

2012-2013 Ph. D. in Physics Academic Assessment Plan

College of Liberal Arts and Sciences
Dmitrii Maslov, Graduate Coordinator
maslov@phys.ufl.edu

Office of the Provost

*University of
Florida*

*Institutional
Assessment*

*Continuous Quality
Enhancement*

Table of Contents

Academic Assessment Plan for ASHLEY ENTER Level and Degree Name	3
A. Mission	3
B. Student Learning Outcomes and Assessment Measures	4
C. Research.....	5
D. Assessment Timeline.....	5
E. Assessment Cycle	7
F. Measurement Tools.....	7
G. Assessment Oversight.....	8
Figure 1. University of Florida Graduate/Professional Program Assessment Plan Review Rubric.....	9
University of Florida Graduate/Professional Program Assessment Plan Review Rubric, continued.....	10

Academic Assessment Plan -Ph.D. in Physics

College of Liberal Arts and Sciences

A. Mission

Graduate Division

The Ph.D. Program in the Physics Department is designed to educate and train the next generation of physicists and to perform cutting-edge and internationally-recognized research. Our graduates learn how to apply fundamental laws of physics to specific situations, set up experiments, analyze and interpret experimental data, compose mathematical models of physical phenomena, and present results via written and oral communication. Externally funded research is the foundation of our graduate program, which prepares our students for scientific challenges in academia, private industry, and government labs. We promote the advancement of science through publications, public outreach, and other activities within our profession and beyond.

College

Our mission is to prepare exemplary qualified physicists and to generate new knowledge about Nature from the physics perspective. The College of Liberal Arts and Sciences is the home for some of the world's most respected educators and scholars who advance the value and practice of exact and natural sciences in the modern society. The faculty are committed to preparing professionals and scholars to practice and teach in a global society, providing leading research and service while generating and sharing knowledge.

University

The mission of the University of Florida is to offer broad-based, exclusive public education, and opportunities for cutting-edge research and service to the citizens of Florida, the nation and the world. The fusion of these three endeavors stimulates a remarkable intellectual vitality and generates a synthesis that promises to be the university's greatest strength. The university maintains its dedication to excellent teaching and researching by creating a strong and flexible foundation for higher education in the 21st century. The university welcomes the full exploration of our intellectual boundaries and supports our faculty and students in the creation of new knowledge and the pursuit of new ideas. Teaching is a fundamental purpose of this university at both the undergraduate and graduate levels. Research and scholarship are integral to the education process and to the expansion of our understanding of the natural world, the intellect and the senses. Service reflects the university's obligation to share the benefits of its research and knowledge for the public good.

Shared Mission

We seek to produce scholars conducting cutting-edge research to create new knowledge and new ideas. These diverse graduates will be skilled in independent thinking and problem-solving to become the leaders in academic and professional environments.

B. Student Learning Outcomes and Assessment Measures

SLO Type	SLO	Assessment method	Delivery Method
Knowledge	Students will describe, define and explain the foundations of Physics.	All Ph.D. students must complete 4 core courses in Mechanics, Electromagnetism, Quantum Mechanics, and Statistic Physics with an average GPA not lower than 3.3. The grades for these courses are based on midterm and final exams, and on solutions of homework problems but not on attendance and participation. Students are required to pass (within the first 2 years in the program) a written examination comprising 12 physics problems, set and graded by 12 faculty members. The pass/fail mark for each exam is determined by the faculty as a whole.	Campus
Knowledge	Students will identify and explain key open questions in modern Physics, in general, and in a chosen subfield of their studies, in particular.	All students are required to take at least three advanced courses in three different subfields of Physics (distribution requirement) with a minimum average GPA of 3.3. The grades for these courses are based on midterm and final exams, and on solutions of homework problems but not on attendance and participation. All students are required to take an oral examination, where they present a plan for their Ph.D. research and demonstrate familiarity with the subject. The examination is open to public and administered by 5 faculty members.	Campus
Skills	Students analyze and apply experimental techniques and mathematical models to physical phenomena.	Students are required to give a written report and oral presentation of their research. This is examined by a team of at least 5 faculty members. The faculty will question the student on how the research was conducted and how it has been presented to other audiences. 80% of those students who have passed the qualifying examination will demonstrate this outcome. Once the exam is passed, student must present annual reports to their supervisory committees.	
Skills	Students will perform research and publish original results in	Students are required to write a thesis summarizing new	

	high-impact journals, and make presentations at national and international conferences.	results obtained in their work. By the time of the final exam, 95% of students will have published papers in high-impact research journal and report their results to national and international conferences. During the exam, the team of 5 faculty will assess the novelty and soundness of research results.	
Professional Behavior	Students will demonstrate ethical behavior, cultural sensitivity, and professional conduct, and will be able to communicate their work orally as well as in writing.	All students are required to attend a training seminar of ethical behavior in science and to sign a pledge, acknowledging familiarity with the University of Florida policies on plagiarism. Qualifying and final exams have both written and oral components. Faculty members read student's papers before the exam and make suggestions on presentation and style. The Department hosts a special seminar, where graduate students give talks on their research, as well as a number of journal club seminars, where students give talks on recent important developments in subfields of their studies. In addition, the Department hosts a general Physics colloquium and a number of specialized seminars, given by leading experts. Student can register for the colloquium and seminars. The Department also supports lunches for outside speakers and Physics graduate students, where they discuss details of scientific research.	

C. Research

The 42 faculty members in the Department have active and productive research programs. Over the past five years, the members of our Department have published an average of 240 papers per year, about 5 articles per tenure-accruing faculty member per year, in peer-reviewed scientific journals, and they are frequently invited to present the results of their research at national and international conferences. Many of the faculty members have received national and international recognition for their research accomplishments, and are extremely active in national and international physics committees and national panel.

All our Ph.D. students are involved in active research programs. To facilitate rapid involvement of students into with actively developing subfields of Physics, the Department offers at least three advanced courses per semester. A coursework is supplemented by individual instruction whereby a typical student will have taken more than 100 credit hours of individual research courses by the end of his/her studies. In addition, we encourage our graduates to publish research papers based on their dissertations.

Preparation: Doctoral students in our program are assigned faculty mentors before they enter the

program. These mentors guide students' progress and give advice on choosing an area of specialization for the first two years in the program. All research groups of the Department conduct sessions where students meet the faculty and learn about research opportunities. All students must be registered for 6 credit hours of individual studies during their first summer semester. Each of the research centers associate with the Department, the Center for Condensed Matter Science (CCMS) and the Institute for High-Energy Physics and Astrophysics, fund 5-6 summer fellowships for 1st/2nd year students. In addition, CCMS runs a series of summer lectures on advanced topics in the Condensed Matter Physics, given by both Physics faculty and outside experts in the field. By the end of the second year, a student must form a supervisory committee that consists of the thesis advisor (Chair) and four other faculty members, including an external member. This committee guides a student's progress via annual reports and ad hoc meeting. The committee also serves as an examination board for qualifying and final exams. To facilitates a rapid involvement of students into cutting-edge research, the Department offers a number of courses on research methods: "Building Scientific Equipment" (PHY6905), "Computer Methods in Physics" (PHZ6156), "Qualitative Methods of Theoretical Physics" (PHZ6166), "Cryogenics" (PHY 6555C), etc. Students learn about most recent developments in modern Physics through the general Physics colloquium (PHY6920), Astrophysics Seminar (PHZ6391), Condensed Matter Seminar (PHZ6493), Particle Physics Seminar (PHZ6392), and Molecular Biophysics and Condensed Matter Theory Journal Clubs. Students receive training in using information resources at a seminar given by a staff member of the Science Library. Students have a chance to report their research findings at a bi-weekly Graduate Student Seminar. In sum, this multi-faceted approach creates a vibrant research-oriented atmosphere, which allows students to make a smooth transition from learning to discovering new physical phenomena.

As a measure of novelty and significance of their research findings, we expect our Ph.D. students to present research papers at top-tier conferences and publish in top-tier journals. To ensure academic honesty and integrity in reporting research results, we require all 1st year students to attend a seminar on scientific ethics and professional conduct. To facilitate presentation of research at academic conferences, we fund a portion of Ph.D. students' travel, as matching funds to the College travel awards. Many of our students receive travel awards from the Graduate Student Council and Office of Research and Graduate Programs and the UF Division of Sponsored Research.

D. Assessment Timeline

Program: Ph. D. in Physics

College of Liberal Arts and Sciences

Assessment	Assessment 1	Assessment 2
SLOs		
Knowledge		
Foundations of Physics	Upon completion of core courses	Preliminary Exam
Advanced Topics in Physics	Upon completion of each advanced-level class	Qualifying Exam, Ph.D. Exam
Skills		
Experimental and Theoretical Research Methods	Dissertation Proposal, annual evaluation	Qualifying Exam, Ph.D. Exam
Presentation of Research Results	Dissertation Proposal, annual evaluation	Qualifying Exam, Ph.D. Exam

Professional Behavior		
Ethics/diversity appreciation	Upon completion of training seminar on scientific ethics (1 st year in the program)	

D. Assessment Cycle

Assessment Cycle for:

Ph. D. in Physics

College of Liberal Arts and Sciences

Analysis and Interpretation:

___ May-June

Program Modifications:

Completed by ___ Completed by August 31

Dissemination:

Completed by ___ Completed by September 30

SLOs	Year	10-11	11-12	12-13	13-14	14-15	15-16
Knowledge							
Foundations of Physics				X	X	X	X
Advanced Topics in Physics				X	X	X	X
Skills							
Experimental and Theoretical Research Methods				X	X	X	X
Presentation of Research Results				X	X	X	X
Professional Behavior							
Ethics/diversity appreciation				X	X	X	X

E. Measurement Tools

- F. The measurement tools involve a combination of methods. The “Foundations of Physics” **knowledge** SLO is measured through the performance of students in core courses, in which they have to maintain an average GPA of 3.3, and through the preliminary exam. In the first case, faculty who teach the core courses derive individual student’s grade, while the Graduate Coordinator monitors the overall process. The grades for these courses are based on midterm and final exams, and on solutions of homework problems but not on attendance and participation. In the second case, an exam composed and graded by a team of 12 faculty members supervised by the Chair of the Preliminary Exam Committee. The pass/fail mark for each exam is decided on by the whole faculty. A student has 4 attempts for passing the exam. Failure to pass on the 4th

attempt means that the student must leave the Ph.D. program. The “Advanced Topics in Physics” **knowledge SLO** is measured by faculty who teach advanced-level courses, while the Graduate Coordinator monitors the overall process. It is also measured by the members of the supervisory committee during the Qualifying Exam, as well as during annual committee meetings and Ph.D. Exam.

The “Experimental and Theoretical Research Methods” **skills SLO** and “Presentation of Research Results” **skills SLO** are measured by the members of the supervisory committee during the Qualifying Exam, as well as during annual committee meetings and Ph.D. Exam. The Qualifying Exam is graded on pass/fail/conditional pass scheme. A fail means that a student has to re-take the exam. A conditional pass indicates that while a student demonstrated good overall understanding of the subject, he or she lacks sufficient knowledge of particular area(s). The committee as a whole indicates which improvements need to be made while the Chair of the committee develops a plan for their implementation. The annual evaluations result is satisfactory/unsatisfactory outcomes. In case of unsatisfactory outcome, the committee recommends a course of action to improve the situation. The Chair of the supervisor committee, in consultation with the committee members, decides whether research results can be published and/or presented at research conferences, and recommends a particular journal and conference venue. In view of timely manner in which results in Physics are disseminated, these decisions are made on a continuous basis. Both written and oral components of the Ph.D. exams are measured on the pass/fail basis. The committee makes recommendations on improving the thesis which are to be implemented by the deadline determined by the UF Graduate School. Ethics and professional behavior in the **professional behavior SLO** are measured in completion of the mandatory training seminar of scientific ethics and professional conducts. In addition, the novelty and originality of research presentations are measured by the members of the supervisor committee at Qualifying and Ph.D. exams, as well as at annual evaluation meetings.

G. Assessment Oversight

Here, list the names and contact information of those who oversee the assessment process in your program. Add or delete rows as needed.

Name	Department Affiliation	Email Address	Phone Number
Dmitrii Maslov	Physics	maslov@phys.ufl.edu	392-0513

Figure 1. University of Florida Graduate/Professional Program Assessment Plan Review Rubric

Related resources are found at <http://www.ua.assessment.edu>

Program:		Year:			
Component	Criterion	Rating			Comments
		Met	Partially Met	Not Met	
Mission Statement	Mission statement is articulated clearly.				
	The program mission clearly supports the College and University missions, and includes specific statements describing how it supports these missions.				
Student Learning Outcomes (SLOs) and Assessment Measures	SLOs are stated clearly.				
	SLOs focus on demonstration of student learning.				
	SLOs are measurable.				
	Measurements are appropriate for the SLO.				
Research	Research expectations for the program are clear, concise, and appropriate for the discipline.				
Assessment Map	The Assessment Map indicates the times in the program where the SLOs are assessed and measured.				
	The Assessment Map identifies the assessments used for each SLO.				
Assessment Cycle	The assessment cycle is clear.				
	All student learning outcomes are measured.				
	Data is collected at least once in the cycle.				
	The cycle includes a date or time period for data analysis and interpretation.				
	The cycle includes a date for planning improvement actions based on the data analysis.				
	The cycle includes a date for dissemination of results to the appropriate stakeholders.				

University of Florida Graduate/Professional Program Assessment Plan Review Rubric, continued

Component	Criterion	Rating			Comments
		Met	Partially Met	Not Met	
Measurement Tools	Measurement tools are described clearly and concisely.				
	Measurements are appropriate for the SLOs.				
	Methods and procedures reflect an appropriate balance of direct and indirect methods.				
	The report presents examples of at least one measurement tool.				
Assessment Oversight	Appropriate personnel (coordinator, committee, etc.) charged with assessment responsibilities are identified				

Appendix A. Qualifying Exam Rubric – Ph.D. in Physics

Written component: Ph.D. thesis proposal (10-15 pages +references)	Exceeds expectations	Near expectations	Below expectations
The paper must be submitted to the Ph. D. committee no later than in a week before the qualifying exam.	Plan is sound and well thought-out. The existing knowledge is thoroughly reviewed and analyzed. The candidate shows familiarity with underlying theoretical concepts and main experimental techniques. Proposal is original and is likely to be successful. The candidate is allowed to proceed with his/her research along the plan.	Plan is acceptable with modest revisions. The candidate is allowed to proceed but the revised version is to be submitted to the Ph. D. committee by the specified deadline.	Plan contains major flaws and/or is not original. The candidate is required to submit new plan by the specified deadline
Oral component (30-40 mins presentation+questioning period)	Presentation is well thought-out and accessible to non-experts in the fields. The candidate answered the questions from the general audience as well from the Ph. D. committee members in satisfactory manner. The candidate is confident and is capable of explaining both fundamental concepts of Physics, as well as details of his/her research proposal.	Presentation is acceptable but reveals certain inconsistencies in candidate's understanding of his/her field of studies. The candidate answered most but not all questions from the general audience and/or from the committee members. The candidate is allowed to proceed but a new presentation on topics selected by the committee will take place by the specified deadline.	Presentation is not acceptable. The candidate revealed major flaws in his/her understanding, and did not answer most of the questions. A new presentation is scheduled by the specified deadline.