IEOR STUDENT OUTCOMES

A. Student Outcomes

The IEOR Department has established the following outcomes for its B.S. degree program. These outcomes are documented on the Department's public web site, www.ieor.berkeley.edu. Graduates of the B.S. IEOR program are expected to be able to:

- Identify opportunities for improvement in practical settings
- Document process, material and information flows
- Collect and structure data to support decision-making
- Define appropriate goals and constraints for decision-making
- Formulate mathematical optimization models for decision-making
- Model the probabilistic aspects of a system
- Validate modeling assumptions and model implications
- Explore model sensitivity to assumptions and parameters
- Apply appropriate solution techniques for optimization problems
- Perform statistical analysis to identify patterns, test hypotheses, and make estimates or forecasts
- Utilize decision support (e.g., optimization, simulation, decision analysis) software
- Use business software (e.g., Excel) and the Internet to analyze and solve problems
- Utilize quantitative tools for specific applications (e.g., inventory, scheduling, supply chain design, quality control)
- Adapt or modify known solution approaches for new problem settings
- Consider humans and organizations in designing systems
- Communicate orally and in writing
- Work in a team
- Understand professional and ethical responsibilities
- Recognize need for and possess ability to engage in lifelong learning

The IEOR department's B.S. degree Program Outcomes as above represent a *superset* of the general ABET Student Outcomes. Most of the department-specific outcomes represent elaborations of the technically-oriented ABET outcomes. For non-technical outcomes on the ABET list, we largely have adopted the stated ABET outcome without additional elaboration. The mapping between IEOR program outcomes and ABET Student Outcomes (a) through (k) is provided in Table 3-1 on the next page.

B. Relationship of Student Outcomes to Program Educational Objectives

The relationships between the ABET Student Outcomes and the IEOR B. S. Program Educational Objectives and the relationships between the IEOR B.S. Program Outcomes and the Program Educational Objectives are defined in Table 3-2 on the second following page. As may be seen, multiple outcomes contribute to each objective.

Table 3-1: Correspondence Between IEOR and ABET Program Outcomes

	ABET Student Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
IEOR Program Outcomes											
Identify opportunities for improvement in practical settings	x		x		x			x	x	x	x
Document process, material and information flows			x		x			x			x
Collect and structure data to support decision-making		x			x						x
Define appropriate goals and constraints for decision-making	x		x		x						x
Formulate mathematical optimization models for decision-making	x		x		x						x
Model the probabilistic aspects of a system	x	x									x
Validate modeling assumptions and model implications		x	x		x	x					x
Explore model sensitivity to assumptions and parameters		x	x		x	x					x
Apply appropriate solution techniques for optimization problems	x				x						x
Perform statistical analysis to identify patterns, test hypotheses, and make estimates or forecasts	x	x			x						x
Utilize decision support (e.g., optimization, simulation, decision analysis) software	x	x	x		x			x			x
Use business software (e.g., Excel) and the Internet to analyze and solve problems	x	x							x	x	x
Utilize quantitative tools for specific applications (e.g., inventory, scheduling, supply chain design, quality control)	x	x	x		x						x
Adapt or modify known solution approaches for new problem settings								x	x	x	
Consider humans and organizations in designing systems								x	x	x	
Communicate orally and in writing							x				
Work in a team				x							
Understand professional and ethical responsibilities						x					
Recognize need for and possess ability to engage in life-long learning									x		

Table 3-2: Relationships Between IEOR B.S. Program Objectives and Outcomes

		Program Educational Objective				
	Program Outcome	Quant. Modeling & Analysis of Systems-Level Problems	Development & Use of Analytical & Computational Methods	Collection & Analysis of Data; Use of Database & Decision Support Tools	Comprehension and Modeling of Uncertainty	Broader Skills, Background and Knowledge to be Effective Professional
(a)	Ability to apply knowledge of mathematics, science and engineering	x	x			
(b)	Ability to design and conduct experiments, analyze and interpret data	x	x	x	x	
(c)	Ability to design a system, component or process to meet desired needs	x				
(d)	Ability to function on multi-disciplinary teams					x
(e)	Ability to identify, formulate and solve engineering problems	x	x	x	x	
(f)	Understanding of professional and ethical responsibility					x
(g)	Ability to communicate effectively					x
(h)	Understand impact of engineering solutions in a global and societal context	x				x
(i)	Recognition of need for and ability to engage in life-long learning					x
(j)	Knowledge of contemporary issues					x
(k)	Ability to use techniques, skills and modern engineering tools for eng. practice	x	x	x	x	
	Identify opportunities for improvement in practical settings	x				x
	Document process, material and information flows	x		x		x
	Collect and structure data to support decision-making		x	x	x	x
	Define appropriate goals and constraints for decision-making	x	x		x	x
	Formulate mathematical optimization models for decision-making	x	x		x	x
	Model the probabilistic aspects of a system	x	x		x	x
	Validate modeling assumptions and model implications	x	x	x	x	x
	Explore model sensitivity to assumptions and parameters	x	x	x	x	x
	Apply appropriate solution techniques for optimization problems	x	x			
	Perform statistical analysis to identify patterns, test hypotheses, and make estimates or forecasts	x		x	x	x
	Utilize decision support (e.g., optimization, simulation, decision analysis) software	x	x	x	x	x
	Use business software (e.g., Excel) and the Internet to analyze and solve problems	x	x	x	x	x
	Utilize quantitative tools for specific applications (e.g., inventory, scheduling, supply chain design, quality control)	x	x	x	x	x
	Adapt or modify known solution approaches for new problem settings	x	x			x
	Consider humans and organizations in designing systems					x
	Communicate orally and in writing					x
	Work in a team					x
	Understand professional and ethical responsibilities					x
	Recognize need for and possess ability to engage in life-long learning					x

Table 4-9: Strength of Contribution of Salient Courses to Program Outcomes

	Course Numbers																		
Program Outcome	E120	174	165	142	160	173	162	172	174	115	130	140	150	151	153	166	170	171	180
Ability to apply knowledge of mathematics, science and engineering	H	H	H	H	H	H	H	H	H	L	M	M	H	H	H	H	M		H
Ability to design and conduct experiments, analyze and interpret data	M	H	H	H		H			H	M		H	M			L	M	M	H
Ability to design a system, component or process to meet desired needs	L	M	H	M	L	M	H		M	H		H	M	M	H	H	H	H	H
Ability to function on multi-disciplinary teams	M	M		M		M			M	H		H	L			L	H	H	H
Ability to identify, formulate and solve engineering problems	M	M	M	M	H	H	H	M	M	H	H	M	H	H	M	H	H	H	H
Understanding of professional and ethical responsibility	M									L	L	M	L			M	L	H	H
Ability to communicate effectively									H	H	L	H	M		M	M	M	H	H
Understand impact of engineering solutions in a global and societal context	M		M			M				M	M	L	L	L		M	M	H	M
Recognition of need for and ability to engage in life-long learning	L	M	L	M	L	M	L	L		M	L	M	L	L	L	L	M	H	H
Knowledge of contemporary issues	H			M						M	H	M	M			M	M	H	M
Ability to use techniques, skills and modern engineering tools for eng. practice	H	H	H	H	H	H	M		H	H	H	H	H	H	H	H	M	H	H
Identify opportunities for improvement in practical settings	L	M	M	M	L	M	L	L	M	M	H	M	H	H	H	M	M	M	H
Document process, material and information flows	L	L	L	M	L	L	L	L	L	M	L		L	L	L	L	L	L	H
Collect and structure data to support decision-making	L	M	L	M	L	M	L	L	M	H	L	L	L	L	L	L	L	L	H
Define appropriate goals and constraints for decision-making	M	M	L	M	H	M	H	L	M		H		H	H	H	H	L		*
Formulate mathematical optimization models for decision-making	H	M	L	M	H	M	H		M		M		H	H	M	M			*
Model the probabilistic aspects of a system	L	H	H	H		H		H	H	L	H	L	M	M	M	H	L	L	*
Validate modeling assumptions and model implications	H	H	M	H	H	H	H		H	H	M	M	H	H	M	H	H		*
Explore model sensitivity to assumptions and parameters	H	H	M	H	H	H	H		H	H			H	H	M	H	H		*
Apply appropriate solution techniques for optimization problems	M				H		H				M		H	H	H	H			*
Perform statistical analysis to identify patterns, test hypotheses, and make estimates or forecasts		H	H	H		H		M	H										*
Utilize decision support (e.g., optimization, simulation, decision analysis) software	L	H		H	L	H	H		H				M	M	M	H			*
Use business software (e.g., Excel) and the Internet to analyze and solve problems	H	L	M	M	M	M	M	M	L	H	H	L	M	M	M	M			*
Utilize quantitative tools for specific applications (e.g., inventory, scheduling, supply chain design, quality control)											M		H	H	H	H			*
Adapt or modify known solution approaches for new problem settings		H	L	H	L	H	L	L	H		H		M	M	M	M			H
Consider humans and organizations in designing systems										L							H	H	*
Communicate orally and in writing		H		H		H			H	H			M	L		L	H	H	H
Work in a team		H		H		H			H	H		H							H
Understand professional and ethical responsibilities	M									L						L	M	H	H
Recognize need for and possess ability to engage in life-long learning	L	L	M	L	M	L	L	M	L	L	M	L	L	L	L	M	M	H	H

* dependent on student's project