

## Appendix B - Assessment Plan

### Program: Ph.D. in Industrial and Systems Engineering

A Ph.D. in Industrial and Systems Engineering (ISYE) allows graduates to pursue professional careers at academic institutions, national research labs, federal and state agencies, and private and public corporations. Students enrolled in the program will develop the ability to identify and pursue important research questions pertaining to the field of Industrial and Systems Engineering. Students will also acquire the quantitative, qualitative and methodological research skills needed to advance research findings that contribute to the development of the economy, society and industry, either locally or globally. Training focuses on the engineering process, skills and critical thinking necessary to design and execute scientific and engineering research. Training through research and study of the primary literature endows graduates of the program with enhanced content knowledge, applied skills and a fundamental understanding of the engineering process and technology to prescribe scientific solutions. The overall goal of the program is to train and develop advanced practitioners, researchers and teaching scholars in Industrial and Systems Engineering.

### 1. Learning Objective/Outcomes

Graduates of the Ph.D. program in Industrial and Systems Engineering will be able to demonstrate the following objectives/outcomes:

- f) *Advanced Knowledge.* Master advanced concepts, methods and technologies in industrial and systems engineering thrust areas.
- g) *Methods.* Understand and apply research methodologies to relevant industrial and systems engineering questions, issues, and problems.
- h) *Research.* Conduct independent research that results in an original contribution to knowledge that meets all the standards for responsible conduct of research.
- i) *Ethics.* Demonstrate knowledge and understanding of ethical standards in executing research.
- j) *Communication.* Communicate research to both technical and general audiences in an effective manner through oral and written formats.

### 2. Methods

Method	Description/Target	Timeline	Person/People Responsible	Objectives/Outcomes Assessed
ISYE671-Linear Programming and Network Flows.	All students must take a required course on formulation and solution techniques for linear programming and network flow problems. This course covers the simplex method, its related theory and computation issues, and applications.  <b>Target:</b> over 90% of Ph.D. students admitted to the program are expected to	Sometime within year 1 in the Ph.D. program	ISYE Graduate Faculty Member	a,b

Method	Description/Target	Timeline	Person/People Responsible	Objectives/ Outcomes Assessed
	successfully pass this course.			
Ph.D. Candidacy Examination (CE)	<p>Students must pass a candidacy exam for the Ph.D. that consists of a written examination based on the core courses. The candidacy exam tests the depth and breadth of the student's knowledge in the field of ISYE, covering topics such as: linear programming, statistics, ergonomics, quality, production planning and simulation.</p> <p><b>Target:</b> over 75% of Ph.D. students admitted to the program are expected to successfully pass this candidacy exam.</p>	Sometime within one year after completion of the core courses (in year 2 or 3 in the Ph.D. program)	Ph.D. Candidacy Committee	b
ISYE701-Industry Residency	<p>After the candidacy exam, all students must take one semester of Industry Residency. Students are required to work on a project at a sponsoring company site. During this course, graduate students are expected to identify a workable problem that later may be used as their dissertation topics.</p> <p><b>Target:</b> 100% of Ph.D. students passing the candidacy exam are expected to successfully pass this course.</p>	Sometime in year 2 or 3 in the Ph.D. program	ISYE Faculty Advisor (Graduate faculty member)	c,d,e
Dissertation Proposal Examination (PE)	The dissertation proposal tests the depth and breadth of the student's knowledge in their area of research, and assesses the student's ability to design and present a coherent, logical and appropriate research plan. Students are also expected to be able to	After accrual of $\geq 45$ hours	Dissertation Research Committee (Graduate faculty members)	a,b,c,d,e

Method	Description/Target	Timeline	Person/People Responsible	Objectives/ Outcomes Assessed
	<p>present a coherent, logical and appropriate research plan describing specific experimental approaches that will be carried out to investigate current ISYE problems in their area of concentration.</p> <p><b>Target:</b> 100% of Ph.D. students passing the candidacy exam are expected to successfully pass the dissertation proposal.</p>			
Dissertation Report and Defense (DRD)	<p>Students must write a Ph.D. dissertation that exhibits original research. Students will defend the Ph.D. dissertation in a public seminar and in a comprehensive examination conducted by the student's advisory committee.</p> <p><b>Target:</b> 100% of students receiving the Ph.D. degree are expected to meet this requirement.</p>	Final Semester of the students' Ph.D. program	Dissertation Research Committee (Graduate faculty members)	a,b,c,d,e
Research Committee Meetings (RCM)	<p>This is a tool of <i>formative</i> assessment. After the candidacy examination, Ph.D. students will meet with their advisory committees once per semester, and every semester thereafter. Students present their project data, progress and proposed plan of research. The committee asks questions, provides feedback and constructive criticism and frames the expectations for the student's final dissertation content.</p> <p><b>Target:</b> 100% of the students passing into</p>	Every semester	Dissertation Research Committee (Graduate faculty members)	a,b,c,d,e

Method	Description/Target	Timeline	Person/People Responsible	Objectives/ Outcomes Assessed
	proposal examination will go on to produce a successful dissertation research project.			
ISYE799- Doctoral Dissertation Research	All Ph.D. students must take at least 21 hours of ISYE799. During their execution of their research projects, students typically meet with and present their research to the principal investigator/ dissertation research advisor in lab meetings or individual meetings. The advisor provides advice and direction, and assesses progress by the student.  <b>Target:</b> 100% Ph.D. students will successfully complete 21 hours of ISYE 799.	Every semester after successful completion of the candidacy examination	ISYE Dissertation Advisor	a,b,c,d,e

### Outcome-by-Methods

	Summative Assessment					Formative Assessment	
	671	CE	701	PE	DRD	RCM	799
a) Advanced Knowledge	x			x	x	x	x
b) Methods	x	x		x	x	x	x
c) Research			x	x	x	x	x
d) Ethics			x	x	x	x	x
e) Communication			x	x	x	x	x