Ph.D. in Industrial and Systems Engineering Academic Assessment Plan 2012-2013

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Office of the Provost

University of Florida

Institutional Assessment

Continuous Quality Enhancement

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Academic Assessment Plan for Ph.D. in Industrial and Systems Engineering

College of Engineering

A. Mission

University

The University of Florida is a public land-grant, sea-grant and space-grant research university, one of the most comprehensive in the United States. The university encompasses virtually all academic and professional disciplines. It is the largest and oldest of Florida's eleven universities, a member of the Association of American Universities and has high national rankings by academic assessment institutions. Its faculty and staff are dedicated to the common pursuit of the university's threefold mission: teaching, research and service.

The University of Florida belongs to a tradition of great universities. Together with its undergraduate and graduate students, UF faculty participate in an educational process that links the history of Western Europe with the traditions and cultures of all societies, explores the physical and biological universes and nurtures generations of young people from diverse backgrounds to address the needs of the world's societies.

The university welcomes the full exploration of its intellectual boundaries and supports its 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 educational 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. The university serves the nation's and the state's critical needs by contributing to a well-qualified and broadly diverse citizenry, leadership and workforce.

The University of Florida must create the broadly diverse environment necessary to foster multicultural skills and perspectives in its teaching and research for its students to contribute and succeed in the world of the 21st century.

These three interlocking elements — teaching, research and scholarship, and service — span all the university's academic disciplines and represent the university's commitment to lead and serve the state of Florida, the nation and the world by pursuing and disseminating new knowledge while building upon the experiences of the past. The university aspires to advance by strengthening the human condition and improving the quality of life.

College

The College of Engineering fosters and provides world-class programs in engineering education, research and service to enhance the economic and social well-being of the citizens of Florida, the nation and the world.

Department

The Department's mission is to develop critical thinkers and provide Industrial Engineering and Operations Research solutions for complex analytical problems in business, government and society in general.

SLO Type	SLO	Assessment Method	Delivery Mode
Knowledge	Basic proficiency in the core methodological areas of operations research and industrial engineering, including mathematical modeling and optimization theory and algorithms	Students must maintain satisfactory classroom performance. Assessments are carried out by final exams in two of the four core classes (ESI 6912: Fundamentals of Mathematical Programming, and 6546: Stochastic Modeling and Analysis). Assessment is performed by the course instructors.	Campus
Knowledge	Mastery of advanced Operations Research foundational material to enable the development of new theoretical and methodological research	Students must pass a General Examination after their first year, and have at most two opportunities to pass the exam. Assessment is performed by the graduate committee.	Campus
Professional Behavior	Ability to effectively and professionally communicate industrial engineering concepts and information in lecture format	Students must present their research during their dissertation defense, as well as at a departmental seminar or at a major research conference (usually both) during their career. Assessment is performed by the dissertation committee chair.	Campus
Skills	Ability to assimilate foundational material, describe important research contributions, and independently plan future research activities that advance the state-of-the-art in the student's field of expertise	Before admission to candidacy, all Ph.D. students must pass a Qualifying Examination and Dissertation Proposal, requiring students to write a brief document summarizing their work. Students additionally answer any written questions posed by their committee, and present their research findings in front of their committee.	Campus
Knowledge	Contribution of significant new research to the student's field of expertise, either in theoretical foundations or practical applications	All Ph.D. students must defend their dissertation before graduation. The dissertation is evaluated based on the significance of new contributions to the field. The dissertation committee, including at least one	Campus

B. Student Learning Outcomes and Assessment Measures

committee member from	
outside the department, is	
responsible for evaluating the	
dissertation.	

C. Research

The Doctor of Philosophy (Ph.D.) degree is the terminal degree in the Industrial and Systems Engineering (ISE) field, and challenges graduate students to establish considerable depth in their field of study, gain world-class depth in their area of specialization, and contribute novel research that is published in top academic publication outlets. Whereas the Ph.D. coursework requirements satisfy the requirement of establishing a base of knowledge from which the students can launch their research, and elective courses allow students to build their expertise within their specification, the research component of this program differentiates it from the other graduate programs in ISE.

A member of the graduate faculty at the University of Florida advises the dissertation, and each dissertation committee member must also be a member of the graduate faculty. (The graduate faculty is a subset of University of Florida faculty whose responsibility includes the development of novel research contributions. Non-graduate-faculty members can be appointed to a committee by special petition.) A student's research is evaluated in three primary stages. During the first stage, the student begins research on an array of unsolved problems or new challenges in the field, receiving active guidance from the dissertation advisor and complementary guidance from the committee members (as appropriate). This stage begins at the time the advisor and student are confident with fundamentals in the field, and continues up through the dissertation defense (see below). The second stage is the dissertation proposal and qualifying exam, and the third stage is the dissertation defense itself. These exams are described in the Measurement Tools subsection.

D. Assessment Timeline

Program: Ph.D. in Industrial and Systems Eng.

College of Engineering

Assessment	Assessment 1				
SLOs					
Knowledge					
Basic proficiency in the core methodological areas of operations research and industrial engineering, including mathematical modeling and optimization theory and algorithms	Final examinations conducted in ESI 6912: Fundamentals of Mathematical Programming, and 6546: Stochastic Modeling and Analysis				
Mastery of advanced Operations	General examination				

Research foundational material to enable the development of new theoretical and methodological research	
Contribution of significant new research to the student's field of expertise, either in theoretical foundations or practical applications	Dissertation defense
Skills	
Ability to assimilate foundational material, describe important research contributions, and independently plan future research activities that advance the state-of-the-art in the student's field of expertise	Qualifying examination and dissertation proposal
Professional Behavior	
Ability to effectively and professionally communicate industrial engineering concepts and information in lecture format	Rubric assessed by the student's dissertation committee chair after the student's dissertation defense

E. Assessment Cycle

Assessment Cycle for: Program: M.S. in Industrial and Systems Eng.

College of Engineering

Analysis and Interpretation: Program Modifications: Dissemination:

June-August Completed by November Completed by December

Year	12-13	13-14	14-15	15-16
SLOs				
Knowledge				
Basic proficiency in the core methodological areas of operations research and industrial engineering, including mathematical modeling and optimization theory and algorithms	х	х	х	x
Mastery of advanced Operations Research foundational material to enable the development of new theoretical and	х	х	х	х

methodological research				
Contribution of significant new research to the student's field of expertise, either in theoretical foundations or practical applications	х	х	х	х
Skills				
Ability to assimilate foundational material, describe important research contributions, and independently plan future research activities that advance the state-of-the-art in the student's field of expertise	х	х	х	х
Professional Behavior				
Ability to effectively and professionally communicate industrial engineering concepts and information in lecture format	x	x	x	x

F. Measurement Tools

There are three knowledge SLOs for the Ph.D. program. The first regards basic knowledge, and is assessed specifically by student performances on the final examinations in ESI 6912: Fundamentals of Mathematical Programming and ESI 6546: Stochastic Modeling and Analysis. The course instructor completes a scorecard to this effect (<u>http://www.ise.ufl.edu/about/sacs-accreditation/</u>). The second SLO, regarding mastery of fundamental Operations Research material, is tested via a rigorous General Examination (GE), taken after the student's first year in the program. This program is an eight-hour examination, requiring four hours of test-taking on each of two consecutive days. The examination questions are designed to test the extent of the knowledge gained within the core Ph.D. courses required of all students. In particular, the committee seeks to determine whether or not the background obtained by the student is sufficient to conduct high-quality research. These examinations are also pass/fail, and the results are documented and communicated to the students. Finally, the third SLO deals with the contribution of significant research to the field. This SLO is measured by the dissertation defense, which is a pass/fail decision by the dissertation committee. The committee examines the quality of the written work, and assesses the extent to which the student has himself or herself personally mastered the material.

The skills SLO is measured by the Qualifying Examination and Dissertation Proposal (QE/DP), and by the dissertation defense, respectively. The former consists of a defense of the student's research work done thus far in his/her career at Florida, and (optionally) of written and oral questions. The

QE/DP begins with a student presentation on his/her research (typically between 30-60 minutes), with questions from the dissertation committee either during or after the presentation. The committee members may elect to quiz the student on his/her foundational knowledge, investigate technical questions pertaining to additional research, and on extensions of the research that are planned for the future. Additionally, the committee members may ask written questions of the students ahead of the QE/DP. A pass/fail decision is reached by the committee, returned to the student, and documented. The professional behavior SLO is measured by a rubric for the dissertation defense is completed by the student's dissertation committee chair. The criteria evaluated by the committee chair include the quality of the presentation materials, the correctness and significance of the content, presentation mechanics, and the ability of students to answer questions posed during the defense. An example rubric is attached in the appendix.

G. Assessment Oversight

Name	Department Affiliation	Email Address	Phone Number
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	Coordinator		

H. Appendix Figure 1. Ph.D. Defense Presentation Rubric.

		20		15	10	5	0
Presentation Delivery	x	Presentation flows with practice evident. Speakers are clear and engage audience.		Presentation flows with practice evident. Not all speakers engage audience.	Presentation flows with practice evident. No speakers engage audience.	Presentations suffers in parts due to lack of flow.	Presentation suffers from lack of flow with need of further practice.
Presentation Materials	x	Materials were appropriate and desgined well.		Materials were appropriate but with minor flaws (spelling, size, etc.)	Materials were appropriate but with major flaws (spelling, size, etc.)	Materials used were inappropriate.	No presentation materials utilized.
Problem Presentation		Problem and background presented clearly and succintly.	x	Problem and background given, but not in sufficient detail.	Problem and background only noted briefly.	Problem presented briefly with no background information.	Problem not defined.
Solution Presentation	x	Solution approach effectively demonstrated and questions answered effetively.		Solution approach effectively demonstrated.	Solution approach hard to follow.	Solution approach presentation incomplete.	Solution approach not presented.
Ability to Answer Questions	x	Questions were answered completely and succinctly.		Questions were answered completely but not succinctly.	Questions were answered but either incomplete or incorrect.	Questions were answered unsatisfactorily.	Questions were not answered.
L	-	80		15	 0	 0	0
Subtotal		95					
Add/Reduce		0					
Total		95					

Defense Presentation

Comments