

PHYSICS DEPARTMENT GRADUATE STUDENT HANDBOOK

Contents

Preface	2
Registration Information	3
Graduate Coursework	4
Grades.....	6
Major Program Examinations	7
Dismissal and Corrective Action Policies	11
Requirements for a Master's of Science in Physics Degree	13
Requirements for the Doctor of Philosophy Degree	14
MS and PhD degree checklist	20
Graduate Student Workload.....	22
Appendix A: Grading Scale for Oral Exam and Annual Progress Report.....	24
Appendix B: Research Assessment Form	25
Appendix C: Annual Progress Report Form	26
Appendix D: Flow Chart for Progress to Degree.....	26

Preface

The Physics Graduate Handbook clarifies departmental requirements, policies, and practices that apply to physics graduate students. Care has been taken to ensure that all information contained in the Physics Graduate Handbook is in compliance with the rules and policies of the University Graduate Handbook. In situations where there are discrepancies with the University Graduate Handbook, the University Graduate Handbook will have precedence.

Objectives of the Graduate Program: Graduate students in physics at the University of Cincinnati will:

- (1) Increase their facility with physical principles and applications, beyond the baccalaureate level and focused toward particular areas of physical research.
- (2) Develop their (mathematical, laboratory, reading, writing, publication, presentation, computational) tools for analyzing and communicating physics.
- (3) Learn to creatively solve problems.
- (4) Master the skills of research and scholarship.

Registration Information

A standard full-time registration consists of 12 graded graduate credits and from 0 to 6 undergraduate, audited graduate, or other credits. Unless special permission has been granted, all students should take 12 graded graduate credits each term. Students who are graduate assistants must be registered for 12 graduate credit hours or more at UC, exclusive of audit credits, for each semester they receive the assistantship. Assistantships will be cancelled if the awardee does not meet his/her enrollment obligation. The exception to this rule is the summer semester where enrollment is not required to be eligible for stipend funds. Please note that courses taken for audit and undergraduate courses do not count toward the required 12 graded credit hours.

At the beginning of each semester, students are informed of the appropriate registration procedures. Students who are without an official research advisor and/or those who have not fulfilled their course requirements will consult the Graduate Program Director before registering for the next semester. Otherwise, students should consult with their research advisor about their registration.

Graduate Coursework

Course levels

1000 to 5000 level courses may be taken by graduate students, but not for graduate credit. Graduate students usually register for 12 hours of graded graduate credit, which allows up to 6 credits total of undergraduate and audited graduate courses. Common undergraduate courses taken by graduate students are exercise courses and languages.

Depending on prior background, graduate students may need to register for 7000 level courses. 7000 level courses offered by the Physics Department are Introductory Quantum Mechanics, Quantum Computing, and Computational Physics.

Courses intended for graduate students are ranked at the 7000, 8000, or 9000 level, with 7000 level courses focused at the first year master's level and 9000 level the most advanced.

Pre-Qualifier Courses

The six pre-qualifier courses are each four graduate credit hours. They are required of all MS and PhD candidates. They are graded on a quality point scale (as explained later in *Grades*) and are usually taken in the student's first year. These courses are the primary source of material for Part II of the Qualifying Exam. Half are offered in the fall term and half in the spring, as listed:

<u>Fall</u>	<u>Spring</u>
Mathematical Physics (PHYS 7001)	Statistical Physics (PHYS 7002)
Classical Particles and Fields I (PHYS 7005)	Classical Particles and Fields II (PHYS 7006)
Quantum Mechanics I (PHYS 7010)	Quantum Mechanics II (PHYS 7011)

A student who does well on the Qualifying exam upon entry to the program, or who has strong prior background, can negotiate with the Graduate Program Director for waivers on one or more Pre-Qualifier courses.

Specialization Lecture Courses

Because a pre-requisite for Specialization courses is completion of the Pre-Qualifier courses, Specialization courses are usually started in the second year. Specialization courses are generally three credit hours and graded on a quality point scale. Thesis master's students need not take specialization courses, but usually do take one or more from their research field. Coursework option master's students are required to take two specialization courses but usually take more to maintain full time student status. Doctoral students are required to take a minimum of 13 credits of Specialization Courses. At least *three credits should be outside the student's research specialization*. The student will generally take three Specialization Courses in the fall semester of the second year and two Specialization Courses in the spring semester of the second year, one of which is a partial course for one credit.

Introductory sequences in the primary departmental research fields are offered in the fall and continue in the spring each year: Particle Physics (PHYS8015/8016), Astrophysics (PHYS8025/8026), and Condensed Matter (PHYS8035/8036).

Additional courses include a Quantum Field Theory sequence (PHYS 8010/8011), Advanced Statistical Physics (PHYS 8030), Many Body Theory (PHYS 8031), Experimental Methods in Condensed Matter (PHYS 8038), and numerous 9000 level advanced topics courses. Advanced and special topics courses change from year to year depending on faculty and student interest.

In addition to the courses listed, students can request for other courses be counted as Specialization courses. This is usually done by students who choose research projects in physics related disciplines (biophysics, medical physics, physical chemistry, engineering physics, etc). Specialization courses must be approved by the student's research advisor and by the Graduate Program Director.

Other Course Offerings

Advanced Problems (PHYS 8071) is individualized study in a particular field. The course professor assigns a supervisor (usually a departmental faculty member) who assigns readings, library research, and/or problems to the student. The supervisor recommends a grade to the course professor who then assigns the grade. Advanced Problems has flexible credit hours and can be repeated multiple semesters for any quantity of total credit.

Research for the Master's (PHYS 8072) is typically a multi-semester course for those students interested in a thesis master's degree. It is typically graded P (for satisfactory progress) or F (for failure to make satisfactory progress) based on the adequacy of the work done each semester while the research is in progress. The semester grade and semester credit are not determinants of the quality or completeness of the thesis: that is reserved for the final defense of the work evaluated by a faculty committee. After reaching agreement with a professor to supervise the master's research, a student should register in any open section of PHYS 8072 and then work with the assistant academic director to have the chosen professor assigned to the registered section. The credit hours of master's research is variable and should be set to ensure the student is registered for 12 total graded graduate credits each term.

Research for the Doctorate (PHYS 9071) is a multi-semester course culminating in a dissertation defense. Most PhD graduates have many more credits of PHYS 9071 than the minimum seven required for the degree. Once the student passes the oral exam to enter candidacy and a clear PhD research project has been chosen and approved, Research is graded P (for satisfactory progress) or F (for failure to make satisfactory progress) based on the adequacy of the work done each semester while the research is in progress. The semester grade and semester credit are not determinants of the quality or completeness of the dissertation: that is reserved for the final defense of the work evaluated by a faculty committee. Students register for doctoral research under their advisor's section number and with a credit hour count set to ensure 12 graduate credits of registration each term.

Graduate Colloquium (PHYS 8090) and Advanced Seminar (PHYS 8091) are offered in the fall and spring terms. These one credit hour courses offer students the opportunity to experience research thrusts beyond those offered in our department, or research thrusts concurrent to those in the department. **All physics graduate students must register for Colloquium and Advanced Seminar in both the fall and spring semester**, unless otherwise granted permission by the Graduate Program Director. First year students should register for the Colloquium and Seminar as audit courses. After the first year the course should be taken as pass/fail. The grade P (for pass) or T (for audit) is awarded for acceptable attendance and participation. A grade of U (for unsatisfactory), F (for fail) or I (for incomplete) is also possible.

Physics Education Seminar (PHYS 8054) is offered occasionally to supplement the curricular and pedagogical advancements of the teaching assistants and the department. As with other seminars, P grades are awarded for acceptable participation. Associated with the Physics Education Seminar are Physics by Inquiry I and II (PHYS8051C and 8052C), which are graduate physics courses for current elementary and middle school level science teachers. Physics by Inquiry may not be taken by physics graduate students, although students may observe course activities.

Grades

Grading in Pre-Qualifier courses, Specialization courses, and Advanced Problems is submitted by the course instructor using the following rubric:

- A = excellent work.
- B = acceptable work.
- C = below average work.

A student needs a minimum 3.0 grade point average to graduate. A student whose GPA falls below 3.0 while in the program will be placed on academic probation. In addition, the following grades may appear on a student's transcript:

- P= Pass. Because a course graded P is not awarded quality points, any course graded P cannot be used toward the department's Pre-Qualifier, Specialization or formal coursework requirements or the graduate school's formal coursework requirements.
- T = Acceptable performance in an audit course.
- U = Unsatisfactory performance in an audit course.

- I = Incomplete. An incomplete is given to students who fail to complete one or more

course requirements (e.g. the final examination, a paper). All I grades must be completed and replaced with valid grades before a student will be permitted to receive any degree. Course work must be completed or the grade will automatically be changed to an I/F one calendar year after the initial I grade is submitted.

- W = Official withdrawal after some attendance.
- WX = Official withdrawal with no attendance.
- NG = No grade. Contact the professor to inquire about grade submission. An NG grade must be corrected by submission of a grade or waived by the graduate school prior to awarding of a degree.
- F, I/F, UW, X = Failures. Graduation with an F (failure), I/F (failure to complete an incomplete), UW (failure after improper withdrawal), or X (failure to neither attend nor withdraw) on the transcript will not be permitted unless the grade is superseded by a grade of C or better in the same course retaken by the student or (under special circumstances) by substituting another course approved by the Graduate Committee and receiving a grade of C or better.

See Appendix A for the grading scale for the Oral Exam / Research Assessment Form.

Major Program Examinations

All examinations but the Master's Thesis Exam must be passed at an acceptable level by students who wish to earn the PhD. Should you fail to complete the oral exam, thesis exam, or final defense of dissertation in the allowable timeframe your assistantship salary will be reduced and you will be placed on academic probation, which may result in termination from the program, unless the student takes corrective action.

Students required to take the OEPT are not eligible for the full assistantship salary until they pass that exam.

OEPT: Oral English Proficiency Test

Administered by the Center for English as a Second Language, the OEPT is a 20-minute video recorded interview. See <http://cech.uc.edu/centers/cesl/oept/faq1.html> for information about the test.

Required for: Non-native English-speaking students on departmental assistantships. Encouraged for other international students.

Exemptions: Students with citizenship in an approved English speaking country or with a TOEFL IBT speaking score of 26 or above or IELTS score of 7.5 and above are exempt from the OEPT exam.

When: The test should be taken at the first opportunity. Students should continue to take the test when offered until passing. A student will make an attempt during any term in which s/he is taking an ESL (English Second Language) class.

Penalty for not passing: Assistantship students will continue to receive a reduced stipend until the OEPT is passed. Students on departmental assistantships who have not passed the OEPT by the start of their second academic term **must** take ESL classes. Students who have not passed OEPT

by the end of the fall semester of their second year are not eligible for an assistantship until they have passed the test.

Diagnostic Exam

Taken by: All incoming graduate students.

All incoming graduate students will take the diagnostic exam and be assigned to one of two streams:

- “Masters (Year 1)” Students assigned to this stream will start immediately in the first year graduate courses.
- “Bridge-Masters (Year B)” Students assigned to this stream will be enrolled in an individualized program including undergraduate physics and math courses, as needed. Students in this stream who have maintained a B average at the end of the academic year will enter the “Masters Year 1” stream the following year.

Master Thesis Examination

Taken by: Thesis master’s students. Students must pass their MS thesis defense examination in order to receive a thesis MS.

When a professor agrees to direct the student's MS research, a MS thesis Committee of three or four faculty members will be constituted. The student will write a thesis based on at least six credits of work in research for the Master's Degree (PHYS 8072). After completion of the thesis the student must pass the oral defense examination conducted by his or her thesis committee. The student is to give a typed final version of the thesis to the committee at least one week before the oral examination. The examination covers the subject matter of the student's thesis and other material related to the field of interest.

Taken when: Usually in the semester of graduation. Must be within the 5 year time limit allowed by the graduate school.

Qualifying Examination

Taken by: Required for PhD and coursework MS students.

The qualifying exams (Part I and Part II) are written exams administered immediately before the fall semester of each year. All students are welcome to take the qualifying exams immediately before their first fall semester in the program. This first attempt is considered unofficial, but is recommended as good practice for the official attempt. If a student passes either part of the qualifying exam at the MS or PhD level on the unofficial attempt, the score will be considered official and will be recorded for future reference. All students will receive one official and final attempt at both parts of the qualifying exam immediately before the fall semester after they have completed “Masters (Year 1).”

The Part I exam and the Part II exam are each of four hours duration and are administered on two separate days. They may each be taken and passed (or failed) independently. Each part of the exam has two passing levels, PhD and MS. A student’s options following the exam will depend on the results.

- The Part I exam (qualitative) consists of a series of about 15 short questions testing knowledge of classical mechanics, electrodynamics, quantum mechanics, statistical mechanics and thermodynamics at an undergraduate level.
- The Part II exam (quantitative) consists of two questions in each of classical mechanics, electrodynamics, quantum mechanics, and statistical mechanics at the level of the material covered in the Pre-Qualifier courses. The student is asked to answer only one of each pair of questions, showing his/her detailed calculation work.

Selected qualifying exams from past years can be found on the department's web site. Copies can also be obtained in the office of the Assistant Academic Director.

Students who pass at the PhD level on both parts will enter the PhD stream in year two.

Students who pass at the MS level on both parts will enter the Masters stream in year two. At the end of year two progress will be assessed and students will either enter the PhD track in year three or be directed to the terminal MS.

Students who do not pass at either the PhD or MS level will enter the Masters stream in year two. At the end of year two progress will be assessed and students will either earn the terminal MS or be invited to write a thesis to earn the MS.

Oral Examination

Taken by: PhD students. A student must pass the Oral examination in order to enter PhD candidacy.

In consultation with the advisor and Graduate Program Director, the student will invite faculty to serve on the student's PhD dissertation committee. The committee will normally consist of three to four physics faculty and be chaired by the student's advisor. The examination will be scheduled by the student in consultation with the doctoral committee. The assistant academic director is to be notified of the time and date about two weeks prior to reserve the room, prepare the candidacy form, and start the approval process for any committee member not currently eligible for doctoral committee work. At least one week prior to the exam, the student is to submit a written report describing his/her proposed thesis project to the committee members. This report should be approximately five pages in length and include an abstract and references. The exam will last approximately an hour, beginning with a 15-20 minute informal presentation highlighting background the proposed project. Such a presentation might include background science, a description of the student's initial efforts, the proposed effort, and anticipated difficulties. Following the presentation, the student will be asked questions on topics included in his/her proposal and on other topics within the same general area.

The oral examination is open to all faculty members. Only the committee will vote on the student's performance on the examination. A student's performance is satisfactory if the student has an understanding of the basic physical ideas which are at the root of the proposed research, if the ideas and plan in the written report are expressed correctly and clearly, and if the proposed research is appropriate for a Ph.D. in physics.

Taken when: The Oral Exam must be taken by March 1 of the third year. Requests for postponement of the Oral Exam in exceptional circumstances may be brought to the Graduate Committee prior to the start of the spring semester of the third year. Failure to comply with

deadlines will result in an automatic grade of D for the Oral Candidacy Research Assessment form and a reduction in assistantship pay. Unless a corrective action is promptly taken, this may result in termination from the program.

Penalty for not passing: A student who fails the Oral exam will not be able to continue in the PhD program.

Final Defense of Dissertation

Taken by: PhD students.

When the dissertation is completed, a valid copy must be submitted to each dissertation committee member for critical evaluation. The dissertation must be given to the committee members at least one week before the dissertation defense. If it is considered to be satisfactory with respect to form and content by the committee, a final defense of dissertation will go ahead as scheduled. The assistant academic director is to be notified of the time and date of the defense at least two weeks prior to reserve the room. The final defense of dissertation is an oral presentation and will be open and members of the academic community. Other persons may also attend.

All doctoral students must announce their defense publicly on the Graduate School website prior to the day of defense. You can announce your defense by logging into the Graduation Checklist and entering your defense information. Additional details about Graduate School requirements for your defense and dissertation can be found on the Graduate School website.

Under the standard procedure, following an oral presentation of the dissertation, the candidate shall answer pertinent questions asked by members of the committee. After the committee has completed its questioning, other persons will have an opportunity to submit questions or comments.

At the conclusion of the defense, the committee will withdraw, make the decision forthwith with regard to the acceptability of the dissertation and its defense, and report to the candidate. If the decision is favorable, the appropriate form will be signed by the committee members and submitted to the Graduate School. The form is scanned and becomes a page in the student's electronic thesis.

Taken when: After the student has completed his/her PhD research, and has written the dissertation. Usually this is in a student's 6th year. If a student takes more than 5 calendar years after the Oral exam, the student will have to request an extension from the College and Graduate Deans. Students who do not defend their dissertation by the end of their 7th academic year will normally be ineligible for assistantships or scholarships.

Penalty for not passing: A student who fails to defend his/her dissertation will not receive a PhD.

Dismissal and Corrective Action Policies

For the purposes of defining acceptable academic progress, graduate students will be divided into two groups, "Pre-candidacy" and "*advanced students*." An advanced student is one who has passed the oral exam.

Dismissal without Probation

A student will be dismissed from the program without a probationary period, if his/her grades for any one semester fall below a C (2.0) average, or if he/she receives an F in any two courses at any time.

Pre-candidacy Academic Progress Requirements

The progress of students in this group will be reviewed by the Graduate Committee twice a year, at the end of the fall and spring semesters after grades for that semester have been reported. Students who fail to maintain an overall B (3.0) average will be placed on academic probation.

Progress of students on probation for grades will be reviewed after every semester, at which time several actions are possible: being taken off probation, continuation of probation, or dismissal. To restore good academic standing a student must raise his/her overall average to a B (3.0) or above. If a student's term grades are at the B (3.0) average, but the overall average is still below a B (3.0) average, the student is allowed to continue in the program, albeit on probation. A student continuing on probation for more than one semester is unlikely to receive departmental financial support while on probation. If a student is already on probation and his/her term grades are below a B (3.0) average, s/he will be dismissed.

For doctoral students: In addition to grades, the committee reviews courses taken and progress on research. Students must meet the various deadlines for progressing towards candidacy shown in this Handbook. Students who fail to meet those deadlines or who do not make sufficient progress in starting research will be placed on probation and have their stipend reduced.

Students placed on probation for lack of pre-candidacy research progress will need to agree to a plan with the Graduate Program Director to get caught up. Students that do not meet plan goals will be removed from the program at the discretion of the Graduate Program Director.

Advanced Student Progress Requirements

Progress of "advanced students" may be reviewed at any time by their Ph.D. dissertation committee.

All students who have passed their oral exam must submit an annual progress report and a research assessment form to the assistant academic director by April 1. Should you fail to submit the completed report and form in the allowable timeframe, your assistantship salary will be reduced. Further, the Department will not reappoint students for the next year without the completed report and form. The annual progress report and research assessment form must be read, approved, and signed by the members of the student's PhD committee and placed in the student's file. Electronic signatures are acceptable.

The progress report will discuss the student's progress towards completion of his/her Ph.D. thesis, and will indicate whether that progress is satisfactory. Any student who is not making satisfactory progress in his/her research will be placed on probation. The PhD committee will periodically review the progress of the student on probation. The period between each review, which will be no longer than six months, will be determined by the committee and communicated to the student. At that time of each review, the committee may recommend to the Graduate Program Director that

- The student is making satisfactory progress, and probation should be lifted.
- The student should remain on probation, with or without assistantship.
- The student should be dismissed.

The progress report for a student in his/her sixth year should present a credible plan, approved by the committee, for completion of the PhD in the seventh year. Absence of such an approved plan will disqualify the student from Departmental financial support for that summer semester and in his/her seventh year.

The progress report for a student in his/her seventh year should present a credible plan, approved by the committee, for completion of the PhD by the end of the summer semester. Absence of such an approved plan will disqualify the student from Departmental financial support for that summer semester. No support will be given by the department to students in their eighth year.

After approval by their PhD committees, all sixth and seventh year students' annual reports will be reviewed by a subcommittee of the graduate committee for final approval of any requested departmental support.

Petition and Appeal

- A student dismissed from the program may file a written petition with the Graduate Program Director for readmission. This petition must be filed no more than five (5) working days after receipt of the written dismissal notice. The petition will be considered by the full Graduate Committee. In making a decision on readmission, the Graduate Committee may consider extenuating circumstances surrounding the reasons for dismissal.
- If a previously dismissed student is readmitted, all previous grades will be considered in computing the overall grade averages.
- Students on probation are encouraged to meet with the Graduate Program Director (and their Ph.D. research advisor, if applicable) to discuss the reasons for being on probation and possible solutions.
- Students will be fully informed of all decisions affecting their status in the program.
- Students have the right to appeal any decision to the Graduate Committee and then to the Department Head. Grievance procedures are available from the Physics Department Office or the office of the Dean of Graduate School.

Requirements for a Master's of Science in Physics Degree

A student pursuing a terminal Master's degree must complete all requirements no later than five years from the date of entering the MS degree program. The normal time is two years. After a student receives an MS, s/he can decide to continue on to the PhD only if accepted into the PhD program. In this scenario, contact the Graduate Program Director for information.

A student in the PhD program is encouraged to apply for a MS after eligibility. The student can receive the MS after the coursework option MS requirements described below are met but before the student has taken the Oral exam to enter formal PhD candidacy. Because of special processing for PhD students requesting an MS, the student should contact the Assistant Academic Director before the start of the term in which (s)he intends to receive the degree. After the Assistant Academic Director opens the MS processing, the student will apply for the degree on-line at www.grad.uc.edu about one week after the start of the graduation term.

Requirements Common to both the thesis and non-thesis options

Pre-Qualifier coursework

All Master of Science in Physics students must complete all the Pre-Qualifier courses: Statistical Physics, Mathematical Physics, Classical Particles and Fields I, Classical Particles and Fields II, Quantum Mechanics I, and Quantum Mechanics II.

On occasion, a student enters the graduate program with exceptional preparation in one or more of the Pre-Qualifier courses, and may wish to be excused from taking those courses. In this situation, the student should contact the Graduate Program Director to petition for a waiver. The decision of whether to grant the waiver will be made by the Graduate Program Director with consultation of the faculty teaching said courses.

Colloquium and Seminar

All Master of Science in Physics students must demonstrate attendance in Colloquium and Seminar. Attendance is demonstrated with a minimum six total registration records (audited or graded).

Graduate School Requirements

A student must also meet all graduate school requirements for a degree, as outlined in the university Graduate Handbook. These include but are not limited to: A minimum of 30 formal graduate credits; an overall GPA of 3.0 or better at time of graduation; and no unacceptable grades.

Coursework Option

Students in the non-coursework + research track will develop a broad knowledge in multiple areas of physics at a level appropriate to the master's degree through extensive advanced coursework. The additional requirements for the non-thesis option are as follows:

Additional Coursework: The student must earn 13 credits of 8000 level + graduate Specialization courses.

Qualifying Examination: The student must perform satisfactorily on the qualifying examination. What constitutes satisfactory performance at the master's level is determined by the exam graders, but the expected master's level performance is typically 60% for Part I and 50% for Part II.

Oral Examination: An oral MS examination will be required if the student chooses the terminal MS option. It will assess the student's overall proficiency in graduate level coursework.

Coursework + Research Option

Students in the coursework + research track will develop expertise at a level appropriate to the Master's degree in an area of physics through substantive work on an original research project. The additional requirements for this option are as follows:

Additional Coursework: The student must earn a minimum of 6 credits of 8000 level + graduate Specialization courses and a minimum of 6 credits of Research for the Master's Degree. The student must earn a minimum of 13 combined credits from specialization and research courses to satisfy requirements.

Research Assessment Exam: When a professor agrees to direct the student's MS research, a MS Research Assessment Committee of 3 or 4 faculty members will be constituted. The student will prepare a presentation based on at least 6 credits of work in research for the Master's Degree (PHYS 8072). After preparing the presentation the student must pass the oral defense examination conducted by his or her committee. The student is to give a typed, final version of the presentation to the committee at least one week before the oral examination. The examination covers the subject matter of the student's research and any other material related to the field of interest. If a student receives a high assessment in the research assessment examination s(he) may be eligible to continue on to the PhD track, if approved by the research advisor and graduate committee. If a student receives a high assessment but does not wish to be considered for the PhD track, s(he) will receive the MS. If a student does not receive a high assessment, s(he) will be directed to complete a thesis to earn the terminal MS .

Requirements for the Doctor of Philosophy Degree

Admission to Candidacy

A student must satisfy the items listed below before he or she can be admitted formally into candidacy for the Ph.D. program. Application forms for admission to candidacy are available in the Department Office.

Course of Study

The student must complete all Pre-qualifier courses and 13 semester hours of Specialization courses. (These are explained in detail in the handbook under "Courses".)

Colloquium and Seminar

Attendance in Graduate Colloquium and an Advanced Seminar section is required in any term during which the student is in residence. This requirement can be only be waived in special circumstances with the permission of the Graduate Program Director.

Ph.D. Qualifying Examination

Students must pass both parts of the exam at the PhD level. The passing level will vary from exam to exam, and is determined by the exam graders, but is typically around 75% for Part I and 65% for Part II. For students with less than a B average in the core courses, their performance on part II of the exam will be used to determine final mastery of all the core subjects at a minimum of a B level.

Research

A student must earn a minimum of 7 semester credits of PHYS9071 Doctoral Research. Most students will earn many more credits for this course to maintain adequate registration load from term to term. A PhD student must complete original research whose quality and quantity is appropriate for a physics PhD.

Choosing a Research Advisor

Before choosing a research advisor, the student should consult with as many of the faculty as possible and discuss with them their current research activities. After the student has decided on a research area, he or she should inform the Graduate Program Director with his choice of advisor and the list of faculty he or she consulted. The Director will then confirm with the student's advisor. A student who does not choose an advisor by the end of the spring semester of the second year will not have time to prepare to take the Orals in time and may be removed from the program.

Dissertation Committee

In consultation with the advisor and graduate program director, the student will invite faculty to serve on the student's PhD dissertation committee. The committee will normally consist of 3 to 4 physics faculty and is chaired by the student's advisor.

Oral Examination

The Oral examination is the examination for the student to officially enter into PhD candidacy.

The Oral Exam must be taken by March 1 of the third year. Requests for postponement of the Oral Exam in exceptional circumstances may be brought to the Graduate Committee prior to the start of the spring semester of the third year. Students who don't pass their Oral exam by the end of their 4th year (end of 3rd for students who start the program with a US Master degree) will have to request an extension from the College and Graduate Deans.

The examination will be scheduled by the student in consultation with the doctoral committee. The Assistant Academic Director is to be notified of the time and date about two weeks prior to reserve the room, prepare the candidacy form, and start the approval process for any committee member not currently eligible for doctoral committee work.

More details on the Oral examination can be found under the "Examinations" section in this handbook.

Additional Requirements for the Ph.D. Degree

University Credit Hour Requirements

The student must complete at least 90 semester credit hours at the graduate level, 30 of which must be completed under the direction of University of Cincinnati graduate faculty.

Time-to-Degree

The doctoral degree will be granted for no less than the equivalent of three years of full-time graduate study. A period of seven months must elapse between admission to doctoral candidacy and receipt of the degree. All requirements for the doctoral degree must be completed within nine consecutive years of initial enrollment. This period includes a maximum of four years before achieving candidacy and a maximum of five years beyond candidacy. If either deadline is not met, a student must petition the Graduate School for an extension.

Final Defense of Dissertation

After the student has satisfied all of the above requirements, a final open defense of dissertation shall be held, according to the following procedure:

- When the dissertation is completed, a typed copy must be submitted to each dissertation-committee member for critical evaluation. If it is considered to be satisfactory with respect to form and content by the committee, a final defense of dissertation will go ahead as scheduled. The dissertation must be given to the committee members at least one week before the proposed dissertation defense date.
- The final defense of dissertation will be open and members of the academic community and other persons may attend.
- All doctoral students must announce their defense publicly on the Graduate School website prior to the day of defense. You can announce your defense by logging into the Graduation Checklist and entering your defense information. Additional details about Graduate School requirements for your defense and dissertation can be found on the Graduate School website.
- Under the standard procedure, following an oral presentation of the dissertation, the candidate shall answer pertinent questions asked by members of the committee. After the committee has completed its questioning, other persons will have an opportunity to submit questions or comments.
- At the conclusion of the defense, the committee will withdraw, make the decision forthwith with regard to the acceptability of the dissertation and its defense, and report to the candidate. If the decision is favorable, the appropriate form will be signed by the committee members, given to the Physics Department office, and transmitted to the Division of Research and Advanced Studies Office.

University Dissertation and Graduation Requirements

University graduation requirements are detailed at the Graduate School website, <http://grad.uc.edu>.

MS and PhD degree checklist

Ask the Assistant Academic Director for any necessary details.

Red = University requirements. Black = Departmental requirements.

Requirements for all graduate degrees awarded through Physics Department:

- 1) Online graduate application and processing submitted before deadlines.
- 2) Contiguous annual fall enrollment for at least one PHYS credit.
- 3) Overall minimum 3.0 GPA.
- 4) No F, I/F, UW, or X grades without repeat or approved substitution.
- 5) No NG grades without waiver.
- 6) No I grades at time of graduation.
- 7) No SP or UP grades still in progress upon graduation.
- 8) Colloquium: attendance required for all registered physics graduate students. Non-attendance must be approved in advance by Graduate Program Director.
- 9) Credits or Graduate Program Director approved waivers of each of the six Pre-Qualifier courses: Quantum I&II, Statistical Physics, Classical Particles and Fields I&II, and Mathematical Physics. Waivers are granted based on coursework and/or Qualifying exam performance prior to program entry.

Additional Physics Master of Science requirements:

Notify Graduate Program Director and Assistant Academic Director prior to graduation term with type of MS: coursework option MS, coursework + research option MS; terminal MS or continuation toward PhD.

- 1) Maximum 5 academic years from start of program.
- 2) Overall minimum 30 formal (with quality points) graduate semester credits.
- 3) Overall minimum 30 graduate semester credits from Pre-Qualifier courses, Specialization lecture courses (may be substituted subject to approval by Program Director with courses from physics related disciplines), and Master's Research.
- 4) Successful thesis defense if required. Qualifying exam passed at a minimum of MS level and oral MS exam for coursework option

Additional Doctor of Philosophy in Physics requirements:

- 1) Minimum 7 graded (P) semester credits of physics Doctoral Research
- 2) Minimum 90 graduate semester credits if no US Master's (or equivalent advanced international) degree, otherwise minimum 60 graduate credits.
- 3) Qualifying exam passed at doctoral level by the fall after the student has completed "Masters (Year 1)". In exceptional circumstances (e.g., involving serious health problems) the student may petition the Graduate Program Director for an extension to the deadline for passing the exams.
- 4) The Oral Exam must be taken by March 1 of the third year. Requests for postponement of the Oral Exam in exceptional circumstances may be brought to the Graduate Committee prior to the start of the spring semester of the third year. A student not entering formal candidacy within 4 years of program entry must petition the Graduate School for an extension.
- 5) A student must defend the dissertation by the end of the 7th academic year. The student can petition the Graduate Program Director for additional time, but the student will not receive departmental support after the 7th year. A student not defending within 9 academic years of

- the date of matriculation into the program must petition the Graduate School for an extension.
- 6) 13 semester hours of Specialization courses, including one outside research specialty. Specialization courses offered by other departments must be approved by the Graduate Program Director and research advisor.
 - 7) Doctoral dissertation accepted, properly formatted, and electronically published.

Graduate Student Workload Guidelines and Policies

A Ph.D. in Physics typically takes around 6 years to complete in the United States. It is important to note, however, that the benchmark for earning a Ph.D. is not time spent in the program, but rather successful completion of the Ph.D. program. Time required to achieve this can vary widely.

The Graduate Assistantship [either a teaching assistantship (TA) or research assistantship (RA)] is a position that pays a stipend associated with full-time effort throughout the calendar year. A student paid as a TA is expected to perform appropriate TA duties during the academic terms as well as to pursue academic effort throughout the year. Research assistants are expected to engage in full-time academic and research effort throughout the year. The policies described here are intended to clearly communicate Departmental expectations and consequences for not meeting expectations. Variations or exceptions require approval of the Assistant Academic Director, the instructors of courses for which students are serving as TAs, and the student's Academic Advisor. If a student has not begun research, the Graduate Program Director is the student's Academic Advisor.

TAs are expected to attend all relevant administrative sessions, appear at all class sessions (on time), grade assignments expeditiously, receive satisfactory evaluations, etc. In case of an emergency that prevents performance of any aspect of these duties, a TA must notify the course instructor and also the Graduate Program Director, and subject to their approval, the TA is expected to arrange for substitutions by trading duties with another TA. The same is true for absences due to travel on University business. In general, absence from teaching and grading responsibilities for personal purposes is not allowed.

Students engaged in research are expected to maintain satisfactory progress toward the degree, as judged by the student's research advisor and his/her thesis committee. All students supported as graduate assistants are expected to pursue academic and research endeavors on a full-time basis throughout the calendar year.

Vacations

Students supported as TAs are expected to be in attendance for the full semesters during which they have duties. This includes the full summer semester, even if the actual teaching/grading assignment is only for a portion of the semester. Students are highly encouraged to remain at UC during break periods if they are preparing to take the qualifying exam during the next semester. Students doing research may arrange limited periods of vacation with their advisor. The advisor, Graduate Program Director, and Department Head must be informed of planned vacations, in writing, in advance. Assistantship pay may be suspended for the duration of the absence.

Travel Outside of the US

International travel (whether personal or business) must be approved by the advisor before the travel occurs. The University requires additional approvals for UC business travel. This includes attendance at conferences, participation in research off campus, etc. Information about these requirements can be obtained from the Business Manager. These approvals must be obtained at least two weeks before travel begins. In addition to the advisor, the Graduate Program Director and UC International must be informed of and approve any travel that may affect visa status.

Illness

Graduate students do not have any formal sick leave. In case of illness, a TA should attempt to find another student to cover his or her teaching and learning center duties. If that is impossible, the TA must request the help of the course instructor to find a replacement as soon as possible. In any case, the course instructor (for a TA), advisor, and Assistant Academic Director must be informed of the absence. This includes absence due to both personal illness and family illness allowed under the Family Medical Leave Act.

Adherence to Policies

Financial support as a Graduate Assistant is predicated on the expectations outlined above. Students who do not adhere to these expectations may have their stipends withdrawn for as long as judged appropriate by the Department. If any extended absences are anticipated, for any reason, students should discuss them in advance with the Department.

Exceptions

The policies described here should cover the vast majority of cases. Variations and exceptions may be appropriate. For TAs, exceptions must be requested from, and approved by, the course instructor, the Academic Advisor, and the Assistant Academic Director. For research students, exceptions must be requested from and approved by the Academic Advisor and the Assistant Academic Director.

MS Students

The above policy for PhD students applies also to students receiving Graduate Assistantships from the Physics Department who are working on a MS degree.

Appendix A

Grading Scale for Oral Exam / Annual Progress Report

- A (ex. Possible future fellowship nominee)
- B (ex. On track for successful thesis completion)
- C (ex. Substantial improvement needed to continue)
- D (ex. Possible termination from research group/program at next APR)
- F (ex. Termination from research group/program)

Appendix B

Research Assessment
For Oral Exam and Annual Progress Report

_____ *student name*

Date _____

_____ grade

- A: Possible future fellowship nominee
- B: On track for successful thesis completion
- C: Substantial improvement needed to continue
- D: Possible termination from research group/program at next APR
- F: Termination from research group/program

Advisor _____

Committee

Appendix C

Annual Progress Report

Annual Progress Report: Completion of Doctoral Research Project
Department of Physics, University of Cincinnati

Date:

Student Name:

Date Entered Program:

Faculty Advisor:

Part A: This section is to be filled out by the student.

Please attach a brief description of your research project. List what you consider to be the substantial activities essential to your research, such as learning or developing specific skills, knowledge or techniques. For each activity list the accomplishments and state what remains to be done. Please supply any additional information relevant to your research.

Please attach a list of all preprints and publications you have (co)authored to date, including all authors, title, and publication data, as well as print/archive number.

Please attach a list of all talks you have given and posters presented to date, including date, title of talk, event, and venue (e.g. Talk at journal club, *Physics and You*, UC, January 2015 or Talk at APS March Meeting, *Physics and Beyond*, Indianapolis, March 2015).

Part B: This section is to be filled out by the faculty advisor after the student completes Part A.

After reading the student's response to Part A please state the areas where the student does not yet have full understanding of what needs to be accomplished. Outline what the student needs to accomplish in those areas to complete the research and dissertation.

Part C: This section is to be filled out jointly after Part A and Part B have been completed.

We have discussed the information requested above and agree that the following approximate schedule for completion of the dissertation is reasonable.

Expected completion date for thesis research:

Expected completion date of first draft of dissertation:

Expected defense date:

In case no such agreement can be reached, we agree to meet with the student's dissertation committee to discuss the disagreement.

Date:

Student Signature:

Advisor Signature:

Committee Members Signatures:

Appendix D

Flow Chart for Progress to Degree

