

**University of Puerto Rico
School of Engineering
Industrial Engineering Department**

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IE Department

To: Dr. Mario Rivera – ABET Faculty Coordinator

Subject: ABET Activities and Student Learning Assessment Results
Academic Year 2005-2006

Date: June 14, 2006

SECTION I: MISSION AND STUDENT LEARNING OUTCOMES (Graduating Student Profile)

Industrial Engineering Department Mission:

“Serve society through the formation of professionals of excellence, performing research, and service in Industrial Engineering and related fields by means of innovative and creative processes with highly motivated human resources in a favorable work environment.”

The profile of the graduate of the IE program states the following:

Graduates from the Industrial Engineering program are instrumental in planning, designing, implementing and evaluating products, services, and systems that integrate people, materials, equipment, and information for the progress and improvement of the quality of life of humankind. They insure that these products, services, or systems can be provided economically with the required level of quality necessary for satisfying society's needs. The Industrial Engineer draws upon knowledge and skills mostly from the areas of mathematics and the physical, social, physiological and computer sciences, together with principles and methods of engineering analysis and design.

The Industrial Engineering department with input from its constituencies has established the following program outcomes.

1. **Design a work facility or system**
All IE graduates should be able to design a work facility or systems that minimizes costs and cycle times, maximizes quality, promotes order, and provides a safe and comfortable environment.
2. **Design and implement quality control systems**
Most IE graduating students should be able to design and implement quality control systems to ensure the consistent delivery of products and services that meet customer specifications.
3. **Design computer-based control and information systems**
Many IE graduating students should understand and be instrumental in the design, development and use of computer-based control and information systems.
4. **Plan and control a production system**
All graduating students should have a clear understanding of the elements of a production system, and be able to plan its requirements, develop the appropriate production schedules, and control its execution.
5. **Evaluate the economics of engineering solutions**
All IE graduating students should be able to evaluate the economic aspects of engineering solutions, emphasizing estimating the cost of producing a product or providing a service, and analyzing the economic implications of engineering design alternatives.
6. **Develop models to experiment, evaluate, or solve a problem**
All IE graduating students should be able to formulate and develop mathematical, statistical, simulation, or physical models to experiment, evaluate existing and proposed systems, or solve a particular problem.
7. **Use engineering design process from IE point of view**
All IE graduating students should be able to use the engineering design process from the industrial engineering point of view, that is, identify and define a problem whose solution will have the greatest impact in the organization, gather and organize relevant data and information, perform the appropriate analysis and draw relevant conclusions, generate and evaluate alternative solutions, select and implement a solution, and finally produce concise and clear documentation of problems, solutions, and procedures. The graduates should have developed the skills and curiosity to gather information that is not readily available or that is not obvious.

8. Use modern telecommunication and computer technology

All IE graduating students should be able to use modern telecommunications and computer technology and software tools, to search for information, analyze data, design solutions, communicate with peers, and document the present results of projects.

9. Present information to individuals or to an audience

All IE graduating students should be able to present information in a clear and concise manner using the most appropriate media and technology, either individually or to an audience, to peers, project teammates, management, or laypeople.

10. Establish goals and work to reach them

All IE graduating students should be able to establish goals and objectives, and to work independently and/or as part of a team to reach them. The graduates should be capable of acquiring new knowledge and developing new skills when the requirements to reach a goal call for it.

11. Understand and practice leadership

All IE graduating students should be able of demonstrating their leadership skills when the circumstances call for call for someone with their background and training. The graduate should be capable of occupying leadership positions in professional, community, and government organizations. They should be able to comment and express their opinion regarding technological and socio-humanistic aspects of the profession.

SECTION II: ABET ACTIVITIES AND ASSESSMENT RESULTS

A. DESIGN OF A FORMAL PROFESSIONAL ADVISING PROCESS

On our last ABET accreditation visit it was pointed out we needed to improve our process of professional advising to students. The informal process of professional advising implemented thereafter to address this issue has not been successful so far based on the number of visits made by students to professors. Therefore, in the fall semester of academic year 2005 – 2006, during a department meeting, a formal process was designed which started in the spring semester of that academic year.

All Industrial Engineering students, including freshmen, were distributed evenly among professors based on their last name. A poster was designed and posted in several places motivating students to visit their professors and e-mails are sent, one week prior to registration week, to all students through their UPRM account. An application was designed to access students through the university web page. The screens showing the process are presented in the Appendix. The

last screen shows the last four digits of the student's number of those students assigned to the professor.

Other advising activities implemented were:

1. "Academic and Professional Orientation on IE elective courses and IE Sub-Specialization Certificates" given also one week prior to registration week, and
2. "Orientation on Opportunities for Graduate Studies" given to graduating students each year during the last week of August and January.

B. CURRICULAR REVISION

Through the analysis of assessment results for academic year 2004 – 2005 some areas of opportunity for improvement were identified. These are presented in Table 1, included in the Appendix, by group of constituents and the consolidated results. These results were obtained through the distribution of questionnaires to constituents.

In October 2005 a meeting was held with the Industrial Engineering Advisory Board where the members expressed the need to improve in the following areas:

1. Communication skills,
2. Management of Human Resources,
3. Human Resources Behavior,
4. Knowledge in Environmental, Health and Safety,
5. Systems integration and manufacturing,
6. Marketing,
7. Logistics,
8. Entrepreneurial skills,
9. Lean Manufacturing, and
10. Management and leadership skills.

When results were presented to faculty at a department meeting it was determined that the curricular revision the department had been working on was addressing most of the areas of opportunity identified through the assessment process. Therefore, it was decided to focus efforts on the completion of the curricular revision.

Table 2, included in the Appendix, shows how the new courses in the curricular revision address those areas of opportunity. As shown, new courses address 70% of the areas of opportunity identified by employers, 100% of the areas of opportunity identified by alumni and graduating students, and 88% of the opportunities identified by consolidating results from the three groups of constituents.

Table 3, included in the Appendix, includes a list of the new courses in the curriculum. Documentation needed for registration and codification has been completed for 8 out of the 16 new ININ courses (50%) in the curricular revision.

C. INCORPORATION OF DIRECT MEASURES INTO THE ASSESSMENT PROCESS

The results obtained from the distribution of questionnaires give a general view on the areas of opportunity for improvement. However, this process is not effective in tracking specific skills within the areas of opportunity students are failing to learn. Therefore, at the department meeting held on May 10, 2006 it was decided to incorporate direct measures into the assessment process.

Several strategies were evaluated based on certain desired criteria. The analysis of alternatives is presented in Table 4, included in the Appendix. Two strategies were chosen:

1. Student performance assessment through sampling in core courses, and
2. Assessment in the capstone course through the course project, a curriculum comprehensive test, and ethics modules.

A strategy for sampling courses will be designed and discussed with department faculty in August 2006.

The design of fundamental or basic questions for the comprehensive test will be done through course committees. These questions should be based on IE outcomes. It will be a pass or no-pass test. Students will have two opportunities to pass the test during his capstone course semester. If he fails in both occasions he will be given an incomplete grade, even if he excels in his capstone project. He will have the opportunity to repeat the test on the following semester. This strategy will be implemented in the fall semester of academic year 2006-2007.

D. ASSESSMENT RESULTS FOR YEAR 2005-2006

Currently, assessment of student learning is performed throughout the curriculum with the Course Skills Assessment Form, prior to graduation with the Graduating Student Assessment Form, and three years after graduation with the Alumni and Employer Assessment Forms. Copies of assessment forms have been included in the Appendix.

Assessment results from graduating students and alumni collected during academic year 2005-2006 are presented in Table 5. Results from employers are not included since questionnaires are sent to them every other year. Scatter diagrams on results are presented in Figures 1 through 3 and the areas of opportunity are presented in Table 6 where these are compared to those identified in academic year 2004-2005. Results from alumni and graduating students were almost the same as those obtained for last year. On their comments alumni expressed the need to improve the curriculum in the following areas:

1. Design of experiments,
2. Lean Manufacturing,
3. Six Sigma,
4. Regulations,

5. Computer Programming, and
6. Information technology.

Some of those areas are being addressed in the curricular revision as follows:

Area of Opportunity	Action
Design of Experiments	Course ININ 4027, Design and Analysis of Experiments changes from elective to core course.
Lean Manufacturing	Covered in new courses ININ 4120, Advanced Production Planning and Control, and ININ 4220, Advanced Methods Improvement and Work Measurement.
Regulations	New course ININ 4320, Compliance with Regulations and Validations.
Computer Programming	Course ININ 4018, Digital Simulation, changes from elective to core course.

Results from the course skills assessment are summarized in Table 7. These are based on the percentage of answers given to disagree and strongly disagree. A report was submitted to each professor with results obtained for his particular course and section including students' comments.

Global results show the greatest area of opportunity is "Use techniques, skills and modern engineering tools". This is in accord with results obtained from an institutional assessment in which more than 30% of Industrial Engineering students expressed low satisfaction with classroom and laboratory resources, emphasizing the need to modernize or update resources.

Currently, one of the laboratories, the quality laboratory, is being enhanced with the addition of sophisticated equipment. The computer laboratory was recently updated and a list of equipment needed for the Human Factors and Work Measurement laboratory was submitted to the Department Head.

Cc. Dr. Agustín Rullán
IE Department Faculty

APPENDIX

Table 1. Areas of opportunity identified through assessment of academic year 2004-2005

EDUCATIONAL OBJECTIVES		AREAS OF OPPORTUNITY			
		EMPLOYERS	ALUMNI	STUDENTS	CONSOLIDATED
1	Extensive Training and education in IE	X			
1 a	a. Design of work facilities and systems.				
1 b	b. Statistical quality control and improvement systems.	X			X
1 c	c. Automated computer based and control systems.	X	X	X	X
1 d	d. Manufacturing Systems	X			
1 e	e. Economic Evaluation.	X			
2	Minimal Training to adjust to professional life.	X			
3	Function effectively in a setting with ethical, social and....	X			
4	Ability to work in multi-disciplinary teams.	X			
5	Need to continue to develop entrepreneurial skills.	X			X
IE PROGRAM OUTCOMES		EMPLOYERS	ALUMNI	STUDENTS	CONSOLIDATED
1	Design a work facility or system.				
2	Design and implement quality control systems.	X			X
3	Design computer-based control and information systems.	X	X	X	X
4	Plan and control a production system.	X			
5	Evaluate the economics of engineering solutions.	X			
6	Develop models to experiment, evaluate, or solve a problem	X	X	X	X
7	Use engineering design process from IE point of view.	X			X
8	Use modern telecommunication and computer technology.				
9	Present information to individuals or to an audience.	X			
10	Establish goals and work to reach them.	X			X
11	Understand and practice leadership.	X			
ABET'S A-K		EMPLOYERS	ALUMNI	STUDENTS	CONSOLIDATED
A	Knowledge of mathematics, science, and engineering.				
B	Design and conduct experiments and data analysis.	X			
C	Design a system, components, or process to meet desired needs.	X			
D	An ability to function on multidisciplinary teams.	X			
E	Identify, formulate and solve engineering problems.				
F	Professional and ethical responsibility.				
G	An ability to communicate effectively.	X			
H	The broad education				
I	Engage in life-long learning.	X			
J	Knowledge of contemporary issues.	X			
K	Use techniques, skills, and modern engineering tools.				

Table 2. Areas of opportunity addressed by new courses in the curricular revision

EDUCATIONAL OBJECTIVES		AREAS OF OPPORTUNITY				New ININ Courses	Non-IE Courses
		EMPLOYERS	ALUMNI	STUDENTS	CONSOLIDATED		
1	Extensive Training and education in IE	X					
1 a	a. Design of work facilities and systems.						PHED 4115, BIOL 3715
1 b	b. Statistical quality control and improvement systems.	X			X	4310, 4320	ININ 4027
1 c	c. Automated computer based and control systems.	X	X	X	X	4410, 4420, 4430	4009
1 d	d. Manufacturing Systems	X				4420, 4430	
1 e	e. Economic Evaluation.	X				4005	
2	Minimal Training to adjust to professional life.	X				4320	
3	Function effectively in a setting with ethical, social and....	X					
4	Ability to work in multi-disciplinary teams.	X					
5	Need to continue to develop entrepreneurial skills.	X			X		ADMI 3XXA, ADMI 3100, INGL 3236, INGL 3250
IE PROGRAM OUTCOMES		EMPLOYERS	ALUMNI	STUDENTS	CONSOLIDATED	New Courses	Non-IE Courses
1	Design a work facility or system.						PHED 4115, BIOL 3715, INEL 5516
2	Design and implement quality control systems.	X			X	4310, 4320	ININ 4027
3	Design computer-based control and information systems.	X	X	X	X	4410, 4420, 4430	INEL 5516, INME 4009
4	Plan and control a production system.	X				4110, 4120, 4160	
5	Evaluate the economics of engineering solutions.	X					
6	Develop models to experiment, evaluate, or solve a problem	X	X	X	X	4150, 5YYY	INEL 5516, ININ 4018, ININ 4027
7	Use engineering design process from IE point of view.	X			X	3100	PHED 4115, BIOL 3715
8	Use modern telecommunication and computer technology.						
9	Present information to individuals or to an audience.	X					3250
10	Establish goals and work to reach them.	X			X		
11	Understand and practice leadership.	X					ADMI 3100
ABET'S A-K		EMPLOYERS	ALUMNI	STUDENTS	CONSOLIDATED	New Courses	Non-IE Courses
A	Knowledge of mathematics, science, and engineering.						INEL 5516, INME 4009, ININ 4018
B	Design and conduct experiments and data analysis.	X					ININ 4027
C	Design a system, components, or process to meet desired needs.	X				4410, 4420, 4430, 4230, 4230	PHED 4115, BIOL 3715
D	An ability to function on multidisciplinary teams.	X					
E	Identify, formulate and solve engineering problems.						
F	Professional and ethical responsibility.						
G	An ability to communicate effectively.	X					3250
H	The broad education						
I	Engage in life-long learning.	X					
J	Knowledge of contemporary issues.	X					
K	Use techniques, skills, and modern engineering tools.						INEL 5516, ININ 4018
% OF AREAS ADDRESSED BY NEW COURSES:		70%	100.00%	100.00%	88%		

Table 3. New courses in the curriculum

Course	Title
ININ 3100	Industrial Engineering Seminar
ININ 4005	Cost Management
ININ 4110	Production Planning and Control I
ININ 4120	Advanced Production Planning and Control
ININ 4150	Introduction to Models in Operations Research
ININ 4160	Management of Supply Chain
ININ 4210	Methods and Work Measurement
ININ 4220	Advanced Methods Improvement and Work Measurement
ININ 4230	Environmental Health and Safety
ININ 4240	Ergonomics and Human Factors in Work Systems Design
ININ 4310	Advanced Quality Control
ININ 4320	Compliance with Regulations and Validations
ININ 4410	Real Time Process Control II
ININ 4420	Manufacturing Integration
ININ 4430	Material Handling
ININ 5YYY	Modern Optimization Methods
ADMI 3XXA	Introduction to Project Management
PHED 4115	Biomechanics of Human Movement
BIOL 3715	Anatomy and Physiology
INEL 5516	Automation and Robotics
INME 4009	Automatic Controls
ININ 4018**	Digital Simulation
ININ 4027**	Design and Analysis of Experiments
ADMI 3100	New Business Development
INGL 3236	Technical Report Writing
INGL 3250	Public Speaking

** Previously electives, now required courses.

Table 4. Alternatives to incorporate direct measures into the assessment process.

Criteria	Weights			Alternatives					
	Must have	Nice to have	Criterion's weight	Sample Core courses	All core courses	Comprehensive test at 4079 pass or fail	Comprehensive test at 4079 - part of course grade	4079 project plus some courses	4079 project + test + ethic modules
Time effective		1	1	1	0	2	2	2	2
Unbiased measure		1	1	0	0	2	2	1	1
Measures at several points in the curriculum		1	1	2	2	0	0	0	0
Minimal unintended consequences		1	1	2	2	0	1	2	1
Direct measure	2		2	2	2	2	2	2	2
Measure individual performance	2		2	1	2	2	1	1	1
Ability to provide feedback to course committees	2		2	2	2	1	1	1	1
Ability to measure all A - K's	2		2	2	2	1	1	2	2
Ability to measure all IE skills	2		2	2	2	1	1	2	2
Easy to implement	2		2	1	0	2	2	1	2
Enough to pass the accreditation	2		2	2	2	1	1	2	2
Sum of products (Weights x Score)				29	28	24	23	27	28
Minimum product				1	0	1	1	1	1
Sum of only must have				12	12	10	9	11	12
Sum of only nice to have				5	4	4	5	5	4

Weights:

Weak = 0

Strong = 1

Very Strong = 2

Table 5. Results from questionnaires for academic year 2005 - 2006

		** based on 2004-2005			ALUMNI			GRADUATING STUDENTS			CONSOLIDATED
EDUCATIONAL OBJECTIVES		IMPORTANCE**			PERFORMANCE			PERFORMANCE			W & VW
		EI & VI	I	S & NI	S & VR	A	W & VW	S & VR	A	W & VW	W & VW
1	Extensive Training and education in IE										
1a	a. Design of work facilities and systems.	76.47%	23.53%	0.00%	71.4%	21.4%	7.1%	95.7%	4.3%	0.0%	3.23%
1b	b. Statistical quality control and improvement systems.	88.24%	11.76%	0.00%	64.29%	28.57%	7.1%	56.5%	39.1%	4.3%	5.59%
1c	c. Automated computer bases and control systems.	28.57%	50.00%	21.43%	16.67%	50.00%	33.33%	26.1%	56.5%	17.4%	24.61%
1d	d. Manufacturing Systems	71.58%	23.16%	5.26%	60.00%	27.50%	12.50%	69.6%	24.6%	5.8%	8.83%
1e	e. Economic Evaluation.	88.57%	8.57%	2.86%	75.8%	24.2%	0.0%	69.49%	8.47%	0.0%	0.00%
2	Minimal Training to adjust to professional life.	94.44%	5.56%	0.00%	72.2%	22.2%	5.6%	87.0%	8.7%	4.3%	4.87%
3	Function effectively in a setting with whtical, social and.	94.29%	5.71%	0.00%	81.1%	16.2%	2.7%	68.3%	6.7%	1.7%	2.15%
4	Ability to work in multi-disciplinary teams	88.89%	5.56%	5.56%	94.7%	5.3%	0.0%	95.65%	4.35%	0.0%	0.00%
5	Need to continue to develop entrepreneurial skills.	94.44%	5.56%	0.00%	89.47%	10.53%	0.0%	86.96%	13.04%	0.0%	0.00%
ABET'S A-K		IMPORTANCE			PERFORMANCE			PERFORMANCE			CONSOLIDATED
		EI & VI	I	S & NI	S & VR	A	W & VW	S & VR	A	W & VW	W & VW
A	Knowledge of mathematics, science, and engineering.	88.89%	5.56%	5.56%	94.7%	5.3%	0.0%	95.7%	4.3%	0.0%	0.00%
B	Design and conduct experiments and data analysis.	94.44%	5.56%	0.00%	73.7%	21.1%	5.3%	65.2%	30.4%	4.3%	4.74%
C	Design a system, componetes, or process to meet des	87.50%	6.25%	6.25%	63.2%	31.6%	5.3%	52.2%	47.8%	0.0%	2.38%
D	An ability to function on multidisciplinary teams.	88.89%	5.56%	5.56%	94.7%	5.3%	0.0%	95.7%	4.3%	0.0%	0.00%
E	Identify, formulate and solve engineering problems.	88.89%	5.56%	5.56%	72.2%	27.8%	0.0%	87.0%	13.0%	0.0%	0.00%
F	Professional and ethical responsibility.	88.89%	11.11%	0.00%	100.0%	0.0%	0.0%	95.7%	4.3%	0.0%	0.00%
G	An ability to communicate effectively.	97.22%	2.78%	0.00%	92.1%	7.9%	0.0%	70.0%	5.0%	1.7%	0.93%
H	The broad education	61.11%	33.33%	5.56%	82.4%	11.8%	5.9%	82.6%	13.0%	4.3%	5.02%
I	Engage in life-long learning.	61.11%	33.33%	5.56%	81.3%	12.5%	6.3%	82.6%	17.4%	0.0%	2.83%
J	Knowledge of contemporary issues.	38.89%	61.11%	0.00%	64.7%	23.5%	11.8%	82.6%	8.7%	8.7%	10.09%
K	Use techniques, skills, and modern engineerig tools.	88.89%	11.11%	0.00%	64.7%	35.3%	0.0%	87.0%	13.0%	0.0%	0.00%
IE PROGRAM OUTCOMES		IMPORTANCE			PERFORMANCE			PERFORMANCE			CONSOLIDATED
		EI & VI	I	S & NI	S & VR	A	W & VW	S & VR	A	W & VW	W & VW
1	Design a work facility or system.	76.47%	23.53%	0.00%	71.4%	21.4%	7.1%	95.7%	4.3%	0.0%	3.23%
2	Design and implement quality control systems.	88.24%	11.76%	0.00%	64.3%	28.6%	7.1%	56.5%	39.1%	4.3%	5.59%
3	Design computer-based control and information system	29.63%	48.15%	22.22%	16.7%	45.8%	37.5%	18.3%	40.0%	16.7%	26.11%
4	Plan and control a production system.	75.00%	18.75%	6.25%	80.0%	13.3%	6.7%	73.9%	26.1%	0.0%	3.02%
5	Evaluate the economics of engineering solutions.	88.57%	8.57%	2.86%	75.8%	24.2%	0.0%	69.5%	8.5%	0.0%	0.00%
6	Develop models to experiment, evaluate, or solve a pro	62.07%	31.03%	6.90%	45.8%	25.0%	29.2%	26.7%	40.0%	10.0%	18.67%
7	Use engineering design process from IE point of view.	64.75%	27.87%	7.38%	64.2%	25.3%	10.5%	53.0%	36.6%	10.4%	10.46%
8	Use modern telecommunication and computer technolo	76.47%	23.53%	0.00%	89.5%	10.5%	0.0%	82.6%	13.0%	4.3%	2.35%
9	Present information to individuals or to an audience.	94.44%	5.56%	0.00%	89.5%	10.5%	0.0%	87.0%	8.7%	4.3%	2.35%
10	Establish goals and work to reach them.	94.44%	5.56%	0.00%	89.5%	10.5%	0.0%	87.0%	13.0%	0.0%	0.00%
11	Understand and practice leadership.	94.12%	5.88%	0.00%	89.5%	10.5%	0.0%	91.3%	8.7%	0.0%	0.00%

Figure 1. Scatter Diagrams on Results from Alumni

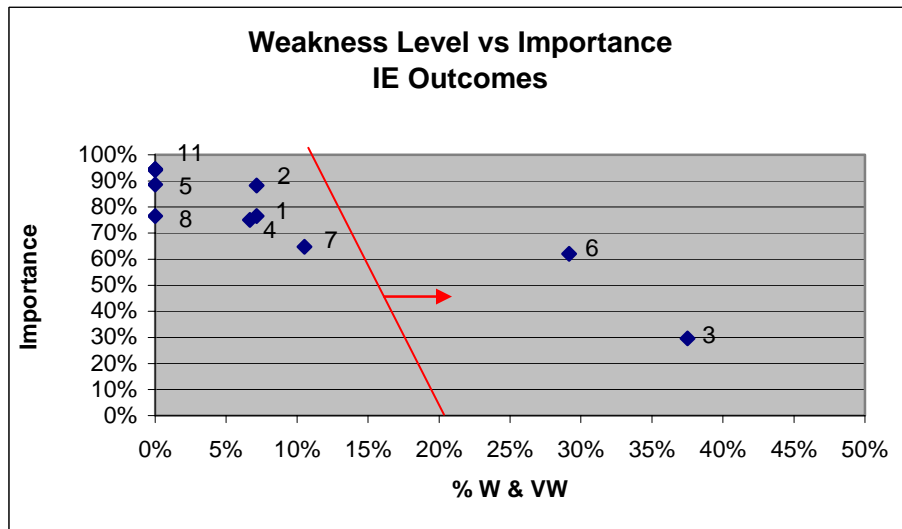
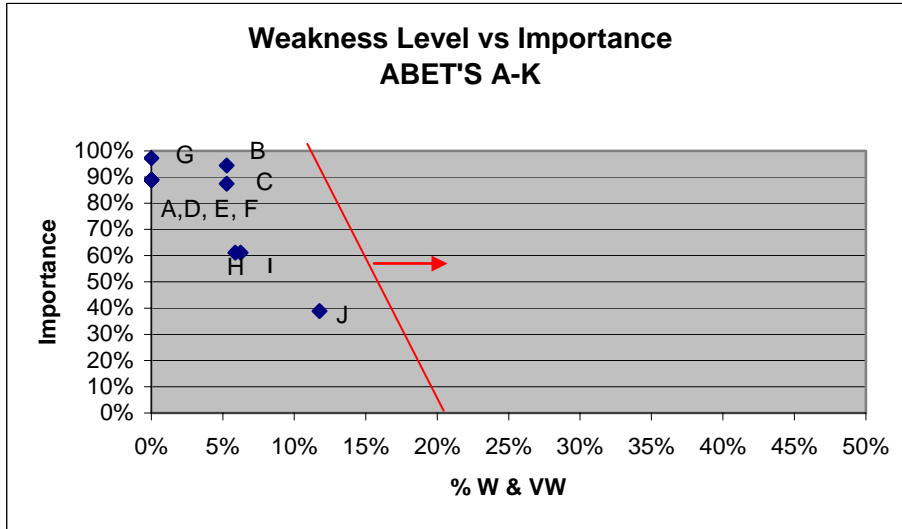
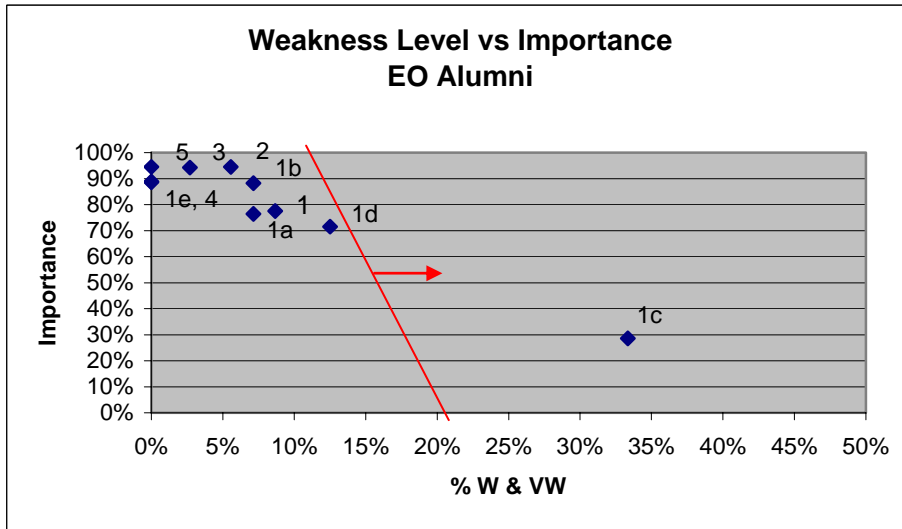


Figure 2. Scatter Diagrams on Results from Graduating Students

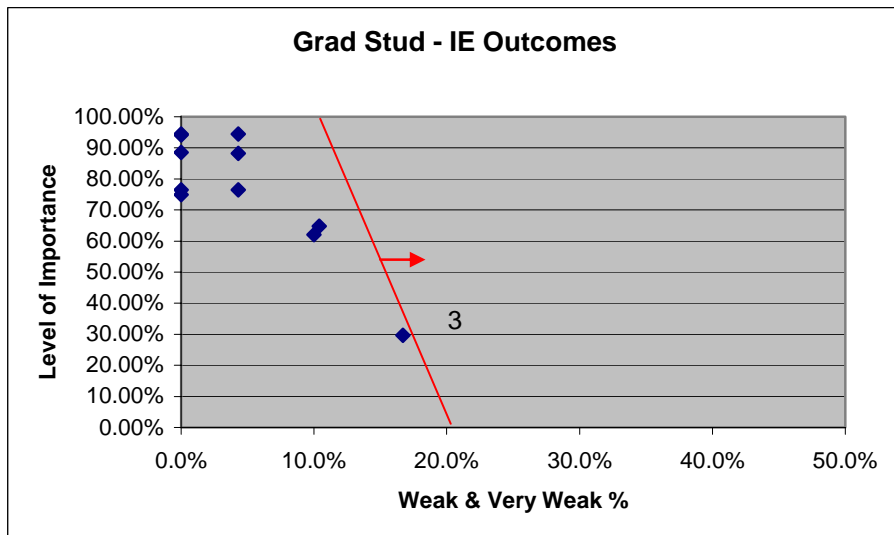
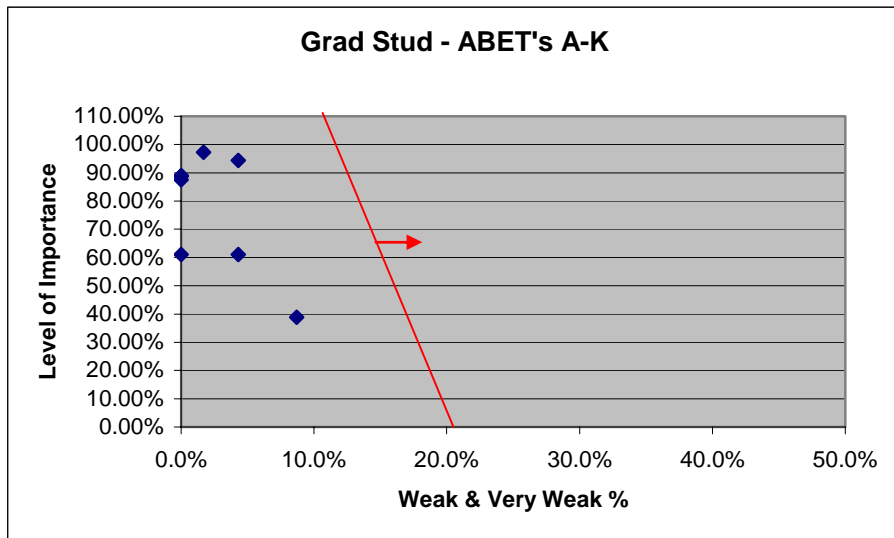
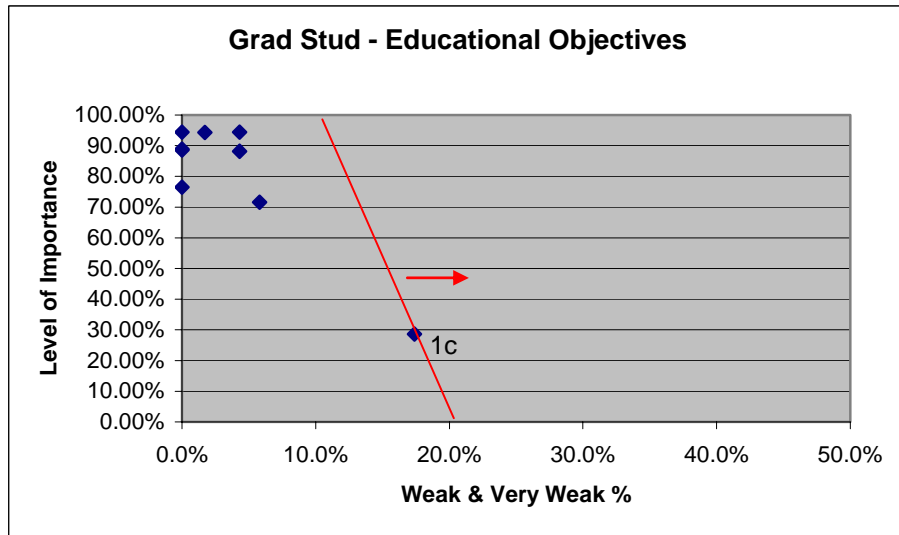


Figure 3. Scatter Diagrams on Consolidated Results

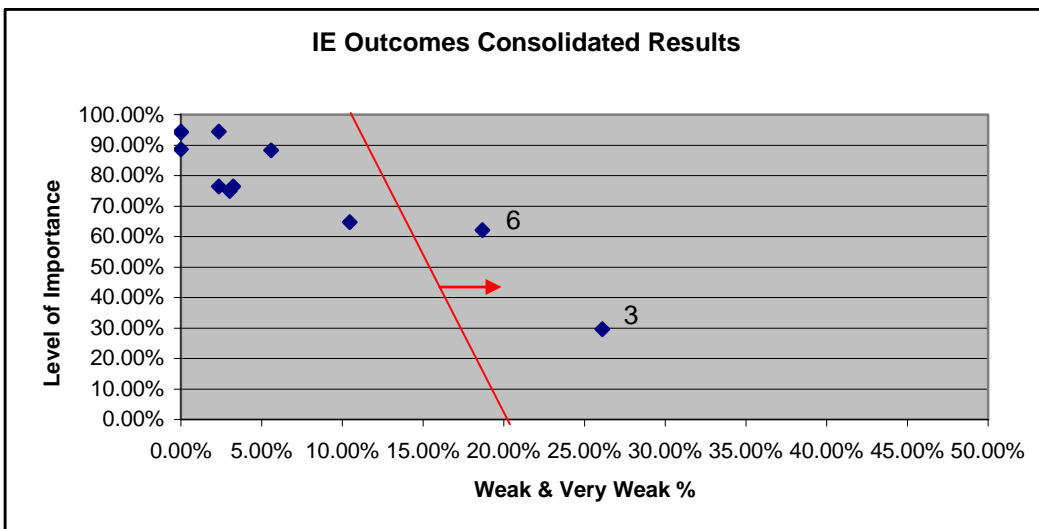
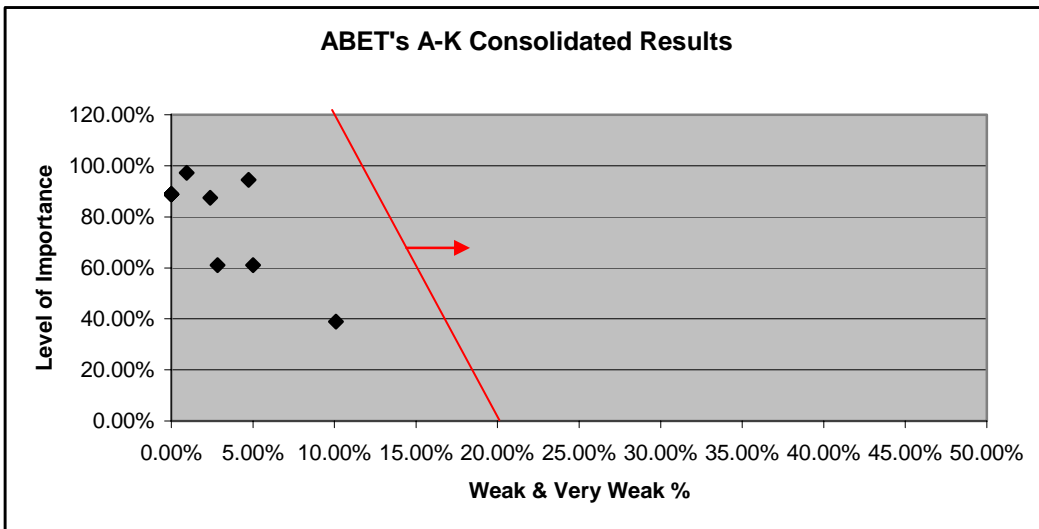
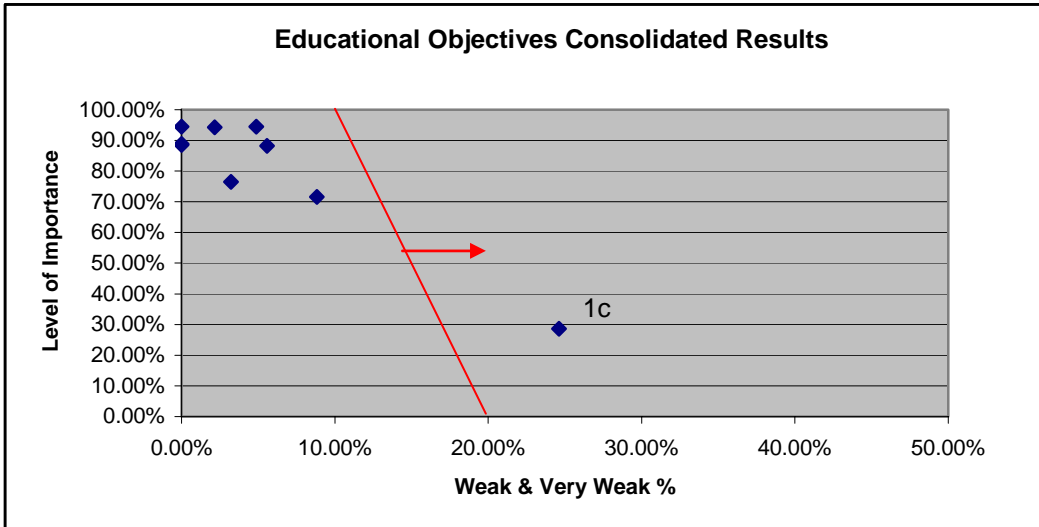


Table 6. Areas of opportunity for academic years 2004-2005 and 2005-2006

EDUCATIONAL OBJECTIVES		AREAS OF OPPORTUNITY 2004-2005				AREAS OF OPPORTUNITY 2005-2006		
		EMPLOYERS	ALUMNI	STUDENTS	CONSOLIDATED	ALUMNI	STUDENTS	CONSOLIDATED
1	Extensive Training and education in IE	X						
1 a	a. Design of work facilities and systems.							
1 b	b. Statistical quality control and improvement systems.	X			X			
1 c	c. Automated computer based and control systems.	X	X	X	X	X	X	X
1 d	d. Manufacturing Systems	X				X		
1 e	e. Economic Evaluation.	X						
2	Minimal Training to adjust to professional life.	X						
3	Function effectively in a setting with ethical, social and....	X						
4	Ability to work in multi-disciplinary teams.	X						
5	Need to continue to develop entrepreneurial skills.	X			X			
IE PROGRAM OUTCOMES		EMPLOYERS	ALUMNI	STUDENTS	CONSOLIDATED	ALUMNI	STUDENTS	CONSOLIDATED
1	Design a work facility or system.							
2	Design and implement quality control systems.	X			X			
3	Design computer-based control and information systems.	X	X	X	X	X	X	X
4	Plan and control a production system.	X						
5	Evaluate the economics of engineering solutions.	X						
6	Develop models to experiment, evaluate, or solve a problem.	X	X	X	X	X		X
7	Use engineering design process from IE point of view.	X			X			
8	Use modern telecommunication and computer technology.							
9	Present information to individuals or to an audience.	X						
10	Establish goals and work to reach them.	X			X			
11	Understand and practice leadership.	X						
ABET'S A-K		EMPLOYERS	ALUMNI	STUDENTS	CONSOLIDATED	ALUMNI	STUDENTS	CONSOLIDATED
A	Knowledge of mathematics, science, and engineering.							
B	Design and conduct experiments and data analysis.	X						
C	Design a system, components, or process to meet desired needs.	X						
D	An ability to function on multidisciplinary teams.	X						
E	Identify, formulate and solve engineering problems.							
F	Professional and ethical responsibility.							
G	An ability to communicate effectively.	X						
H	The broad education							
I	Engage in life-long learning.	X						
J	Knowledge of contemporary issues.	X						
K	Use techniques, skills, and modern engineering tools.							

Table 7. Summary of course skills assessment for academic year 2005-2006

COURSE	SECTION	ABET CRITERIA A-K										
		A	B	C	D	E	F	G	H	I	J	K
ININ 4010	SEC 030	3.85%	3.85%	11.54%	7.69%	0.00%	3.85%	7.69%	7.69%	7.69%	3.85%	7.69%
ININ 4010	SEC 040	0.00%	0.00%	3.70%	0.00%	0.00%	0.00%	3.70%	0.00%	7.41%	3.70%	0.00%
ININ 4010	SEC 081	0.00%	18.18%	0.00%	9.09%	9.09%	0.00%	9.09%	9.09%	0.00%	9.09%	27.27%
ININ 4010	ALL	1.28%	7.34%	5.08%	5.59%	3.03%	1.28%	6.83%	5.59%	5.03%	5.55%	11.65%
ININ 4015	SEC 040	13.33%	13.33%	13.33%	6.67%	13.33%	13.33%	0.00%	6.67%	13.33%	13.33%	26.67%
ININ 4015	SEC 070	0.00%	0.00%	0.00%	9.09%	0.00%	0.00%	9.09%	0.00%	0.00%	0.00%	45.45%
ININ 4015	SEC 061	0.00%	0.00%	0.00%	4.17%	0.00%	0.00%	4.17%	0.00%	12.50%	0.00%	16.67%
ININ 4015	ALL	4.44%	4.44%	4.44%	6.64%	4.44%	4.44%	4.42%	2.22%	8.61%	4.44%	29.60%
ININ 4018	SEC 036	0.00%	0.00%	0.00%	0.00%	0.00%	25.00%	0.00%	0.00%	0.00%	0.00%	0.00%
ININ 4022	SEC 016	0.00%	26.67%	13.33%	6.67%	0.00%	6.67%	20.00%	6.67%	6.67%	6.67%	0.00%
ININ 4022	SEC 066	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	11.11%	0.00%	0.00%	0.00%	0.00%
ININ 4022	ALL	0.00%	13.34%	6.67%	3.34%	0.00%	3.34%	15.56%	3.34%	3.34%	3.34%	0.00%
ININ 4029	SEC 036	7.14%	7.14%	7.14%	14.29%	7.29%	14.29%	14.29%	21.43%	21.43%	7.14%	35.71%
ININ 4035	SEC 096	0.00%	12.50%	0.00%	0.00%	12.50%	0.00%	12.50%	0.00%	0.00%	12.50%	12.50%
ININ 4039	SEC 036	0.00%	0.00%	0.00%	3.70%	0.00%	0.00%	7.41%	0.00%	0.00%	7.41%	3.70%
ININ 4075	SEC 066	0.00%	0.00%	12.50%	0.00%	0.00%	12.50%	6.25%	6.25%	6.25%	6.25%	31.25%
ININ 4075	SEC 076	0.00%	0.00%	0.00%	12.50%	0.00%	25.00%	0.00%	12.50%	0.00%	0.00%	25.00%
ININ 4075	ALL	0.00%	0.00%	6.25%	6.25%	0.00%	18.75%	3.13%	9.38%	3.13%	3.13%	28.13%
ININ 4077	SEC 030	9.52%	9.52%	4.76%	4.76%	9.52%	4.76%	9.52%	0.00%	4.76%	0.00%	52.38%
ININ 4077	SEC 060	5.00%	5.00%	5.00%	0.00%	5.00%	5.00%	10.00%	0.00%	5.00%	5.00%	35.00%
ININ 4077	ALL	7.26%	7.26%	4.88%	2.38%	7.26%	4.88%	9.76%	0.00%	4.88%	2.50%	43.69%
ININ 4078	SEC 026	9.09%	9.09%	27.27%	0.00%	9.09%	27.27%	18.18%	0.00%	18.18%	0.00%	27.27%
ININ 4078	SEC 066	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
ININ 4078	ALL	4.55%	4.55%	13.64%	0.00%	4.55%	13.64%	9.09%	0.00%	9.09%	0.00%	13.64%
ININ 4079	SEC 110N	0.00%	5.88%	5.88%	0.00%	0.00%	11.76%	0.00%	11.76%	0.00%	5.88%	0.00%
ININ 4079	SEC 112N	14.29%	14.29%	14.29%	14.29%	14.29%	0.00%	14.29%	14.29%	14.29%	14.29%	21.43%
ININ 4079	ALL	7.15%	10.09%	10.09%	7.15%	7.15%	5.88%	7.15%	13.03%	7.15%	10.09%	10.72%
ININ 4085	SEC 066	21.05%	15.79%	31.58%	10.53%	31.58%	21.05%	15.79%	21.05%	15.79%	36.84%	36.84%
ININ 4085	SEC 086	0.00%	5.88%	5.88%	0.00%	0.00%	5.88%	5.88%	5.88%	5.88%	17.65%	11.76%
ININ 4085	ALL	10.53%	10.84%	18.73%	5.27%	15.79%	13.47%	10.84%	13.47%	10.84%	27.25%	24.30%
		3.53%	6.46%	6.41%	4.55%	5.17%	8.75%	8.41%	5.70%	6.12%	6.94%	17.80%

Percentages are based on answers given to disagree and strongly disagree.

