oral Examination in defense of the thesis was conducted on:

_____

EXAMINING COMMITTEE:

_____ _____
Committee Chairperson Date Department Chairperson Date

_____ _____
Date Dean Date

_____
Date

APPENDIX G

PHYSICS Ph.D. GUIDANCE COMMITTEE REPORT FORM I

First Ph.D. Guidance Committee Meeting Report Form
Department of Physics and Astronomy

Student Name: _____

Date: _____

Research Advisor: _____

	Qualifier	Mechanics	E&M	Quantum	Stat Mech
GRADES:	MS / PhD				

Committee Meeting Grade: 3.0 / 3.5 / 4.0

Research plan presented: ☐ Yes ☐ No, tentative date _____
If yes: ☐ Satisfactory
☐ Not satisfactory, reschedule for _____
Reason _____

Goals for next year: _____

Progress and continuing support recommendation: _____

Career Goals and Other Activities: _____

Approved by the Guidance Committee:

Name:	Signature:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Student Signature _____ Department Chair _____

cc: Student Advisor, Department Chair

APPENDIX H

ASTROPHYSICS Ph.D. GUIDANCE COMMITTEE REPORT FORM I

Student Name: _____ Date _____
Research Advisor: _____

Qualifier exam passed: ____ PhD level ____ MS level
Core courses/subject exams completed (enter grade):
____ Mechanics ____ E&M ____ Stat.Mech. ____ Rad.Processes
____ Stars ____ Galactic ____ Extragalactic ____ Nuc.Astro.
____ GPA for core courses (3.375 required)
2nd Yr Project: ____ Proposal submitted ____ Semesters AST805 ____ Oral Exam
Guidance comm. form completed: ___ Yes ___ No

Research plan presented: ___Yes ___No, tentative date _____
If yes: ___ Satisfactory
___ Not satisfactory, reschedule for: _____
Reason: _____
_____
Goals for next year: _____
_____

Progress and continuing support recommendation:
_____
_____
_____

Approved by the Guidance Committee:

Name:	Signature:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Student (Signature): Department Chair:

_____ _____

cc: Student, Advisor, Department Chair

APPENDIX I

Ph.D. GUIDANCE COMMITTEE REPORT FORM II

2^{nd} – N^{th} Ph.D. Guidance Committee Meeting Report Form
Department of Physics and Astronomy

Student Name: _____

Date: _____

Research Advisor: _____

Progress: ☐ Satisfactory (Attach one-page progress report)
☐ Not satisfactory, Explain: _____

Goals for next year: _____

Progress and continuing support recommendation: _____

Career Plan and Other Activities: _____

Approved by the Guidance Committee:

Name:	Signature:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Student Signature _____ Department Chair _____

cc: Student Advisor, Department Chair