PURDUE SCHOOL OF ENGINEERING AND TECHNOLOGY 2005 ASSESSMENT REPORT

Prepared by the School's Assessment Committee and Charles F. Yokomoto, Chair

July25, 2005

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Introduction

The Purdue School of Engineering and Technology, IUPUI (E&T) continues its tradition of reporting the results of its outcomes assessment process by department. In 2004, a report from Freshman Engineering was included for the first time. In this report, the Department of Biomedical Engineering (BME) and the Technical Communications Program (TCM) have submitted reports. BME has just completed its first year and a department that awards degrees. TCM does not award degrees but instead teaches courses in workplace speaking and workplace writing. Some of the department reports present historical information from prior years' assessment, while the department and programs newer to the process may present only current year assessment or only a narrative of their current progress in outcomes assessment.

In prior years, the campus asked department to report on the following information.

- General outcomes for the program
- PULs associated with the general outcomes
- Measurable learning outcomes
- Where students will accomplish the learning
- How students will accomplish the learning
- Assessment methods used
- Assessment findings
- Improvements put in place and improvements planned based on assessment findings

Anyone who is interested in the reports for the 2004 year and earlier may view them by logging on to the following web page,

http://www.planning.iupui.edu/prac/prac.html

Scrolling down to "School Assessment Reports" and click the year of interest.

Starting in 2003, the campus asked that departments submit only the following information:

- Assessment methods used
- Changes made
- Impact of changes

However, several departments have chosen to submit the new information and some of the old information in order to paint a more complete picture of their outcomes assessment processes. Thus, in this 2005 report, you will find assessment findings from 2004 that serve as a reference point to the 2005 findings.

The E&T 2004-2005 Assessment Committee

The school's assessment committee has been very active since its inception in the fall semester of 1996. Under the guidance of Dr. Charles Yokomoto, Professor of Electrical and Computer Engineering, the committee has met monthly. The members of the 2004-2005 committee are the following:

Hasan Akay, Mechanical Engineering
Edward Berbari, Biomedical Engineering
Jie Chen, Mechanical Engineering
Tim Diemer, Organizational Leadership and Supervision
Eugenia Fernandez, Computer and Information Technology
Becky Fetterling, Technical Communications
Patricia Fox, Organizational Leadership and Supervision and Dean's Office
Laura Lucas, Construction Technology
Peter Orono, Freshman Engineering
Armando Pellerano, Mechanical Engineering Technology
Kenneth Reid, Electrical and Computer Engineering Technology
Kenneth Rennels, Dean's Office
Rich Pfile, Electrical and Computer Engineering Technology
Maher Rizkalla, Electrical and Computer Engineering
Gail Shiel, Construction Technology
Wanda Worley, Technical Communications
Charles Yokomoto, Assessment Committee Chair, Electrical and Computer Engineering
H. Öner Yurtseven, Dean
Heather Woodward, Mechanical Engineering Technology

Assessment Process Variations in the School's Departments

Taken from our School's 2002 annual report and updated to current times, Table 1 characterizes the differences in ways that our seven departments have chosen to implement our common assessment plans. Column 2 of the table describes the whether a department's process is based on its professional accreditation or the IUPUI Principles of Undergraduate Learning (PUL). Two of the departments have developed their assessment programs around the engineering accreditation criteria of the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET/EAC), four by the by the technology accreditation criteria of the Technology Accreditation Commission of ABET (ABET/TAC), and one has chosen to be guided by the IUPUI Principles of Undergraduate Learning (PUL).

Due to a recent changeover to an outcomes assessment based accreditation process, engineering faculty and technology faculty must demonstrate student accomplishment of Program Outcomes that they write for their programs, and these much include eleven, directly or indirectly, eleven program outcomes written by ABET. The EAC and TAC outcomes are similar but not the same, and both sets map quite well into the PULs. Rather than developing a complex outcomes assessment process where both the ABET outcomes and PUL outcomes are assessed, the six ABET directed departments have chosen a strategy of assessing their ABET Program Outcomes and demonstrating through a relational matrix that they cover the PULs.

To show that the eleven ABET outcomes for EAC and for TAC map into the PULs, two tables were developed, Table 2 for engineering programs and Table 3 for engineering technology programs. The engineering mapping differs slightly from the technology matrix in that it demonstrates the quality of the linkage, rating the linkage as strong, moderate, or mild. Both tables show that the eleven ABET outcomes adequately cover the PULs.

Table 1. Characterization of Departmental Assessment Processes.

DEPARTMENT	BASIS	PRIMARY STRATEGY	SUPPLEMENTAL SOURCES OF ASSESSMENT DATA
Computer and Information Technology (CIT)	ABET/TAC	Assessment in selected courses that cover the department's outcomes	Student self reports of well they feel they have learned the course outcomes using surveys Retention rates, graduation rates, and number of degrees conferred Continuing students satisfaction using in-house survey Alumni satisfaction Employer satisfaction
Construction Technology (CNT)	ABET/TAC	Assess actual learning in all courses taught by full-time faculty and selected courses taught by associate faculty. Each course is assigned one or more of the department's outcomes for assessment.	Student self reports of well they feel they have learned the course outcomes using surveys Retention rates, graduation rates, and number of degrees conferred Continuing students satisfaction Alumni satisfaction Employer satisfaction
Electrical and Computer Engineering (ECE)	ABET/EAC	Assess selected courses with strong emphasis on the senior capstone design course and the senior ethics course.	Focus group discussion with seniors Retention rates, graduation rates, and number of degrees conferred Continuing students satisfaction using in-hours survey Alumni satisfaction Employer satisfaction
Electrical Engineering Technology (EET)	ABET/TAC	Assess how well students feel they have learned the course objectives/ outcomes using surveys	Continuing students satisfaction Senior capstone project Student works in selected courses Retention rates, graduation rates, and number of degrees conferred Alumni satisfaction Employer satisfaction
Mechanical Engineering (ME)	ABET/EAC	Assess student self reports of confidence in the course outcomes	Capstone design course Student works (artifacts) in selected courses Student self reports of well they feel they have learned the course outcomes using surveys Retention rates, graduation rates, and number of degrees conferred Continuing students satisfaction Alumni satisfaction Employer satisfaction Exit interview
Mechanical Engineering Technology (MET)	ABET/TAC	Assess actual learning through comprehensive exam or portfolio, depending on the degree program	Student works (artifacts) in selected courses Student self reports of well they feel they have learned the course outcomes using surveys Retention rates, graduation rates, and number of degrees conferred Continuing students satisfaction Alumni satisfaction Employer satisfaction
Organizational Leadership and Supervision (OLS)	PUL	Assess actual learning in selected courses, including the required senior research project course	Graduating senior survey Passing rate on certificate program Retention rates, graduation rates, and number of degrees conferred Continuing students satisfaction Alumni satisfaction Employer satisfaction

TABLE 2. PULS COVERED BY ABET/EAC CRITERION 3 FOR ENGINEERING PROGRAMS

Updated With Wording From the ABET 2005-2006 Criteria

3 = strong linkage, 2 = moderate linkage, 1 = mild linkage	PULs COVERED BY THE ABET/EAC a-k																				
	PUL 1					PUL 2					PUL 3			PUL 4			PUL 5			PUL 6	
ABET/EAC CRITERIA 3 Engineering programs must demonstrate that their students attain:	Core Communication and Quantitative Skills					Critical Thinking					Integration and Application of Knowledge			Intellectual Depth, Breadth, and Adaptiveness			Understand Society and Culture			Values and Ethics	
	a	b	c	d	e	a	b	c	d	e	a	b	c	a	b	c	a	b	c	a	b
(a) an ability to apply knowledge of mathematics, science and engineering				3		2	2		2	2	2	3	2	3	2						
(b) an ability to design and construct experiments, as well as to analyze and interpret data						3	3	3	2			2		3	1	2					
(c) an ability to design a system, component, or process to meet desired needs within the realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability						2	2	3	3	1	3	2	3	3		3					
(d) an ability to function on multi-disciplinary teams			2												1	3			2		
(e) an ability to identify, formulate and solve engineering problems		2		3		3	3	3	3	3	3	3	3	3	1	2					
(f) an understanding of professional and ethical responsibility						2	3					2	1		3	2	1	1	2	3	1
(g) an ability to communicate effectively	3		3																		
(h) the broad education necessary to understand the impact of engineering solutions in global, economic, environmental, societal context											1	2	2			2	2	2		2	
(i) a recognition of the need for and an ability to engage in life-long learning		3			2		2														
(j) a knowledge of contemporary issues		2								1					1			2			2
(k) an ability to use the techniques, skill and modern engineering tools necessary for engineering practice					3							3	2	3							

TABLE 3. PULS COVERED BY ABET/TAC CRITERION 2 FOR ENGINEERING TECHNOLOGY PROGRAMS

Updated With Wording From the ABET 2005-2006 Criteria

ABET OUTCOMES ***TAC CRITERION 2—PROGRAM OUTCOMES*** An engineering technology program must demonstrate that graduates have:	**PRINCIPLES OF UNDERGRADUATE LEARNING ADDRESSED**																				
	PUL 1 Core Communication and Quantitative Skills					**PUL 2** Critical Thinking					**PUL 3** Integration and Application of Knowledge			**PUL 4** Intellectual Depth, Breadth, and Adaptiveness			**PUL 5** Understand Society and Culture			**PUL 6** Values and Ethics	
	a	**b**	**c**	**d**	**e**	**a**	**b**	**c**	**d**	**e**	**a**	**b**	**c**	**a**	**b**	**c**	**a**	**b**	**c**	**a**	**b**
(a) an appropriate mastery of the knowledge, techniques, skills and modern tools of their discipline				*	*							*		*							
(b) an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology						*	*		*	*			*	*		*					
(c) an ability to conduct, analyze and interpret experiments and apply experimental results to improve processes		*				*		*		*				*							
(d) an ability to apply creativity in the design of systems, components or processes appropriate to program objectives							*		*				*	*		*					*
(e) an ability to function effectively on teams			*																*		
(f) an ability to identify, analyze and solve technical problems		*		*		*	*	*	*					*		*					
(g) an ability to communicate effectively	*		*								*								*		
(h) a recognition of the need for, and an ability to engage in lifelong learning		*			*		*														
(i) an ability to understand professional, ethical and societal responsibilities						*						*						*		*	
(j) a respect for diversity and a knowledge of contemporary professional, societal and global issues										*		*	*		*		*	*	*	*	
(k) a commitment to quality, timeliness and continuous improvement					*					*	*					*				*	

Departmental and Program Annual Reports for 2005

The 2005 departmental and program assessment reports included in this school report represent the collected works of the following:

Biomedical Engineering (BME)
Computer and Information Technology (CIT)
Construction Technology (CNT)
Electrical and Computer Engineering (ECE)
Electrical and Computer Engineering Technology (ECET)
Freshman Engineering
Mechanical Engineering (ME)
Mechanical Engineering Technology (MET)
Organizational Leadership and Supervision (OLS)
Technical Communications (TCM)

DEPARTMENT OF BIOMEDICAL ENGINEERING 2005 ASSESSMENT REPORT NARRATIVE
Written By Edward Berbari
May, 2005

The Biomedical Engineering (BME) Program was formally established on our campus with the initiation of the MS and PhD degrees in 1996. BME has matured as a profession and it has become clear that an undergraduate degree program on our campus would fulfill a number of goals identified within the community and on our campus. As a new life science based degree program, our students will be equipped to apply engineering skills of design and analytical problem solving to the next generation of medical devices and industrially based life science solutions in the coming decades. We have developed a curriculum in collaboration with faculty from a number of schools on campus and in consultation with numerous community-based industrial leaders. Our formal degree request to the Higher Education Commission was approved in the Spring of 2004. Our goal was to establish a new Department of Biomedical which would continue to have 12 full time faculty members who will support a BS through PhD degree suite and whose research mission will primarily coincide with the current programs in the School of Medicine.

Our goals have been to evolve the BME Program into a new Department of Biomedical Engineering and to begin offering a new BS level degree in Biomedical Engineering, in addition to the MS and joint PhD degrees. The first BS degrees are planned to be awarded in May of 2008. With respect to the new BS degree, it will be developed in way which will allow for eventual accreditation by the Accreditation Board for Engineering and Technology (ABET).

There are two categories for evaluation of our success. The first will be based on achieving our goals as a functioning department and the other will be the assessment of our new BS degree program.

Department Goals

BME currently has 6 full time tenure/tenure track faculty members. We are currently recruiting 5 more tenure track faculty. The department faculty made a decision to convert the department technician and one TA position into a Lecturer position, who would be devoted to the undergraduate program, i.e., teaching, advising, and assessment. The Lecturer position has been advertised and the first candidate will be interviewed this week. Finally, the Department is also recruiting at the senior faculty level with the resources provided by an endowed chair funded by the Guidant Foundation. Once the department has reached its manpower goals the full range of department activities and responsibilities will be realized.

Assessment of the BSBME degree

Assessment of the success of the BSBME degree program will follow the model developed by the School of Engineering and Technology's Assessment Committee for its Accreditation Board for Engineering and Technology (ABET) and North Central Association outcomes assessment processes. As with the other engineering programs, assessment of the success of the program will have the following components: (1) assessment of student learning through evidence collected on the measurable learning outcomes developed to meet ABET Criteria and IUPUI's Principles of Undergraduate Learning, (2) an assessment of industry's satisfaction using both a survey form that is currently being developed and focus groups, (3) an assessment of alumni satisfaction through feedback using a process similar to that being developed for industry feedback, and (4) assessment of success of the program by tracking matriculation rates, graduation rates, successful job placement, graduate school admissions, and advancements.

The new BME Department will also take advantage of the internal review process directed by Vice Chancellor Banta's office, the Fall of 2005. A self study is being written this summer and will provide the roadmap for further elucidating and reaching our department goals as well as noting the progress in the ABET process for our new degree. It should be noted that the ABET assessment criteria will be mapped to the campus' Principles of Undergraduate Learning.

The BSBME curriculum has had a few changes since the initial IHEC approval. The department faculty have worked closely with several departments in the School of Science to meet our curricular goals. In addition, meetings with admissions officials in the IU Schools of Dentistry and Medicine have been held to verify their respective admissions requirements with respect to our plan of study.

Some of the first steps in meeting the ABET will be the establishment of an External Advisory Board and the writing of our Program and Educational Objectives. This will happen during the remainder of 2005.

We are on track with establishing our department and implementing our new curriculum. We have yet to reach a point of a full assessment where action could be taken. Our first such point will be our Department Review this Fall.

DEPARTMENT OF COMPUTER INFORMATION TECHNOLOGY ASSESSMENT NARRATIVE

Written By Eugenia Fernandez

June, 2005

The assessment process of the CIT Department involves gathering and assessing artifacts for various Measurable Learning Outcomes (MLOs) that we have developed for each ABET TAC criterion. Although we are not (yet) accredited by ABET, we are using the TAC criteria to help us assess student learning in our courses. By addressing the set of ABET TAC Criteria, the CIT Department believes that the Principles of Undergraduate Learning are also assessed.

Artifacts are collected and assessed in selected courses each semester. Our plan is to collect artifacts from a different subset of courses each semester and thus, over a 3-5 year period, accumulate assessment information from all courses in our curriculum. Generally the courses have been selected by convenience. However, we have begun to create a more systematic assessment plan. This has been prompted by our plan to seek accreditation under the new ABET IT criteria.

As a first step in our more structured assessment plan, we have recently mapped all course objectives to the new ABET IT criteria, and will be creating a schedule of artifact collection to ensure that all outcomes are assessed within a three-year cycle. In addition we will be mapping the new IT outcomes to the TAC outcomes we have been using so we can use previous assessment results.

In addition, we are planning to institute two new assessment measures: surveys of student confidence of his/her knowledge of the course outcomes, and assessment of student internship/project reports. The department will be able to use information from these activities to help us modify the teaching/learning process

DEPARTMENT OF COMPUTER & INFORMATION TECHNOLOGY 2005 ANNUAL REPORT

Outcomes Assessed Fall 2004*

Prepared by Eugenia Fernandez, June 29, 2005

1. General outcomes	Associated PULs	2. Measurable Outcomes	3. How will you help students learn it?	4. Methods used to assess the outcomes	5. Assessment findings	6. Improvements (changes) put into place based on assessment findings
ABET TAC Outcome (a) : Demonstrate an appropriate mastery of the knowledge, techniques, skills and modern tools of their discipline.	1(d), 1(e), 3(b), 4(a), 4(b)	a1. Explain the terminology and basic concepts of information technology.	Readings Lecture	Assessed in CIT 233 via final exam	Only 62% of students in CIT 115 scored 75% or more on the final exam.	More review exercises and a writing assignment were added to CIT 233.
		a2. Demonstrate a proficient level of competency in word processing, spreadsheet, database, graphical presentation, Internet browser and Web publishing software.	Reading Lectures Labs	Assessed in CIT 299 using a "Putting it All Together" project	100% of the students scored above 75% on this assignment.	No improvements were needed since our goal was met.
		a3. Demonstrate mastery of general object oriented concepts.	Readings Lectures Labs & Programs	Assessed in CIT 262 via final exam	Only 67% of students in CIT 262 scored 75% or more on the final exam.	More review exercises were added to CIT 262.
		a5. Write a program using an object oriented programming language.	Readings Lectures Labs & Programs	Assessed in CIT 262 via programs	Over two programming assignments, 75% of the students scored above 75%.	No improvements were needed since our goal was met.
ABET TAC Outcome (b): Apply current knowledge and adapt to emerging applications in technology.	2(d), 2(e), 3(a), 3(c), 4(a), 4(b), 4(c)	b1. Apply systems theory, logic & statistics, and object oriented concepts to problem solving and decision making.	Readings Lecture Short Paper	Assessed in CIT 120 via exam.	85% of the students earned 70% or better on this exam.	No improvements were needed since our goal was met.
		b3. Create, manipulate and maintain database systems.	Readings Lectures Demos Labs	Assessed in CIT 288 using the SQL exam.	Only 65% of students in CIT 262 scored 75% or more on the final exam.	Lectures were archived for easier review by students.

* We have switched from reporting on academic year basis to reporting on a calendar year. Outcomes assessed during Spring 2004 (the other half of the 2004 calendar year) are included in last year's report.

1. General outcomes	Associated PULs	2. Measurable Outcomes	3. How will you help students learn it?	4. Methods used to assess the outcomes	5. Assessment findings	6. Improvements (changes) put into place based on assessment findings
ABET TAC Outcome (c): Conduct, analyze, interpret and document testing experiments and apply experimental results to improve processes.	1(b), 2(a), 2(b), (c), 4(a),	c1. Use programming logic, critical thinking and debugging skills in hardware and software troubleshooting.	Readings Lecture Lab	Assessed in CIT 402 using the DHCP lab.	84% of the students earned above a 3 on this lab.	No improvements were needed since our goal was met.
ABET TAC Outcome (d): Apply creativity in the design of systems, components or processes appropriate to program objectives.	4(b)	D4. Apply creativity in the design of web pages and applications.	Lecture Examples Web readings	Assessed in CIT 412 using Project Phase 1 in which students design and build a home page for a web application.	941% of the students scored above a 3 on this assignment.	No improvements were needed since our goal was met.

DEPARTMENT OF CONSTRUCTION TECHNOLOGY 2005 ASSESSMENT NARRATIVE

Prepared by Laura Lucas, June 2005

The CNT Department has turned toward focusing more on the impact of changes in core courses as we document student learning outcomes for our upcoming accreditation from ABET-in 2006. Although we narrowed the ABET responsibilities for data collection to fewer criteria per course and involved faculty in determining the criteria for their course, data collection is still inconsistent from course to course. Also, the assessment committee is not fully confident that data is truly measuring the appropriate criteria. In any event, we have mapped these onto the IUPUI Principles of Undergraduate Learning to show that all PULs are thus assessed and that we can better target our efforts towards improving teaching and thus student learning as necessary. Our findings for the last calendar year indicate that for the ABET/PUL criteria, we are meeting or exceeding our target for the "hard" outcomes (a-g) and even the difficult to measure "soft" outcomes (h-k). In fact, we are somewhat concerned with this overwhelming success and will investigate and refine the connection between work items and measurable outcomes to better substantiate this data. As a department and particularly thru our curriculum committee we intend to qualify and quantify the connection between learning objectives and outcomes for these core classes of ART 117, ART 120, ART 155, CNT 280 and CET 104.

Although we have all faculty educated in the PULs and involved in the collection of work items and outcomes data, we are not getting the participation of enough faculty for dependable and consistent data collection every semester. Also, the data we are getting is not as focused on tying student outcomes to student objectives as we would like, thus leading us to a reliance on a few core courses for in depth scrutiny of the impact of changes and improvements in student learning (in both the two and four year programs). These courses assess almost all of our accreditation-based program outcomes, and we think they will prove to be good indicators of student learning. Additionally, exit surveys of students in upper level courses along with surveys of alumni and employers have been done to complement the direct evidence that we obtained by assessing student works.

Finally, findings and impacts in these core courses are being shared with all faculty members so that all outcomes in all courses are better interrelated and correlated, i.e. our curriculum committee makes plans for modifying the teaching/learning process so all program outcomes and PULs are appropriately covered in all courses. The overall impact of this focus on attempting and documenting changes is that instructors are thinking more about the outcomes they assessed, and the outcomes of many courses have been revised to better reflect the intentions of the instructor.

DEPARTMENT OF CONSTRUCTION TECHNOLOGY 2005 ANNUAL REPORT

Prepared by Laura Lucas for Spring 2004 and Fall 2004 semesters

17-Jun-05

WORK ITEM TYPE: CA=Computer assmt;FX=Final Exam; GPJ=Group proj.; IPJ=IndivProj;IR=InternshipReport;J=Journal;LG=LabGroup;LR=Lab Report;OP=Oral

1. What General Outcomes are you seeking?		2. How would you know it? If you saw it? 3. How will you help students learn it?	4. How could you measure each of the desired behaviors listed in #2	5. what are the assessment findings?	6. What improvements have been made based on assessment findings?		6. Impactof Changes
Measurable outcomes (ABET Criteria 1)	**Related PULs**	**Methods used to assess the desire behaviors vary along with the work items chosen by each teacher specific to each course.**		**Assessment findings(spring and fall 2004)**	**Faculty Improvements (changes) based on baseline findings**	**Departmental Improvements (changes)**	**Impact of changes that were put into place**
Individual course learning objectives are defined for each course on the sylabus		Course numbers; ART=Arch; CET=Civil; CNT=Constr	See listing above for meanings of these abbreviations	Goal of 60% of class scoring above average on the selected work item	As part of the assessment checklist each faculty is asked to make comments on changes/improvements for next time they teach the course. These comments are collected and collated across semesters.	Departmentally course expectations for data collection have been revised to allow faculty to focus on better data on less criteria per class.	faculty have been reviewing previous change comments for this class for review and feedback. This is still in progress for most faculty and most courses
a- Mastery demonstrate an appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplin+A12e	1d, e, 3 b, 4a, b	ART 120, CNT 341, CNT 342, CNT 447,	IPJ, FX,GPJ, TX,CA,IBJ,PSH,	Two of the four courses submitted data this year , for an **avg. of 75%** ,thus meeting the departmental goal of 60%, courses that don't meet the goal are reviewed with more emphasis on connecting course objectives to student learning especially in relationship to the work item.	See listing as appendix A to this report: comments over the last four semesters are listed per course	Courses assigned for data collection per ABET criteria have been adjusted using faculty input, to hopefully improve data participation and to focus improvements within courses and measurable outcomes.	Faculty as a whole are more aware of student learning in their courses and more of them are willing to try improvements and report back on the perceived impact of those changes. Faculty participation in data collection is still low.

DEPARTMENT OF CONSTRUCTION TECHNOLOGY 2005 ANNUAL REPORT

Prepared by Laura Lucas for Spring 2004 and Fall 2004 semesters

17-Jun-05

WORK ITEM TYPE: CA=Computer assmt;FX=Final Exam; GPJ=Group proj.; IPJ=IndivProj;IR=InternshipReport;J=Journal;LG=LabGroup;LR=Lab Report;OP=Oral

1. What General Outcomes are you seeking?		2. How would you know it? If you saw it? 3. How will you help students learn it?	4. How could you measure each of the desired behaviors listed in #2	5. what are the assessment findings?	6. What improvements have been made based on assessment findings?		6. Impactof Changes
b- Knowledge- apply current knowledge and adapt to emerging applications in SME & T	2d, e,	ART 284, CET 275, CET 430, CET 452, CNT 280, CNT 330, CNT 494	FX, TX,CA,IBJ,PSH,	Three of the seven courses submitted data this year , for an **avg. of 62%** ,thus meeting the departmental goal of 60%, courses that don't meet the goal are reviewed with more emphasis on connecting course objectives to student learning especially in relationship to the work item	see listing as appendix A to this report: comments over the last four semesters are listed per course	Courses assigned for data collection per ABET criteria have been adjusted using faculty input, to hopefully improve data participation and to focus improvements within courses and measurable outcomes.	Faculty are becoming more knowledgeable about incorporating measurable objectives in their courses and some adjustments are being made to have this outcome access in more courses. Faculty participation is still low.
c- Analysis - conduct, analyze and interpret experiments and apply experimental result to improve process	1b, 2a,b,c 4a,	CET 104, CET 204, CET 267, CET 312,	PSX,LR, FX,TX,IBJ, PSH,	One of the four courses submitted data this year , for an **avg. of 78%** ,thus meeting the departmental goal of 60%, courses that don't meet the goal are reviewed with more emphasis on connecting course objectives to student learning especially in relationship to the work item	See listing as appendix A to this report: comments over the last two semesters are listed per course	Courses assigned for data collection per ABET criteria have been adjusted using faculty input, to hopefully improve data participation and to focus improvements within courses and measurable outcomes.	Faculty as a whole are more aware of student learning in their courses and more of them are willing to try improvements and report back on the perceived impact of those changes. Faculty participation is still low.

DEPARTMENT OF CONSTRUCTION TECHNOLOGY 2005 ANNUAL REPORT

Prepared by Laura Lucas for Spring 2004 and Fall 2004 semesters

17-Jun-05

WORK ITEM TYPE: CA=Computer assmt;FX=Final Exam; GPJ=Group proj.; IPJ=IndivProj;IR=InternshipReport;J=Journal;LG=LabGroup;LR=Lab Report;OP=Oral

1. What General Outcomes are you seeking?		2. How would you know it? If you saw it? 3. How will you help students learn it?	4. How could you measure each of the desired behaviors listed in #2	5. what are the assessment findings?	6. What improvements have been made based on assessment findings?		6. Impactof Changes
d- creativity- apply creativity in the design of system, components or processes appropriate to program objectives	4b	ART 155, CET 350, CET 452, CANT 470	IPJ, FX,GPJ, TX,	One of the four courses submitted data this year , for an **avg. of 77%** ,thus meeting the departmental goal of 60%, courses that don't meet the goal are reviewed with more emphasis on connecting course objectives to student learning especially in relationship to the work item	see listing as appendix A to this report: comments over the last two semesters are listed per course and per teacher	Courses assigned for data collection per ABET criteria have been adjusted using faculty impute, to hopefully improve data participation and to focus improvements within courses and measurable outcomes.	Faculty as a whole are more aware of student learning in their courses and more of them are willing to try improvements and report back on the perceived impact of those changes. Faculty participation is still low.
e- team function effectively on teams	1c, 3a,b,c 4c, 5c	ART 210, CET 312, CANT 447,	GPJ,	One of the three courses submitted data this year , for an **avg. of 71%** ,thus meeting the departmental goal of 60%, courses that don't meet the goal are reviewed with more emphasis on connecting course objectives to student learning especially in relationship to the work item	See listing as appendix A to this report: comments over the last two semesters are listed per course and per teacher	Courses assigned for data collection per ABET criteria have been adjusted using faculty input, to hopefully improve data participation and to focus improvements within courses and measurable outcomes.	Faculty as encouraged to have group projects in all courses because of feedback from our advisory panel. But since faculty seldom teach teamwork they are reluctant to measure it, More courses are expected to access this objective next semester as teaming is taught by more instructors thru shared instructional materials

DEPARTMENT OF CONSTRUCTION TECHNOLOGY 2005 ANNUAL REPORT

Prepared by Laura Lucas for Spring 2004 and Fall 2004 semesters

17-Jun-05

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1. What General Outcomes are you seeking?		**2. How would you know it? If you saw it? 3. How will you help students learn it?**	**4. How could you measure each of the desired behaviors listed in #2**	**5. what are the assessment findings?**	**6. What improvements have been made based on assessment findings?**		**6. Impactof Changes**
f- Problems-identify, analyze and solve technical problems+A11	1d, 2a,b,c,d 3a,c 4c	ART 117, CET 160, CET 260, CET 307, CET 350,	IPJ, FX,GPJ, TX,PSH, PSX, CA,IBJ,	Two of the five courses submitted data this year , for an **avg. of 71%** ,thus meeting the departmental goal of 60%, courses that don't meet the goal are reviewed with more emphasis on connecting course objectives to student learning especially in relationship to the work item	See listing as appendix A to this report: comments over the last two semesters are listed per course	Courses assigned for data collection per ABET criteria have been adjusted using faculty impute, to hopefully improve data participation and to focus improvements within courses and measurable outcomes.	Faculty as a whole are more aware of student learning in their courses and more of them are willing to try improvements and report back on the perceived impact of those changes. Faculty participation is still low.

DEPARTMENT OF CONSTRUCTION TECHNOLOGY 2005 ANNUAL REPORT

Prepared by Laura Lucas for Spring 2004 and Fall 2004 semesters

17-Jun-05

WORK ITEM TYPE: CA=Computer assmt;FX=Final Exam; GPJ=Group proj.; IPJ=IndivProj;IR=InternshipReport;J=Journal;LG=LabGroup;LR=Lab Report;OP=Oral

1. What General Outcomes are you seeking?		**2. How would you know it? If you saw it? 3. How will you help students learn it?**	**4. How could you measure each of the desired behaviors listed in #2**	**5. what are the assessment findings?**	**6. What improvements have been made based on assessment findings?**		**6. Impactof Changes**
g- Communicate effectively, written, oral and drawing	1a,c	ART 117, ART 222, CANT 280, CANT 347, CANT 390,	IPJ, FX,GPJ, TX,OP,PSH, PSX,CA,	Three of the five courses submitted data this year , for an **avg. of 53%** ,thus not meeting the departmental goal of 60%, courses that don't meet the goal are reviewed with more emphasis on connecting course objectives to student learning especially in relationship to the work item	See listing as appendix A to this report: comments over the last four semesters are listed per course	Courses assigned for data collection per ABET criteria have been adjusted using faculty input, to hopefully improve data participation and to focus improvements within courses and measurable outcomes.	Faculty are being educated to the idea that the spectrum of communication must be taught practiced and accessed. And that choosing the most effective method of communicating is the most important aspect. Faculty participation is still low as being technology people they are hesitant to think of themselves as teachers of communication. this is also assessed separately by the TCM dept.

DEPARTMENT OF CONSTRUCTION TECHNOLOGY 2005 ANNUAL REPORT

Prepared by Laura Lucas for Spring 2004 and Fall 2004 semesters

17-Jun-05

WORK ITEM TYPE: CA=Computer assmt;FX=Final Exam; GPJ=Group proj.; IPJ=IndivProj;IR=InternshipReport;J=Journal;LG=LabGroup;LR=Lab Report;OP=Oral

1. What General Outcomes are you seeking?		2. How would you know it? If you saw it? 3. How will you help students learn it?	4. How could you measure each of the desired behaviors listed in #2	5. what are the assessment findings?	6. What improvements have been made based on assessment findings?		6. Impactof Changes
h- Lifelong-recognize the need for and possess the ability to pursue lifelong learning	6b	CANT 105, ART 210	CA	One of the two courses submitted data this year , for an **avg. of 71%** ,thus meeting the departmental goal of 60%, courses that don't meet the goal are reviewed with more emphasis on connecting course objectives to student learning especially in relationship to the work item	See listing as appendix A to this report: comments over the last four semesters are listed per course	Courses assigned for data collection per ABET criteria have been adjusted using faculty input, to hopefully improve data participation and to focus improvements within courses and measurable outcomes.	Faculty as a whole are more aware of this kind of lifelong student learning in their courses and more of them are willing to try improvements and report back on the perceived impact of those changes but it is one of the hardest to tie into course content. Faculty participation is still low.
i- Society- understand professional, ethical and societal responsibly	3a,b, 5c, 6a	ART 210, CANT 452	GPJ,	One of the two courses submitted data this year , for an **avg. of 71%** ,thus meeting the departmental goal of 60%, courses that don't meet the goal are reviewed with more emphasis on connecting course objectives to student learning especially in relationship to the work item	See listing as appendix A to this report: comments over the last four semesters are listed per course	Courses assigned for data collection per ABET criteria have been adjusted using faculty impute, to hopefully improve data participation and to focus improvements within courses and measurable outcomes.	Faculty as a whole are more aware of this kind of lifelong student learning in their courses and more of them are willing to try improvements and report back on the perceived impact of those changes but it is one of the hardest to tie into course content. Faculty participation is still low.

DEPARTMENT OF CONSTRUCTION TECHNOLOGY 2005 ANNUAL REPORT

Prepared by Laura Lucas for Spring 2004 and Fall 2004 semesters

17-Jun-05

WORK ITEM TYPE: CA=Computer assmt;FX=Final Exam; GPJ=Group proj.; IPJ=IndivProj;IR=InternshipReport;J=Journal;LG=LabGroup;LR=Lab Report;OP=Oral

1. What General Outcomes are you seeking?		2. How would you know it? If you saw it? 3. How will you help students learn it?	4. How could you measure each of the desired behaviors listed in #2	5. what are the assessment findings?	6. What improvements have been made based on assessment findings?		6. Impactof Changes
j- Issues- recognize contemporary professional, societal and global issues and be aware of and respect diversity	2e,4c, 5a,b,c	CANT 105, CANT 447	CA	Neither of the two courses submitted data this year ,for an avg. of **0%**Thus showing difficulties meeting the departmental goal of 60%, the dept will work directly with the faculty in these two course to assist in defining work items to use for assessment and thus gather more relevant data	See listing as appendix A to this report: comments over the last four semesters are listed per course	Courses assigned for data collection per ABET criteria have been adjusted using faculty input, to hopefully improve data participation and to focus improvements within courses and measurable outcomes.	Now that Faculty that teach these courses are more involved in the assignment of ABET criteria for measuring, and with the support of the dept assessment committee collection of data will improve. The dept will also review these courses with faculty as the data may have been assessed but somehow not collected.
k-Continuous Improvement- have a commitment to quality, timeliness and continuous improvement	1e, 2d,e, 4c, 6a,	ART 120, ART 155, ART 165 , CANT 330, CANT 341, CANT 342,	IPJ, FX, PSH, CA,	Three of the six courses submitted data this year for an avg. of **76%** thus meeting the departmental goal of 60%, courses that don't meet the goal are reviewed with more emphasis on connecting course objectives to student learning especially in relationship to the work item	See listing as appendix A to this report: comments over the last four semesters are listed per course	Courses assigned for data collection per ABET criteria have been adjusted using faculty input, to hopefully improve data participation and to focus improvements within courses and measurable outcomes.	Faculty as a whole are more aware of student learning in their courses and more of them are willing to try improvements and report back on the perceived impact of those changes. Faculty participation is still low.

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING NARRATIVE
Written by Charlie Yokomoto
June, 2005

The ECE Department has a mature outcomes assessment process due to the outcomes assessment that we have developed for the new ABET accreditation process, which focuses on the assessment of student learning. The department has undergone accreditation visits in 2002 (computer engineering) and 2004 (both computer engineering and electrical engineering). Our ABET assessment process focuses on assessment our ABET-required Program Outcomes, which we have mapped onto the IUPUI Principles of Undergraduate Learning to show that all PULs are thus assessed.

For our 2002 accreditation visit, a complete cycle of assessment was performed over a period of two years, including an evaluation of our assessment findings and the determination of modifications in the teaching/learning process to be made to improve performance on weak outcomes. For our 2004 visit, a second complete cycle w as performed, again over a two-year cycle. Student learning was again assessed and compared against expectations, and further modifications were proposed to improve performance on weak outcomes.

A new two-year cycle was started in the Fall of 2004, and the department has assessed learning outcomes in five key courses, including ECE 492 (capstone design course), ECE 401 (ethics and professionalism), ECE 301 (signals and systems), ECE 440 (communications systems), ECE 311 (engineering electromagnetics), and TCM 360 (technical communications). Together, this set of courses assess student learning on almost all of our accreditation-based program outcomes. The findings have been analyzed and changes in the teaching/learning process have again been determined. In the 2005-2006 academic year, the outcomes that were not assessed in the 2004-2005 year will be assessed, and surveys of alumni and employers will be done to complement the direct evidence that was obtained by assessing student works.

Finally, each faculty member has analyzed the data from the survey of student confidence of his/her knowledge of the course outcomes and has made plans for modifying the teaching/learning process from this activity.

ELECTRICAL AND COMPUTER ENGINEERING 2005 ASSESSMENT REPORT PART 1—FOUNDATIONS AND BASELINE FINDINGS

Prepared by Charles Yokomoto and Maher Rizkalla

July 1, 2005

This year, the ECE Departments annual assessment report is composed of two sets of tables due to the large number of columns that it needs to report its assessment findings, improvements planned and/or and implemented, and their impact on student performance. Part 1 contains the first four columns of our previous annual assessment reports, which contains the following information:

Column 1: The Program Outcome being assessed in the table. The Program Outcomes are written expressly for our professional accreditation by the Accreditation Board for Engineering and Technology (ABET). Each of our Program Outcomes has been linked to the IUPUI Principles of Undergraduate Learning (PUL), and these linkages are demonstrated by Table 1 on page 4 of this report.

Column 2: The Measurable Outcomes for each Program Outcome.

Column 3: Courses where the Measurable Outcomes are taught.

Column 4: How the outcomes are measured.

Part 2 contains our actual findings, improvements planned and/or implemented, and the impact of the improvements for 2002, 2004, and 2005. The information for 2002 and 2004 were complete due to our professional accreditation visits in those two years. For 2005, we have changed our assessment process by reporting findings on a cycle.

Column 5: Findings from the complete 2002 assessment of outcomes for our Fall 2002 accreditation visit.

Column 6: Improvements (changes) planned based on the 2002 findings.

Column 7: Findings from the complete 2004 assessment of outcomes for our Fall 2004 accreditation visit.

Column 8: Impact of the changes.

Column 9: Further changes planned.

Column 10: Findings for those outcomes assessed in the 2004-2005 phase of our revised assessment cycle, where the assessment of our complete set of outcomes is distributed over more than one year.

Column 11: Impact of the changes

Column 12: Further changes planned.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
a1. The ability to use mathematics and engineering science. The ability to apply knowledge of science was split off as outcome a2 for assessment purposes. This part of ABET Criterion 3, Outcome a, is interpreted to mean the application of mathematics and engineering science. The applied aspects of engineering are assessed in outcomes b, c, and k.	a1(1) The ability to solve engineering science problems that require depth on knowledge in the major. a1(2) The ability to solve engineering science problems that require knowledge of mathematics.	ECE201, 202, 255, 264, 266, 301, 302, 311, 362, 382, 365, 369, 440 In addition to the mathematics that they use in their engineering courses, EE majors are required to take MATH 163, 164, 261, and 262.	ECE students' ability to use mathematics and engineering science is assessed in ECE 305, 382, and 444. In the future, ECE 305 will be replacing by ECE 311, and ECE 444 will be upgraded with a laboratory to become EE 440.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
a2. The ability to use science in engineering (EC2000 Outcome a). This part of ABET Criterion 3, Outcome a, is interpreted to mean the application of science principles taught in our engineering courses. The two most likely candidates are EE 305 (elective) and EE 311 (required).	Level 1: The ability to recall memorized information at a basic level. Level 2: The ability to recall routine knowledge of definitions, principles, or laws, possibly without true understanding Level 3: The ability to use basic definitions, principles, or laws, requiring an understanding rather than rote recall Level 4: The ability to apply reasoning that integrates knowledge of different kinds to come up with the correct response	For EE majors, we now use ECE 311 as our main course to assess this outcome, supplemented with data from ECE 202, ECE 201, and ECE 255 and course grades fro Physics 152 and 251 and from Chemistry C105. ECE 311 replaces ECE 305 from the 2002 visit. For CmpE majors, we obtain data from ECE 201, ECE 202, and ECE 255, as well as course grades from Phys 152, Phys 251, and Chem C105.	Student final exams in EE 305 were assessed. Two types were written. One type assessed students' general knowledge of the science principles through multiple-choice questions. The other type assessed problem solving.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
b1. The ability to design and conduct experiments (EC2000 Outcome b)	Students will be assessed on their ability to test a design to determine if it meets the design criteria. This will be done in ECE 492.	ECE207, 208, and 267 provide laboratory experiments for lecture classes ECE201, 255, and 266, respectively. ECE362 is a lecture/laboratory course, ECE492 is a capstone design course, and ECE301 is an engineering science course where students cover material on designing and conducting experiments.	Projects reports in ECE 492 For 2004, projects in ECE 255 were assessed.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
b2. The ability to analyze and interpret data (EC2000 Outcome b)	Students will be able to interpret output waveforms, output data tables from computer programs and simulators, and input-output data from systems.	ECE students are required to take ECE 207, 208, 266, 267, 301, 302, 311, 440, and 492.	This general outcome is assessed in ECE492, the senior capstone design course. This is assessed as part of the grading of the project through an evaluation of the final report and the oral presentation. This outcome is assessed in ECE492, the capstone design course.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
c. The ability to design a system, component, or process to meet desired needs (EC2000 Outcome c)	Students will be able to c(1 Execute the design according to the formal design process taught in the course. c(2) Complete the design project successfully.	ECE students are required to take ECE 208, 255, 266, 267, 301, 302, 311, 362, 382, 444, and 492.	This general outcome is assessed in ECE 492, the senior capstone design course. This is assessed as part of the grading of the project through an evaluation of the final report and the oral presentation.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
d. The ability to work on interdisciplinary teams	Students will demonstrate: d(1) Attendance at group meetings d(2) Contributions to group discussions d(3) Carrying out assignments d(4) Spirit of teamwork d(5) was assessed holistically from instructor and advisor observations of teams in the laboratory and in team meetings with the instructor or advisor.	ECE students are required to take ENGR 195, and ECE 401, and ECE 492, all of which use interdisciplinary teams to some degree.	Outcome d1 was assessed in ECE401 using a fairly detailed rubric is used. Outcome d2 was assessed holistically through instructor and advisor observations. Outcome d3 was assessed through an essay written on an exam.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
e. The ability to identify, formulate, and solve engineering problems (EC2000 Outcome e)	e(1) Students will be able to translate a need into a design task identifying the need and formulating it as a design task.	ECE students are required to take ENGR 197, and ECE201, 202, 207, 208, 255, 264, 266, 267, 302, 311, 382, 440, and 492.	This outcome is assessed in ECE 492 holistically in an assessment of the students' ability to identify and formulate the design task that is assigned to them. Although the assessment is holistic, it is based on the instructor's interaction with the design team throughout the semester-long project.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
f. An understanding of professional and ethical responsibilities (EC2000 Outcome f)	f(1) Describe how codes of ethics help an engineer work ethically. f(2) Analyze a behavior using models of right and wrong (ethical bases) f(3) Analyze ethics codes using models of right and wrong (ethical bases) f(4) Describe how group discussions can help with critical thinking. f(5) Discuss ethical issues in the workplace. f(6) Described how knowledge of cultures is needed for ethical behavior	ECE students are required to take ECE 400 and 401.	The outcomes were assessed in ECE 401 using a variety of rubrics to score assignments and by using an essay final exam.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
g1. The ability to communicate effectively orally (EC2000 Outcome g)	We have defined oral presentations as taking place in the workplace. Students are assessed in TCM 360 on the following competencies: g1(1) Introduction g1(2) Content g1(3) Assumptions g1(4) Conclusions g1(5) Organization g1(6) Visuals g1(7) Style/Wording g1(8) Length g1(9) Grammar g1(10) Delivery g1(11) Pace/Volume g1(12) Body Lang. g1(13) Visual Equip g1(14) Q&A time g1(15) Appropriateness g1(16) Overall rating In ECE 492 starting Sp 04;: g1(17) Overall quality of the oral presentation and effectiveness of visual aids.	ENGR 195 ECE 401, 492 TCM 360	In TCM 360, oral presentations were assessed by a team of faculty members who were trained by Dr. Marjorie Hovde. They use a scoring rubric that was developed by Dr. Hovde. This assessment process was taken over by Dr. Wanda Worley Fall '03.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
g2. The ability to communicate effective in writing (EC2000 Outcome g)	We have defined writing as workplace writing. Students are assessed on the following competencies: g2(1) Introduction g2(2) Content g2(3) Assumptions g2(4) Conclusions g2(5) Organization g2(6) Visuals g2(7) Style/Wording g2(8) Page Layout g2(9) Length g2(10) Grammar g2(11) Sources g2(12) Appropriateness g2(16) Overall rating	ENGR 195 EE401, 492 TCM360	Assessment of students' written papers was assessed in TCM 360 using a scoring rubric developed by Dr. Marjorie Hovde of the TCM program. The assessment of learning outcomes was taken over by Dr. Wanda Worley Fall '03.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
h. A broad education necessary to understand the impact of engineering solutions in a global and societal context (EC2000 Outcome h)	h(1) 2002 visit: Ability to discuss how U.S. technological developments can have an impact on society locally and globally, the latter requiring an understanding of different cultures h(2) 2004 visit: Ability to relate humanities and social science electives to the global, cultural, and environmental impact of engineering decisions.	ECE 401	h(1). A question on this outcome was written for the ECE 401 final exam. h(2). Students were asked to write a paper that described how two of their general education electives helped them understand the global nature of engineering in particular and business in general.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
i. A recognition of the need for and the ability to engage in lifelong learning. (EC2000 Outcome i)	i(1): Graduates of the program will report continued education by reporting that they have attained advanced degrees and certificates, have attended workshops. i(2): Students will demonstrate the ability to use the library and the Internet to search for information for their projects.	ECE 362, 401, 492	ECE 401: Students are assessed on a group homework project that requires them to find print and Internet articles that demonstrate an ethical issue. Also, the groups may use library and Internet searches to find articles that will improve their group presentation (term project.) ECE 492: Students are assessed on their use of the library and Internet to search for background information for their design projects.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
j. A knowledge of contemporary issues (EC2000 Outcome j)	j(1) Students are able to identify and interpret current ethical issues in the print and Internet media. j(2) Students will be able to write an essay on the final exam on the importance of knowledge of current events to a professional engineer.	ECE 401	j(1) is assessed by grading the quality of the ethical issues submitted by students on the assignment that requires them to find articles that describe ethical issues. j(2) is assessed on the final essay exam.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
k. The ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (EC2000 Outcome k)	k(1) Students will be able to use engineering tools successfully in the completion of their senior design project.	ENGR 195, 196, 197 ECE 202, 207, 264, 266, 267, 311, 321, 382	k(1) is assessed by the instructional team or the course supervisor that grades the senior design project reports. This ability is graded on a scale of 4: excellent 3.: competent 2: satisfactory 1: marginal 0: poor

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
l. The ability to use the Internet and the Library for research	*l*(1) Students will be able to use the Internet and Library to find resource material for their senior design project (EE 492) *l*(2) Students will be able to use the Internet and library to search for articles on ethical dilemmas for EE 401	ECE 401, EE 492, EE 362	In ECE 492, this is scored with a holistic score in the project scoring rubric by the instructor from information provided in their final reports. In ECE 401, students are scored on the basis of the quality of the articles and the number of articles submitted.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
m. The Ability to Think Critically	m(1) In ECE 492, the ability to think critically in the course of the design of their senior design project. m(2) In ECE 401, the ability to think critically to resolve ethical dilemmas. Critical thinking occurs in many of the problem solving and laboratory courses, but ECE 492 and ECE 401 and the courses where students apply critical thinking in broader ways than solving engineering problems.	ECE 401, 492, and all problem solving courses.	In ECE 492, this is scored with a holistic score in the project scoring rubric by the instructor from information provided in their final reports. In ECE 401, awareness of the importance of critical thinking is assessed with an essay question on the final exam. Also in ECE 401, critical thinking is assessed in a team presentation of their defense of both sides of an ethical dilemma and on the resolution of dilemmas.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
n. The Ability to Use Creativity in Design (When Needed)	The ability to think outside the box when necessary in the course of a design project.	ECE 492	In ECE 492, this is scored with a holistic score in the project scoring rubric by the instructor from information provided in their final reports and from consultations that the students have with the instructor.

1. Program Outcome	2. Measurable Outcomes	3. Courses That Cover This Outcome	4. How the Outcomes are Measured.
o. An appreciation of quality workmanship in producing a product.	A recognition that workmanship is important in the delivered product in a senior design experience	ECE 492	In ECE 492, this is scored with a holistic score in the project scoring rubric by the instructor from observations of the final deliverable.

ELECTRICAL AND COMPUTER ENGINEERING 2005 ASSESSMENT REPORT PART 2 –2005 FINDINGS AND IMPROVEMENTS
Prepared by Charlie Yokomoto and Maher Rizkalla
July 2005

This part of the ECE annual assessment report contains our actual findings, improvements planned and/or implemented, and the impact of the improvements for 2002, 2004, and 2005. The information for 2002 and 2004 were complete due to our professional accreditation visits in those two years, but beginning with this 2005 report, we are not assessing all of our outcomes each year. Instead, we will cycle through our outcomes over a period of two years. Columns 1 and 2 from Part 1 are repeated in this set of tables. This part of our report presents the following information:

Column 1: The Program Outcome being assessed in the table. The Program Outcomes are written expressly for our professional accreditation by the Accreditation Board for Engineering and Technology (ABET). Each of our Program Outcomes has been linked to the IUPUI Principles of Undergraduate Learning (PUL), and these linkages are demonstrated by Table 1 on page 4 of this report.

Column 2: The Measurable Outcomes for each Program Outcome.

Column 7: Findings from the complete 2004 assessment of outcomes for our Fall 2004 accreditation visit. For the 2002 findings and improvements, please refer to Part 1 of this report.

Column 8: Impact of the changes.

Column 9: Further changes planned.

Column 10: Findings for those outcomes assessed in the 2004-2005 phase of our revised assessment cycle, where the assessment of our complete set of outcomes is distributed over more than one year.

Column 11: Impact of the changes

Column 12: Further changes planned.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
a1. The ability to use mathematics and engineering science. The ability to apply knowledge of science was split off as outcome a2 for assessment purposes. This part of ABET Criterion 3, Outcome a, is interpreted to mean the application of mathematics and engineering science. The applied aspects of engineering are assessed in outcomes b, c, and k.	a1(1) The ability to solve engineering science problems that require depth on knowledge in the major. a1(2) The ability to solve engineering science problems that require knowledge of mathematics.	ECE 301: Outcomes were generally met on scoring the final exam according to the degree of difficulty of problems. ECE 440: marginally successful based on students successfully solving three of six problems on the final exam. ECE 492 Sp '03 and Sp '04: this outcome scored 3.47/4.00—successful.	ECE 301: More time will be spent on stability. ECE 440: Continue to emphasize value of mathematics and mathematical approach to problem solving rather than a computational approach. ECE 492: Revisions that were put into place were successful, including a faculty committee to review all project proposals for technical content and appropriateness. Also, more faculty involvement of faculty in the evaluation of projects has been initiated.	ECE 301 Spring 2005: As in the 2004 findings, outcomes were generally met according to the scoring of final exam problems using our problem solving rubric that rates the difficulty of the problems according to our taxonomy of problem difficulty. Specifically, nine of eleven problems were rated as satisfactory. ECE 440 Fall 2004: Marginally successful (three of five problems showed successful performance) based on the taxonomy of problems. Slightly better than 2004 ECE 492 spring 2005: 75% of the teams scored 3.0 or better, and teams averaged 3.0 or better.	ECE 301: *Check 2004 spreadsheet for comparison.* ECE 440: There is mild indication of an improvement in performance (three of six in 2004 to three of five in 2005). ECE 492: Performance was similar to performance in past semesters.	ECE 301: Students need better preparation in ECE 202 on convolution. ECE 440: Faculty teaching this course will be asked to consider things that can be done to improve learning. ECE 492: No changes planned, but instructor recommended structural changes to improve student performance.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
a2. The ability to use science in engineering (EC2000 Outcome a). This part of ABET Criterion 3, Outcome a, is interpreted to mean the application of science principles taught in our engineering courses. The two most likely candidates are EE 305 (elective) and EE 311 (required).	Level 1: The ability to recall memorized information at a basic level. Level 2: The ability to recall routine knowledge of definitions, principles, or laws, possibly without true understanding Level 3: The ability to use basic definitions, principles, or laws, requiring an understanding rather than rote recall Level 4: The ability to apply reasoning that integrates knowledge of different kinds to come up with the correct response	Physics 152 course grades Sp '04: engineering students' final grades averaged 2.95/4.00—satisfactory Phys 251 course grades Sp '04: engineering students' final grades averaged 2.87/4.00—satisfactory. Chemistry course grades Sp '04: engineering students' final grades averaged 2.61/4.00--satisfactory ECE 201 findings Sum '04: From first exam on science principles, students averaged 76% (n = 13)—satisfactory. ECE 202 findings: satisfactory based on mid-term exam on magnetic coupling. ECE 255 findings: satisfactory based on 75% average on science unit. ECE 311 (for EE degree only): marginally satisfactory.	For EE majors: ECE 311-- provide more supplemental materials and practice. For CmpE majors: no changes needed.	This outcome will be assessed during the 2005-2006 academic year in our revised process where different outcomes are assessed in different years.	See note under 2005 Assessment Findings (column 9)	See note under 2005 Assessment Findings (column 9)

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
b1. The ability to design and conduct experiments (EC2000 Outcome b)	Students will be assessed on their ability to test a design to determine if it meets the design criteria. This will be done in ECE 492.	ECE 492: Successful (3.27/4.00) from Sp '03 and Sp '04 data. ECE 255 project Sp '04: Successful (average score 89% on a desired average score of 65% for the class).	ECE 492: None needed. ECE 255: None needed.	ECE 492: Successful (3.13/4.00), three of four groups scoring 3.0 of better. ECE 255: to assessed in the 2005-2006 academic year.	ECE 492: No reporting needed since no changes were put into place between S '04 and S '05 based on assessment findings.	ECE 492: No changes planned, but instructor recommended structural changes to improve student performance.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
b2. The ability to analyze and interpret data (EC2000 Outcome b)	Students will be able to interpret output waveforms, output data tables from computer programs and simulators, and input-output data from systems.	ECE 492: Successful based on score of 3.29/4.00, an improvement over the 2002 data. Criteria: average team scores 3.00/4.00 or better or 70% of teams scoring 3.00/4.00 or better.	No further changes needed.	ECE 492: Not successful (avg = 2.75/4.00 and 75% of the groups scored below 3.00/4.00).	No reporting needed since no changes were put into place between S '04 and S '05 based on assessment findings.	The Undergraduate Affairs Committee, working with faculty who have taught ECE 492, will investigate ways that performance can be improved. The UAC will also consider using other courses such as ECE 382 and ECE 440 for EE majors and ECE 362 for CmpE and ECE majors. Also, ECE 365 may be considered for CmpE majors.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
c. The ability to design a system, component, or process to meet desired needs (EC2000 Outcome c)	Students will be able to c(1) Execute the design according to the formal design process taught in the course. c(2) Complete the design project successfully.	ECE 492 from Sp '03 and Sp '04 c(1) was met (3.17/4.00), which is an improvement from the previous cycle. c(2) was clearly met (3.75/4.00) from faculty evaluations of oral presentations. ECE 255 Sp '04: c(2) Students met this outcome successfully from their amplifier design project (89% class average)	None needed.	ECE 492 Spring 2005: c(1) was marginally met (average of team scores - = 3.00/4.00) and 100% of teams scored 3.00 or better. c(2) was met, with the average of team scores 3.13/4.00 and 75% of the teams scoring 3.00/4.00 or better. ECE 255: this outcome in this course will be assessed in the 2005-2006 cycle.	No reporting needed since no changes were put into place between S '04 and S '05 based on assessment findings.	While this outcome was met successfully, scores dropped somewhat from the previous cycle. The Undergraduate Affairs Committee will look into this to see if something needs to be done about it.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
d. The ability to work on interdisciplinary teams	Students will demonstrate: ECE 401 peer assessment of teamwork: d(1) Attendance at group meetings d(2) Contributions to group discussions d(3) Carrying out assignments d(4) Spirit of teamwork d(5) was assessed holistically from instructor and advisor observations of teams in the laboratory and in team meetings with the instructor or advisor. ECE 401 Essay question on teamwork: d(5) Describe how working in teams in ECE 401 has prepared you to work in teams in industry ECE 492: Quality of the functioning of the team, including mutual support, ability to reach consensus, spirit of cooperation, and responsibility	ECE 401: Sp '04, all teams rated each member on "value to the team", and all teams averaged 3.00/4.00 or better—successful. ECE 492 Sp '03 and Sp '04 combined data: instructor rating of all teams averaged 3.29/4.00—satisfactory.	None needed.	ECE 401 Spring '05: d(1)-d(4): From the peer evaluation of teamwork score, seven of ten teams met the department's expectations of 70% of teams scoring 3.0/4.0 or better in all categories. ECE 401 d(5): Average was 8.7/10.0 (goal = 8.0) and 93% scored 8.0 or better (goal = 70%). ECE 492: This outcome was satisfied by instructor observation (average score across all groups was 3.13/4.00)	No reporting needed since no changes were put into place between S '04 and S '05 based on assessment findings.	ECE 401: The single low score was due to the make-up of the team. Next semester, a mid-term evaluation will be conducted to try to sort out difficulties before they become magnified. It difficult to expect that all students in a class will exhibit good teamwork skills. ECE 492: No changes are needed.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
e. The ability to identify, formulate, and solve engineering problems (EC2000 Outcome e)	e(1) Students will be able to translate a need into a design task identifying the need and formulating it as a design task.	ECE 255: Improvements in determining an appropriate strategy needed. ECE 492: This outcome was very successful in S'03, with 100% of the groups scoring 3.0 or better.	ECE 311: Provide more supplemental materials and practice. ECE 255: More help in the form of help sessions will be given, with more experiences in determining an appropriate strategy from among possible strategies.	ECE 255: next year ECE 492: succsssful on the basis of 75% of groups scoring 3.0 or better (goal = 70%)	No reporting needed since no changes were put into place between S '04 and S '05 based on assessment findings.	ECE 492: No changes needed, but the instructor will ask students to spend more time of the details of the design before assembling the final product. ECE 255: This will be assessed during the next cycle.

1. Program Outcome	2A. Measurable Outcomes prior to Spring 2005	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	2B. Measurable Outcomes Starting Spring 2005	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
f. An understanding of professional and ethical responsibilities (EC2000 Outcome f)	f(1) Describe how codes of ethics help an engineer work ethically. f(2) Analyze a behavior using models of right and wrong (ethical bases) f(3) Analyze ethics codes using models of right and wrong (ethical bases) f(4) Describe how group discussions can help with critical thinking. f(5) Discuss ethical issues in the workplace. f(6) Described how knowledge of cultures is needed for ethical behavior. f(7) Describe behaviors of working professionals (new S'05)	ECE 401 Sp '04: f(1) marginally successful f(2) improved to successful f(3) marginally successful f(4) Successful f(5) marginally successful f(6) marginally successful	Emphasis will be placed on acquiring specific knowledge for multiple choice exams.	f(1) Demonstrate a basic understanding of ethical principles. f(2) Demonstrate an understanding of models of right and wrong and their use in determining right actions. f(3) Demonstrate a working knowledge of a process for resolving ethical dilemmas. f(4) Demonstrate a working knowledge of professional behaviors in the workplace. f(5) Demonstrate an understanding of how a code of ethics can help an engineer work	ECE 401 Sp '05: f(1) on the multiple choice questions, 68% (goal 60%). f(2) marginally successful. Average essay question was 8.0/10.00, but only 50% of the class scored 8.0 or better. Goal is met if one or the other is true. f(3) from the essay question—successful based on average of 8.7/10.0 and 93% of the class scoring 8.0 or better. However, scores on the multiple choice test were not successful. f(4) from the essay questions—marginally successful (average 8.5/10.0, but only 56% scored 8.0 or better.) From the	Scores on the multiple choice part of the exam are still lower than desired, about 10% lower than the scores on the essay exam.	f(2): Scores on the essay questions where improvements are needed showed a bimodal distribution, with enough high scores to bring up the average to a level considered to be successful. Performance can be improved by bringing the bottom part of the class up toward the top of the class. A mid-term essay exam was instituted a few semesters ago to give students more practice with essay exams. The multiple choice exam always scores lower, probably because it

				ethically and to determine right actions.	multiple choice questions, the average was 78% (goal 60%). f(5) from the essay exam: marginally successful on the basis of students averaging 8.0/10.0 (goal 8.0). However, only 60% of the class scored 8.0 or better. Outcome was successful from score of 89% on multiple choice questions (goal = 60%).		requires more specific knowledge than the essay exam. Improvements will be sought by emphasizing the need to know specifics. f(3) more attention needs to be placed on resolution of dilemmas. f(4) same as f(2). f(5) same as f(3)

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
g1. The ability to communicate effectively orally (EC2000 Outcome g)	We have defined oral presentations as taking place in the workplace. Students are assessed in TCM 360 on the following competencies: g1(1) Introduction g1(2) Content g1(3) Assumptions g1(4) Conclusions g1(5) Organization g1(6) Visuals g1(7) Style/Wording g1(8) Length g1(9) Grammar g1(10) Delivery g1(11) Pace/Volume g1(12) Body Lang. g1(13) Visual Equip g1(14) Q&A time g1(15) Appropriateness g1(16) Overall rating In ECE 492 starting Sp 04;: g1(17) Overall quality of the oral presentation and effectiveness of visual aids.	TCM 360 Sp '04: All outcomes were met successfully ECE 492: Average 4.23/5.00—successful.	No changes needed.	TCM 360 Sp '05: students were successful on all of the assessment outcomes g1(1) through g1(16) except g1(4) on Conclusions. However, the score of 3.45/5.00 is very close to our goal of 3.50/5.00. ECE 492: three of four groups scored 3.0 or better.	TCM 360: No change were put into place based on the 2004 fin dings.	TCM 360: Since the outcome g1(4) was not met still scored within round-off of the goal, no changes are contemplated at this time. However, the TCM staff is working on a holistic evaluation of writing (and oral presentations. ECE 492: no changes needed at this time.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
g2. The ability to communicate effective in writing (EC2000 Outcome g)	We have defined writing as workplace writing. Students are assessed on the following competencies: g2(1) Introduction g2(2) Content g2(3) Assumptions g2(4) Conclusions g2(5) Organization g2(6) Visuals g2(7) Style/Wording g2(8) Page Layout g2(9) Length g2(10) Grammar g2(11) Sources g2(12) Appropriateness g2(13) Overall rating	TCM 360 Sp '04: Performance on all outcomes except g2(10) on grammar and punctuation was satisfactory.	Instructors will spend more time on grammar and punctuation and recommend that students make use of the TCM Writing Center for help with this outcome.	TCM 360: this will be assessed during the next cycle ECE 492: barely successful. Three groups scored 3.00 and one scored 2.50.	No reporting needed since no changes were put into place between S '04 and S '05 based on assessment findings.	ECE 492: Students in this course will be advised to make use of the Writing Center that is run by the school's TCM program.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
h. A broad education necessary to understand the impact of engineering solutions in a global and societal context (EC2000 Outcome h)	h(1) 2002 visit: Ability to discuss how U.S. technological developments can have an impact on society locally and globally, the latter requiring an understanding of different cultures h(2) 2004 visit: Ability to relate humanities and social science electives to the global, cultural, and environmental impact of engineering decisions.	h(1) is no longer assessed but is kept here for reference. Focus is on h(2) instead. h(2) ECE 401 S '04 This outcome was judged to be successful from the distribution of grades on assignment H-13 that asked students to write a short essay on the connection between their humanities and social science electives and the global, cultural, and environmental aspects of engineering, with 29 of 38 (76%) papers scoring B+ or better, and 18 of 38 scoring A- or better.	No changes needed.	From ECE 401 assignment H-13 Spring '05: successful on the basis of 35 of 46 papers (74%) on assignment H-13 (see column 7 for description). ECE 401 essay question on the final S '05: marginally satisfactory with average score 8.6/10.0 (goal = 8.0), but only 60% scored 8.0 or better (goal = 70%), but performance should be improved. ECE 401 S '05 multiple choice final: three of the four questions that pertained to this outcome, 60% or more (our goal) of all students selected the right answer. On three of the four items, 80% or more of the class scored 80% or better.	No reporting needed since no changes were put into place between S '04 and S '05 based on assessment findings.	ECE 401: Put more emphasis on the importance of developing a stronger awareness of global issues and Donaldson's International Rights. The material is not difficult—students must don't put much importance on it and hence do not study it adequately.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
i. A recognition of the need for and the ability to engage in lifelong learning. (EC2000 Outcome i)	i(1): Graduates of the program will report continued education by reporting that they have attained advanced degrees and certificates, have attended workshops. i(2): Students will demonstrate the ability to use the library and the Internet to search for information for their projects.	i(1): We were unsuccessful in obtaining data for this outcome due to the small number of alumni who responded to our survey. i(2) ECE 401: Assignment on finding Internet and newsprint articles on ethical issues was successful. i(2) ECE 492: Average score on project reports on Library and Internet resources was 3/25/4.00—successful.	No improvements needed on outcome i(2).	ECE 401 S ’05: Only five of ten groups (50%) scored B+ or better on assignment H-2. This is not considered to be successful. Students were able to find articles on the Internet and in the printed media but were weak in describing the issues. i(2) in ECE 492: Not successful. Two of four groups scored below 3.00/4.00, and the average across teams was less than 3.00/4.00.	Changes were not made after the 2004 assessment. However, it should be noted that student performance was lower in S ’05 than in S ’04.	ECE 492: Instructor will put more emphasis on the need and value of background research for senior design projects. ECE 401: Instructor will give more instruction on describing the issues in the articles that students find in assignment H-2. He will also require interim reports to keep students working at a reasonable pace on this multi-week assignment.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
j. A knowledge of contemporary issues (EC2000 Outcome j)	j(1) Students are able to identify and interpret current ethical issues in the print and Internet media. j(2) Students will be able to write an essay on the final exam on the importance of knowledge of current events to a professional engineer.	ECE 401 from Sp '04: j(1) 100% of the groups met the judging criteria on their contemporary issues assignment (number of articles and analysis of articles). j(2) This outcome was clearly met on the final exam.	No changes needed.	ECE 401: j(1) was not met (only 50% of the groups scored B+ or better.) j(2) This outcome was met on the final exam (one question on the final exam). Class average 8.7/10.0 (goal = 8.0) and 83.7% scored 8.0 or better (goal = 70%).	No reporting needed since no changes were put into place between S '04 and S '05 based on assessment findings.	J(1) Nothing concrete has been planned at this time, but we are considering pre-screening activities early in the semester to determine if a class has to be pushed more. Prior classes did extremely in this activity. If this low performance is due to students' ability to write, the department may have to consider moving its technical writing course from the senior year to the junior year.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
k. The ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (EC2000 Outcome k)	k(1) Students will be able to use engineering tools successfully in the completion of their senior design project.	ECE 492: This outcome in the combined Sp '03 and Sp '04 data showed marked improvement. The average score was 2.80/4.00, and the score increased to 3.40/4.00.	No changes are required.	ECE 492 Sp '05: the average score across teams was 3.13/4.00 and 75% of the class scored 3.00/4.00 or better. Our expectations are satisfied if either the average is 3.0 or better or if 70% or more of the groups score 3.0 or better.	No reporting needed since no changes were put into place between S '04 and S '05 based on assessment findings.	No changes are required, but the assessment committee feels that the ability to use tools should be assessed in more courses, such as ECE 301 (Matlab), ece 340 for EE majors (LabView), and in an ECE course on architecture (FPGA and software tools)

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
l. The ability to use the Internet and the Library for research	*l*(1) Students will be able to use the Internet and Library to find resource material for their senior design project (ECE 492) *l*(2) Students will be able to use the Internet and library to search for articles on ethical dilemmas for ECE 401	This outcome was successfully met in both ECE 401 and ECE 492. In ECE 401, students did Internet and library research for articles on ethical issues. In ECE 492, students did research to find reference materials on their projects.	None needed.	ECE 492 S '05: Outcome l(1) was not met. The average across groups was only 2.81/4.00 (goal is 3.00/4.00) and only 50% of the groups scored 3.00/4.00 or better (goal is 70%). ECE 401 Sp '05: Outcome l(2) was not met on	No reporting needed since no changes were put into place between S '04 and S '05 based on assessment findings.	The department is considering the move of TCM 360 up into the junior year so that they will be better prepared to perform Internet research. The department will also be discussing the addition of Internet research

				assignment H-2. Only 50% of the teams (5 of 10) met the B+ or better criterion for successful performance (goal is 80%).		activities into traditional courses.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
m. The Ability to Think Critically	m(1) In ECE 492, the ability to think critically in the course of the design of their senior design project. m(2) In ECE 401, the ability to think critically to resolve ethical dilemmas. Critical thinking occurs in many of the problem solving and laboratory courses, but ECE 492 and ECE 401 and the courses where students apply critical thinking in broader ways than solving engineering problems.	m(1) ECE 492 Sp '03 and Sp '04: Successful on 3.03/4.00 score, but decreased slightly. m(2) ECE 401 Sp '04: 100% of the 10 groups scored B+ or better on the related assignment (assignment H-5).	None needed.	m(1) ECE 492: m(1) was met (3.06/4.0 and 75% of the groups scored 3.0 or better). m(2) ECE 401 S'05: seven of ten (70%) of all groups scored B+ or better on assignment H-5. This is a drop from 100% in S '04.	No changes were put into place. However, performance dropped in the assessment of m(2).	ECE 401: instructor will give students will receive more instruction on what is expected on this project H-5.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
n. The Ability to Use Creativity in Design (When Needed)	The ability to think outside the box when necessary in the course of a design project.	ECE 492 Sp '03 and Sp '04: Successful based on score of 3.35/4.00.	None needed.	ECE 492: Successful since 75% of the groups scored 3.0 or better (goal is 70%), but scores indicated that improvements may be warranted.	No reporting needed since no changes were put into place between S '04 and S '05 based on assessment findings.	Instruction is needed to demonstrate to students that their proposed solutions should not be too similar to existing approaches. The ECE Department will consider removing this as a Program Outcome and folding it into one of the a-k Outcomes.

1. Program Outcome	2. Measurable Outcomes	7. What are the 2004 Assessment Findings?	8. Further Changes Planned and Proposed	9. 2005 Assessment Findings	10. Impact of Changes	11. Changes Planned and Proposed
o. An appreciation of quality workmanship in producing a product.	A recognition that workmanship is important in the delivered product in a senior design experience	ECE 492 Sp '03 and Sp '04: Successful based on score of 3.78/4.00. This improved from the 2002 cycle. The judging criterion is that teams score an average of 3.00/4.00 or better or 70% of the teams score 3.0 or better.	None needed.	ECE 492: Successful since 75% of the groups scored 3.0 or better (goal is 70%). However, the average of team scores was 2.94/4.00, indicating that this outcome should be looked at.	No reporting needed since no changes were put into place between S '04 and S '05 based on assessment findings.	The department will consider ways that students can be given more time to work on their projects by making either spreading the current three-credit course over two semesters or making ECE 492 a six-credit course.

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
TECHNOLOGY 2005 ASSESSMENT NARRATIVE
Written by Kenneth Reid
May 2005

The ECET Department has an established assessment plan in place, but recently refined our departmental objectives and outcomes. We mapped each departmental outcome to ABET criteria a-k and to the IUPUI Principals of Undergraduate Learning (PULs). The ECET Department will undergo an ABET accreditation visit in 2006. All learning outcomes were assessed completely in our latest cycle of assessment, and student learning has met departmental expectations on approximately 95% of the outcomes. Improvements have been planned to try to raise performance on the remaining outcomes.

In addition, we modified our assessment plan to be sure that each outcome is assessed using multiple methods, including assessment rubrics that were developed within the department, student self-assessment surveys, and specific final exam questions to be repeated each semester. Other assessment methods which may be applicable to specific objectives are also used.

Each faculty member also prepares an end of semester course reflection, identifying changes made, reasons for each change, and changes which should be made or investigated and assessment results which lead to these conclusions. These reflections are documented and reviewed to ensure continuous course improvement.

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING TECHNOLOGY 2005 A.S. ASSESSMENT REPORT
Prepared by Kenneth Reid, June 2005

Spring 2004 and Fall 2004 Semesters

1. General outcomes:	2. What the student will know or be able to do? (measurable outcomes)	3. How will you help students learn it (in class or out of class)	4. Where will your students learn it?	5. How each of the measurable outcomes is measured	6. 2003 assessment findings	7. Changes planned/put into place	8. 2004 assessment findings	9. Impact / further change needed
ABET Criterion 1, item a; Demonstrate an appropriate mastery of the knowledge, techniques, skills and modern tools of their discipline.	There are sets of generally accepted skills that are used in the discipline such as circuit analysis and design, analog and digital design, and programming.	Laboratories are a strong component of this learning objective. In addition normal classroom activities such as lectures, homework, and group learning activities.	Mastery of a skill set is a primary objective of the departments teaching mission and all courses in this curriculum have this as a primary focus.	Student self-assessment of their comprehension of course objectives was measured for courses taught during the spring and fall semesters. There were 128 course objectives identified with this criterion in the Spring 2004 semester, and fifty six in the Fall 2004.	The department is strong in this outcome with many relevant course objectives and 84.6 percent of students indicating they strongly agree or agree that they can perform tasks indicated by the course objectives	Changes were made in the assessment methods and data collection: course assessment surveys are completed for each course, and results for all courses are summarized. In addition, individual areas are investigated to look for problem areas. Changes made due to low scores are documented in Course Reflections done at the end of each semester.	The department is still strong in this outcome with 84.1% (Spring 2004) and 82.3% (Fall 2004) of students indicating that they strongly agree or agree that they can perform tasks indicated by the course objectives.	The department has modified its assessment plan and will have multiple areas from which to draw data for 2005; specific final exam questions in ECET 157, 164 and 209 will be analyzed.

Summary of the A.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item b; Apply current knowledge and adapt to emerging applications in mathematics, science, engineering and technology.	This is determined by a student's ability to synthesize information and arrive at reasoned conclusions. Given that the laboratory level is state-of-the-art & emerging technology (as our industrial advisory board has indicated), students demonstrate this in laboratory assignments.	Laboratories are a strong component of the learning. In addition normal classroom activities such as lectures, homework, and group learning activities.	Each course has course objectives relevant to this criterion.	Student self-assessment of their comprehension of course objectives was measured for courses taught during the spring and fall semester. Twenty nine course objectives from courses taught in the Spring 2004 and twenty five in Fall 2004 related to this course objective were analyzed.	The department remained strong in this area with 87.5 percent of students indicating they strongly agree or agree they can perform tasks in this area.	Changes were made in the assessment methods and data collection: course assessment surveys are completed for each course, and results for all courses are summarized. In addition, individual areas are investigated to look for problem areas. Changes made due to low scores are documented in Course Reflections done at the end of each semester.	The department remained strong in this area with 83.2 percent (Spring 2004) and 76.9 percent (Fall 2004) of students indicating they strongly agree or agree they can perform tasks in this area.	The department has modified its assessment plan and will have multiple areas from which to draw data for 2005; specific final exam questions in ECET 207, 307 and 357 will be analyzed.

Summary of the A.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item c; Conduct, analyze and interpret experiments and apply experimental results to improve processes.	Students ability to conduct experiments and properly measure outputs and form proper conclusions based on the outputs.	Laboratories are a strong component of this learning objective. All ECET courses include a laboratory component.	Students will learn this objective in all AS courses; since they are all include a laboratory component.	Student self-assessment of their comprehension of course objectives was measured. There were 26 course objectives identified with this criterion (Spring 2004) and five in Fall 2004. Laboratory practicals are given in many courses that require a student to design a circuit or system, construct it, and analyze the results to determine if improvements are needed.	The department is strong in this area with 84.9 percent of students indicating they strongly agree or agree they can perform tasks related to this objective. 80 percent of students scored 70% or higher on the EET205 laboratory practical	Courses are assessed at the end of each semester for continuous improvement. Specific assessment of items in this topic showed the department to be strong in this area, and no specific changes were implemented due to assessment data.	The department remains strong in this area with 79.3 percent (Spring 2004) and 74.9 percent (Fall 2004) of students indicating they strongly agree or agree they can perform tasks related to this objective**.** 85.7 percent of students scored 70% or higher on the EET209 laboratory practical in Spring 2004.	The department will investigate using other laboratory practical exams in addition to the student self-assessment. We plan to develop a rubric to assess students ability to analyze experimental results.

Summary of the A.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item d; Apply creativity in the design of systems, components or processes appropriate to program objectives.	Students should be able to design a system by creatively applying fundamental skills learned in the curriculum.	Some laboratory assignments and projects require a creative approach such as the course projects in ECET109, 159, 209 and 231.	ECET109, ECET159, ECET164, ECET209, and ECET231 have course objectives that have a creative component.	Student self-assessment of their comprehension of course objectives was measured. There were 29 course objectives identified with this criterion in Spring, and seven in Fall.	The department is strong is this outcome with many relevant course objectives and 89 percent of students indicating they strongly agree or agree that they can perform tasks indicated by the course objectives.	ECET 257 was offered as a problem-based learning course for the first time – all problems presented required significant creativity.	The student self evaluations showed that 84.2 percent (Spring 2004) and 78.5 percent (Fall 2004) strongly agreed or agreed that they could perform tasks related to this objective. The results of the design rubric in ECET257 showed an average of 4.43/5.0 (Spring 2004)	Changes have been made to the assessment plan, including assessing the program as a whole instead of AS vs. BS level. This outcome will be assessed primarily in the Senior Design project course.

Summary of the A.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item e; Function effectively on teams.	Students should successfully work within a team environment: this includes understanding different roles within a team and working with others in modular designs and projects.	Laboratories are a strong component of this learning objective. In addition normal classroom activities such as lectures, homework, and group learning activities.	Students work in small groups in most of our laboratories and learn practical group skills. In addition, courses taught in spring 2004 have 5 course objectives related to group activities, and four in Fall 2004. Most courses have group projects.	Student self-assessment of their comprehension of course objectives was measured. There were four course objectives identified with this criterion in Fall. A team-assessment rubric was completed by students and the instructor teaching ECET 234. This course was used to evaluate group activity since it is one of the last courses taken for the A.S. degree. Course objectives were evaluated by students.	The percentage of students who strongly agree or agree that they can perform tasks indicated by the course objectives was 83.2 percent. Results from team rubrics in ECET 159 and ECET 209 showed 84.2% of students ranked their team as 3,4, or 5 on a 5-point scale: the average team ranking was 3.79 out of 5	Changes were made in the assessment methods and data collection: course assessment surveys are completed for each course, and results for all courses are summarized. In addition, individual areas are investigated to look for problem areas.	The percentage of students who strongly agree or agree that they can perform tasks indicated by the course objectives was 83 percent (Spring 2004) and 85.8 percent (Fall 2004). Results from team rubrics in ECET 234 showed 94.6% (Spring 2004) and 97.4% (Fall 2004) of students ranked their team as 3,4, or 5 on a 5-point scale.	The new assessment plan calls for the ECET Teaming rubric to be used in specific courses (ECET 209, 257, 307, 309, 360, 371, and 417)

1. General outcomes:	2. What the student will know or be able to do? (measurable outcomes)	3. How will you help students learn it (in class or out of class)	4. Where will your students learn it?	5. How each of the measurable outcomes is measured	6. 2003 assessment findings	7. Changes planned/put into place	8. 2004 assessment findings	9. Impact / further change needed
ABET Criterion 1, item f; Identify, analyze and solve technical problems.	There are sets of generally accepted problem types used in the discipline.	A large portion of normal classroom activities such as lecture and homework are devoted to teaching this objective. Laboratories also play a strong role in teaching related to this learning objective.	Mastery of discipline related problem solving is primary objective of the departments teaching mission and all courses in this curriculum have this as a primary focus.	Student self-assessment of their comprehension of course objectives was measured. There were 66 course objectives identified with this criterion (Spring) and 26 (Fall).	The department is strong is this outcome with many relevant course objectives and 81.7 percent of students indicating they strongly agree or agree that they can perform tasks indicated by the course objectives. The results from the selected EET 204 problem indicate a 4 out of a possible 5 for problem solving. Results from EET154 indicate that 23 out of 26 students were successful, an 88% success rate.	We looked at better defining our goals and assessment strategy in this area to better delineate (a) from (f) based on Bloom's level. Our new assessment plan successfully measures both outcomes.	The department has many course outcomes in this area: 83.9% of students (Spring 2004) and 86.7% (Fall 2004) and strongly agree or agree that they can accomplish tasks in this area. Results from a survey of three questions in ECET284 measuring analysis skills showed that 65.33% of students scored 70% or higher: there is some question on which analysis problems should be used (Spring)	The department has modified its assessment plan and will have multiple areas from which to draw data for 2005; specific final exam questions in ECET 207, 231, 307, 309, 417, 483 and BMET 320 will be analyzed. In addition, a "problem solving steps" bookmark has been developed, and will be distributed to all students. Faculty are encouraged to require that the process on the bookmark be followed by students.

Summary of the A.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item g; Communicate effectively.	We evaluated based on communications skills that are expected by industry of recent AS graduates.	Students are required to write papers that are returned for corrections. Oral presentations are critiqued. ENGW131 and COMM R110 are required courses in the curriculum.	Students take the required English composition and speech courses. In addition, papers are required in ECET155, 157, and 234. Seventeen course objectives from courses taught in spring (four in Fall) were related to communications. Nearly all laboratories require written reports.	Student self-assessment of their comprehension of course objectives was measured. Oral presentations and writing skills were evaluated in ECET234.	87.8 percent of students surveyed strongly agreed or agreed they could do tasks in these areas. ECET 155 peer evaluations had an average evaluation of 93%, and written reports (final formal reports) evaluation of 95.6%. Evaluations in ECET204 indicate that 90% of students made written & oral presentations that the instructor felt would be acceptable for a recent A.S. graduate.	Additional instructions on written and oral presentations were introduced in lecture and on the Internet for students in ECET 234. Courses requiring oral or written presentations will use the ECET Writing and Speaking rubrics for assessment.	84.9 percent of students (Spring) and 93 percent (Fall) surveyed strongly agreed or agreed they could do tasks in these areas. ECET 234 peer evaluations of oral presentations had an average evaluation of 3.95 out of 5 (Spring) and 4.03 (Fall). Instructor evaluations for ECET234 were: oral presentations: 3.86/5 (77%) written: 4.0/5 (80%) (Spring)	The new assessment plan calls for the oral and writing rubrics to be implemented in each course requiring these reports.

Summary of the A.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item h; Recognize the need for and possess the ability to pursue lifelong learning.	Evaluate student's ability to investigate an unfamiliar topic outside of class using global research tools.	Provide guidance to direct students to appropriate research tools.	ECET103.	Student self-assessment of their comprehension of course objectives was measured. There were two course objectives identified with this criterion in Spring; three in Fall.	The department is strong is this outcome with many relevant course objectives and 90.9 percent of students indicating they strongly agree or agree that they can perform tasks indicated by the course objectives.	Courses such as ECET 234 have added assignments requiring students to conduct a research project using outside recourses.	85 percent of students (Spring) and 76.7 percent (Fall) indicated they strongly agree or agree that they can perform tasks indicated by course objectives.	The new assessment plan implements separating the writing report rubric to separate out "relevant courses used"

Summary of the A.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item i; Understand professional, ethical and societal responsibilities.	Evaluation of course objectives and review case studies / safety requirements. Performance ratios from student designs.	Ethical case studies related to safety are presented in the classroom. T	ECET106 and 107.	Student self-assessment of their comprehension of this course objective was measured for ECET231 during the spring semester, and 106, 107 and 234 for Fall.	80 percent of students indicating they strongly agree or agree that they understand ethical issues related to safety.	ECET 106 students will be introduced to the importance of these issues in the workplace. ECET 107 has added a specific learning objective covering the IEEE Code of Ethics	95.2% of students surveyed (Spring) and 91.7 percent (Fall) indicated that they strongly agree or agree that tasks associated with these objectives can be accomplished.	The department developed a "civility / ethics" rubric and has implemented it into the assessment plan. The department added a required 1credit ethics course in the senior year.

Summary of the A.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item j; Recognize contemporary professional, societal and global issues and be aware of and respect diversity.	Respect diversity: Increased awareness of personality types and individual differences.	Students are taught to identify their own personality types based on standard scales such as Meyers-Briggs.	ECET106	Classroom lecture accompanied by on-line assessments.	91.5 percent of students surveyed indicated that they strongly agree or agree that tasks in course objectives in this are can be completed.	The department developed a "civility / ethics" rubric and has implemented it into the assessment plan. The department added a required 1credit ethics course in the senior year.	71.9 percent of students surveyed indicated that they strongly agree or agree that tasks in course objectives in this are can be completed (note: a large number of responses were marked "undecided") – Spring 2004. In Fall, 94% agreed or strongly agreed.	The new assessment plan calls for implementation of the faculty survey on civility / respect for diversity and ethics: this was first used in Spring 2005. The new required course in ethics will also cover issues in this area.

Summary of the A.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item k; Have a commitment to quality, timeliness and continuous improvement.	Timeliness outcomes measured and a rubric for quality will be generated.	Enforcing strict project deadlines and explain the quality rubric.	All courses will stress timeliness; ECET 157 has a required power supply project where quality and the design process are emphasized.	We have identified courses for which we track the number of assignments of varying complexity that are submitted by the due date.	91.5 percent of students surveyed indicated that they strongly agree or agree that tasks in course objectives in this are can be completed. In an initial assessment, 83% of the assignments tracked in ECET 207 were submitted on time.	We will increase the amount of data collected to accurately track timeliness in the new assessment plan.	87% of assignments of different level of complexity and importance in ECET 109 and ECET 234 were submitted on time in Spring. 82.6% of similar assignments were submitted on time for Fall 2004. Student self-assessment surveys in Fall showed 88% of students agree or strongly agree they meet objectives in this area.	The department plan includes identifying more assignments in different courses for which timeliness will be recorded. Students will *not* be notified which assignments are used to collect this data

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING TECHNOLOGY 2005 B.S. ASSESSMENT REPORT
Prepared by Kenneth Reid, June 2005

Spring 2004 and Fall 2004 Semesters

1. General outcomes:	2. What the student will know or be able to do? (measurable outcomes)	3. How will you help students learn it (in class or out of class)	4. Where will your students learn it?	5. How each of the measurable outcomes is measured	6. 2003 assessment findings	7. Changes planned/put into place	8. 2004 assessment findings	9. Impact / further change needed
ABET Criterion 1, item a; Demonstrate an appropriate mastery of the knowledge, techniques, skills and modern tools of their discipline.	There are sets of generally accepted skills that are used in the discipline such as circuit analysis and design, analog and digital design, and programming.	Laboratories are a strong component of this learning objective. In addition normal classroom activities such as lectures, homework, and group learning activities.	Mastery of a skill set is a primary objective of the departments teaching mission and all courses in this curriculum have this as a primary focus.	Student self- assessment of their comprehension of course objectives was measured for courses taught during the spring semester. There were 35 course objectives from courses taught in Spring 2004 - 18 in the Fall semester - identified with this criterion, including ECET491 senior design, the department's terminal course. The design itself and the design process were evaluated in ECET 491. Selected exam questions were used in ECET303. We also surveyed graduates 6 months after graduation to determine how well the ECET department prepared them for the job market.	The department continued to be strong is this outcome with many relevant course objectives and 81.9 percent of students indicating they strongly agree or agree that they can perform tasks indicated by the course objectives. 100% of graduates surveyed replied that the department did a good or excellent job of preparing them for their current assignment.	Changes were made in the assessment methods and data collection: course assessment surveys are completed for each course, and results for all courses are summarized. In addition, individual areas are investigated to look for problem areas. Changes made due to low scores are documented in Course Reflections done at the end of each semester.	The department continues to be strong is this outcome with 35 relevant course objectives in each course offered; 80.4 percent of students indicating they strongly agree or agree that they can perform tasks indicated by the course objectives in Spring, and 84 percent in Fall 2004.	The department modified the assessment plan for 2005 and beyond. The new assessment methods continue to include student self-assessment, and we will add specific questions on final exams in ECET 157, 164 and 209 to assess this outcome. The assessment plan for 205 assesses programs rather than separating into AS and BS degrees.

Summary of the B.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item b; Apply current knowledge and adapt to emerging applications in mathematics, science, engineering and technology.	This is determined by a student's ability to synthesize information and arrive at reasoned conclusions.	Laboratories are a strong component of the learning. In addition normal classroom activities such as lectures, homework, and group learning activities.	ECET417, ECET490, and ECET491 have course objectives relevant to this criterion. For example, ECET 417 uses VHDL (not typically found in Technology programs).	Student self-assessment of their comprehension of course objectives was measured. Twenty four course objectives from both Spring and Fall 2004 semesters related to this course objective.	90.0 percent of students indicating they strongly agree or agree that they can perform tasks indicated by the course objectives.	Courses are assessed at the end of each semester for continuous improvement.	80.4 percent of students in Spring 2004 and 85.1% in Fall 2004 indicated they strongly agree or agree that they can perform tasks indicated by the course objectives. Out Industrial Advisory Board (IAB) has informally said that our labs deal with emerging technologies.	Additional courses within ECET will be targeted for assessment of this item in addition to Senior Design. A rubric to assess design skills has been developed and will be implemented in these courses. We are looking for a method to quantify our IAB opinion of our laboratories.

Summary of the B.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item c; Conduct, analyze and interpret experiments and apply experimental results to improve processes.	Student's ability to conduct experiments and properly measure outputs and form proper conclusions based on the outputs.	Laboratories are a strong component of this learning objective. All ECET courses include a laboratory component.	Students will learn this objective in all AS courses, since they are all include a laboratory component.	Student self-assessment of their comprehension of course objectives was measured. There were 5 course objectives identified with this criterion. Laboratory practicals are given in many courses that require a student to design a circuit or system, construct it, and analyze the results to determine if improvements are needed.	77.2 percent of students indicated they strongly agree or agree that they can perform tasks indicated by the course objectives.	Courses are assessed at the end of each semester for continuous improvement.	87 percent (Spring 2004) and 80.3 percent (Fall 2004) of students indicated they strongly agree or agree that they can perform tasks indicated by the course objectives.	We plan to develop a rubric to be used in ECET 307 and 357 to measure student's ability to analyze experimental results.

Summary of the B.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item d; Apply creativity in the design of systems, components or processes appropriate to program objectives.	Students should be able to design a system by creatively applying fundamental skills learned in the curriculum.	Some laboratory assignments require a creative approach such as a lab project in ECET307 where students perform two designs and compare and contrast them. Results are presented in persuade investors to invest in the project. In ECET360 students design a production line and make the case for it to potential investors.	Most ECET courses have course objectives that have a creative component.	Student self-assessment of their comprehension of course objectives was measured. There were 18 (Spring) and 10 (Fall) course objectives identified with this criterion. This outcome was also evaluated in ECET491 senior design, the department's terminal course. The design itself and the design process were evaluated in ECET 491.	74.7 percent of students indicated they strongly agree or agree that they can perform tasks indicated by the course objectives. The results from ECET 491: 4.2/5.0 from a variety of faculty and industry evaluators.	Courses are assessed at the end of each semester for continuous improvement.	80.9 percent (Spring) and 87 percent (Fall) of students indicated they strongly agree or agree that they can perform tasks indicated by the course objectives. The results from ECET 491 were a 4.14/5.00 rating (Spring) and 3.18/5.00 (Fall).	Investigate methods to further quantify creativity, including but not limited to the design rubric, especially within problem-based learning courses or modules., in addition to Senior Design

Summary of the B.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item e; Function effectively on teams.	Students should successfully work within a team environment: this includes understanding different roles within a team and working with others in modular designs and projects.	Laboratories are a strong component of this learning objective. In addition normal classroom activities such as lectures, homework, and group learning activities.	Students work in small groups in most of our laboratories and learn practical group skills. Courses ECET309, ECET 360 and ECET 417 have formal group projects.	A self-assessment was completed by students and the instructor teaching courses with group projects. Course objectives were evaluated by students. There was one course with specific objectives relating to these criteria. The ECET Teaming rubric is to be used o assess team skills in any course with a group project.	78.3 percent of students indicated they strongly agree or agree that they can perform tasks indicated by the course objectives A peer review of teammates in EET 360 rated team member contributions as a 4.4 out of 5.	Courses are assessed at the end of each semester for continuous improvement. The ECET teaming rubric was validated by OLS.	81.5 percent (Spring 2004) and 85% (Fall 2004) of students indicated they strongly agree or agree that they can perform tasks indicated by the course objectives ECET 417 had two group projects: the first had an average team score of 3.7/5.0. After teaming instruction, the results were 4.53/5.0. There as a perception that more courses had problems with individual students within teams (Spring 2004). Students in ECET 360 rated their team skills as 4.58 / 5.00 (instructor rating 4.56 / 5.00) – Fall 2004.	The improvement in results in 417 show that more teaming instruction should be offered. We need to look at addressing teaming training earlier and throughout the curriculum.

Summary of the B.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item f; Identify, analyze and solve technical problems.	There are sets of generally accepted problem types used in the discipline.	A large portion of normal classroom activities such as lecture and homework are devoted to teaching this objective. Laboratories also play a strong role in teaching related to this learning objective.	Mastery of discipline related problem solving is primary objective of the departments teaching mission and all courses in this curriculum have this as a primary focus.	Student self-assessment of their comprehension of course objectives was measured. There were 39 (Spring) and six (Fall) course objectives identified with this criterion. This outcome was also evaluated in ECET491 senior design, the department's terminal course. The design itself and the design process were evaluated in ECET 491.	The department is strong is this outcome with many relevant course objectives and 80.8 percent of students indicating they strongly agree or agree that they can perform tasks indicated by the course objectives. The results from ECET491 were a 4.4 out of a possible 5.	Courses are assessed at the end of each semester for continuous improvement.	83.1 percent (Spring) and 84.5 percent (Fall) of students indicated they strongly agree or agree that they can perform tasks indicated by the course objectives. Results of using the design rubric in ECET417 showed an average of 3.10 out of 5, with 77% of teams scoring a 3, 4, or 5.	The new assessment plan calls for assessment of this outcome in ECET 207, 231, 307, 309, 417, 483 and BMET 320: these courses will use specific final exam questions to measure this outcome (goal: 70% score 70% or higher on each question). In addition, a "problem solving steps" bookmark has been developed, and will be distributed to all students.

Summary of the B.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item g; Communicate effectively.	We evaluated based on communications skills that are expected by industry of recent AS graduates.	Students are required to write papers that are returned for corrections. Oral presentations are critiqued.	Students take the required English composition and speech courses. In addition, papers are required in many courses, including ECET490 and ECET491.	Oral and written presentations were evaluated in ECET 491 senior the department's capstone course. Seven course objectives from courses taught in spring were related to communications.	78 percent of students indicated they strongly agree or agree that they can perform tasks indicated by the course objectives. Oral presentations in EET 360 were judged by an outside panel of experts: student presentations were rated at 4.2 out of 5. In ECET 491, the presentations were ranked as 4.2/5.0	The assessment rubrics used in Senior Design were modified to be consistent with other courses assessing oral and written presentations.	95.2 percent of students (Spring) and 91.7% (Fall) indicated they strongly agree or agree that they can perform tasks indicated by the course objectives. Written reports in ECET 417 were rated at 4.0/5.0 In ECET 491, the presentations were ranked as 4.14/5.00 (Spring) and 3.95/5.00 (Fall)	Written reports are to be assessed in ECET 155, 157, 234, 304, 403, 417, 483 and Senior Design: oral reports will be assessed in 155, 234, 360, 371, 483 and Senior Design. There were more instances of plagiarism this semester: this must be addressed further.

Summary of the B.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item h; Recognize the need for and possess the ability to pursue lifelong learning.	Evaluate student's ability to investigate an unfamiliar topic outside of class using global research tools.	We require research projects using technical literature. ECET 490-91 requires demonstration of technical competence in state-of-the art project management and project design.	Many courses require investigative reports or assignments, including ECET303, ECET307, ECET360, ECET403, ECET472, ECET490 and ECET491.	Student self-assessment of their comprehension of course objectives was measured. There were six course objectives identified with this criterion.	The department is strong is this outcome with many relevant course objectives and 79.5 percent of students indicating they strongly agree or agree that they can perform tasks indicated by the course objectives.	Courses which require outside research as part of papers or projects are to stress the importance of assessing the validity of their sources. Additionally, sources other than Internet sources are now required.	87.5 percent (Spring) and 100% (Fall) of students indicated they strongly agree or agree that they can perform tasks indicated by the course objectives. One finding related to this objective was a sharp increase in plagiarism; the department has developed a plan to address this problem.	Investigate other assessment methods, especially in PBL courses/projects (PBL projects require self-directed learning, essential in life long learning). We are also looking at a modification of the writing rubric to separate out "relevant courses used" We are developing a plan to detect and educate students on plagiarism.

Summary of the B.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item i; Understand professional, ethical and societal responsibilities.	Students can successfully communicate the many alternative choices.	Ethical case studies are presented in the classroom.	ECET491.	There were 4 course objectives from B.S. courses taught in the Spring 2004 semester covering these criteria.	92.9 percent of students indicated they strongly agree or agree that they understand material related to course objectives covering this topic.	This outcome has undergone significant change: we now formally educate students in ECET 106 and 107, and added a new required course in the Senior year on ethics. A civility / ethics rubric was also developed and will be implemented into the assessment plan in 2005.	84 percent (Spring) and 61% (Fall) of students indicated they strongly agree or agree that they understand material related to course objectives covering this topic. Changes have been implemented to address the low number in Fall (although the total number of responses is low (18 total), which indicate the percentage may not be as significant as other percentages in the report.	The department developed a "civility / ethics" rubric and has implemented it into the assessment plan. The department added a required 1credit ethics course in the senior year.

Summary of the B.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item j; Recognize contemporary professional, societal and global issues and be aware of and respect diversity.	Respect diversity: Increased awareness of individual differences.	Case studies are presented in the classroom.	ECET491: in addition, students are taught to identify their own personality types based on standard scales such as Meyers-Briggs.	There were five course objectives from B.S. courses taught in the Spring 2004 semester covering these criteria, and one in Fall.	92.9 percent of students indicated they strongly agree or agree that they understand material related to course objectives covering this topic.	The department developed a “civility / ethics” rubric and has implemented it into the assessment plan. The department added a required 1credit ethics course in the senior year.	85.5 percent of students (Spring) and 90% (Fall) indicated they strongly agree or agree that they understand material related to course objectives covering this topic.	The new assessment plan calls for implementation of the faculty survey on civility / respect for diversity and ethics: this was first used in Spring 2005. The new required course in ethics will also cover issues in this area.

Summary of the B.S. Degree Program –Spring 2004 and Fall 2004 Semesters

1. General outcomes:	**2. What the student will know or be able to do? (measurable outcomes)**	**3. How will you help students learn it (in class or out of class)**	**4. Where will your students learn it?**	**5. How each of the measurable outcomes is measured**	**6. 2003 assessment findings**	**7. Changes planned/put into place**	**8. 2004 assessment findings**	**9. Impact / further change needed**
ABET Criterion 1, item k; Have a commitment to quality, timeliness and continuous improvement.	Timeliness outcomes measured and a rubric for quality will be generated.	Teach project management making use of Gantt charts and other organizational tools.	Throughout the 100/200 level courses, and ECET490/491	Student self assessment of their comprehension of course objectives was measured. There were two course objectives identified with this criterion.	100 percent of students indicated they strongly agree or agree that they understand concepts behind the course objective.	Student self-evaluation and milestone (Gantt) charts (expected and delivered) will be evaluated in Senior Design	87.5 percent (Spring) and 78.1% (Fall) of students indicated they strongly agree or agree that they understand material related to course objectives covering this topic. 80.4 percent of assignments in ECET 307 were submitted on time.	A rubric to assess milestone charts will be implemented in senior design (ECET 490/491). In addition, quality rubrics used in lower level courses will be assessed here in 2005 when the AS and BS degrees are combined into one assessment report.

FRESHMAN ENGINEERING PROGRAM 2005 ASSESSMENT ANNUAL REPORT
Based on ABET/EAC's Program Outcomes
Prepared by the Freshman Engineering Staff
June 2005

1	2	3	4	5	6	7	8
Program outcomes	**Measurable outcomes: What will the student know or be able to do?**	**Courses Reflecting the Outcomes**	**Methods of Teaching/Learning**	**How do you measure each of the desired behaviors listed in column 2?**	**What are findings in assessing general outcomes (column 1)?**	**Proposed improvements (and changes) based on available assessment findings?**	**Impact of changes?**
(a) Ability to apply knowledge of mathematics, science, and engineering	Students will be able to use Matlab to perform computations involving scalars, vectors and matrices. Students will be able reverse-engineer a real world electro-mechanical device. Students will be able to write programs in C language to solve engineering problems.	ENGR 196, ENGR 197	Lectures, computer assignments, labs, group discussions, homework assignments, reverse-engineering projects. .	Tests, homework, computer programs, course outcome surveys, student satisfaction surveys, evaluation of project reports.	Quantitative assessment across sections is not available. Outcome surveys for ENGR 196 and 197 have ratings above 3.75 for most outcomes involving math and science application. Preliminary survey indicates benefit of a reverse-engineering project in meeting learning objectives. Upper division professors in ECE and ME report that students do not retain Matlab learned in freshman year.	Use standardized exams for the different sections of courses to help better assess the program outcomes. (A standardized final exam for ENGR 197 is planned for 2005-2006.) Extend hands-on team projects to all sections of Engr 196. Develop better-structured projects using feedback gained from pilot project survey in spring 2004. Remove Matlab from freshman curriculum and insert a one-credit Matlab course in the sophomore year.	

Program outcomes	Measurable outcomes: What will the student know or be able to do?	Courses Reflecting the Outcomes	Methods of Teaching/Learning	How do you measure each of the desired behaviors listed in column 2?	What are findings in assessing general outcomes (column 1)?	Proposed improvements (and changes) based on available assessment findings?	Impact of changes?
(b) Ability to design and conduct experiments, as well as to analyze and interpret data	Students will be able to conduct experiments by following instructions for set up of simple experiments. Students will be able to obtain experimental numerical or graphical data and to compare results with theoretical models.	ENGR 196	Tutorials in class, lectures, computer assignments, lab work, group discussions, homework assignments, and Web resources.	Lab reports and outcome surveys.	Outcome survey results suggest that students have better mastery of simulation than of circuit construction and experimentation.	Use robots to illustrate electrical principles.	

Program outcomes	Measurable outcomes: What will the student know or be able to do?	Courses Reflecting the Outcomes	Methods of Teaching/Learning	How do you measure each of the desired behaviors listed in column 2?	What are findings in assessing general outcomes (column 1)?	Proposed improvements (and changes) based on available assessment findings?	Impact of changes?
(d) Ability to function on multi-disciplinary teams	Students will be able to work together in small groups to carry out experiments and to complete projects. Students will be able to collaborate with others to report on project findings, orally and in writing. Students will be able to operate as a member of a team with an understanding of the roles and relationships of members.	ENGR 195, ENGR 196	Lectures and team building exercises; practice in teamwork doing laboratory experiments, reverse engineering projects, library research projects, and team oral and written reports.	Lab reports, project presentation grades, and peer evaluations	Current group work appears to provide sufficient interaction between students of different disciplines, but not all teams are functioning well.	Include more specific teamwork instruction in ENGR 196 and extend reverse engineering team projects to all sections at IUPUI. Improve team instruction at Butler and add a second team project.	

Program outcomes	Measurable outcomes: What will the student know or be able to do?	Courses Reflecting the Outcomes	Methods of Teaching/Learning	How do you measure each of the desired behaviors listed in column 2?	What are findings in assessing general outcomes (column 1)?	Proposed improvements (and changes) based on available assessment findings?	Impact of changes?
(e) Ability to identify, formulate, and solve engineering problems	-Starting with a given problem, students will be able to develop and solve algorithms with Matlab or C programs. -Students will be able to solve for electrical circuit voltages and currents using Pspice.	ENGR 196, ENGR 197	Lectures, assigned computer programs, and class exercises.	Tests, quizzes, homework, computer programs, outcome surveys.	Complaints were received from some students in ENGR 197 regarding learning both Matlab and C programming in one semester. Too much is covered in a short time. In outcome surveys, writing of C programs to solve engineering problems continues to receive ratings lower than 3.75.	Remove Matlab from the freshman curriculum and add a separate Matlab course in the sophomore year. Change the C textbook (being changed in fall, 2004). Administer a standardized C programming final exam in 2005-2006 to assist with assessment.	

Program outcomes	Measurable outcomes: What will the student know or be able to do?	Courses Reflecting the Outcomes	Methods of Teaching/Learning	How do you measure each of the desired behaviors listed in column 2?	What are findings in assessing general outcomes (column 1)?	Proposed improvements (and changes) based on available assessment findings?	Impact of changes?
(f) Understand professional and ethical responsibilities.	Students should be able to demonstrate a knowledge of the engineering professional societies Students should be able to articulate an understanding of the responsibility of engineers regarding safety.	ENGR 195	Lectures and case studies.	Homework, reports and outcome surveys.	Outcome surveys indicate student mastery (ratings above 4.1).	Try to insure that professional society representatives meet with all sections early in the semester.	

Program outcomes	Measurable outcomes: What will the student know or be able to do?	Courses Reflecting the Outcomes	Methods of Teaching/Learning	How do you measure each of the desired behaviors listed in column 2?	What are findings in assessing general outcomes (column 1)?	Proposed improvements (and changes) based on available assessment findings?	Impact of changes?
(g) Ability to communicate effectively	Students will be able to write reports and make project presentations to peers.	ENGR 195 ENGR 196	Lectures, project reports, and oral presentations including PowerPoint.	Written report and oral presentation evaluations using rubrics.	Students are developing an appreciation for communication skills in engineering. Better guidelines are needed for reports in reverse engineering project.	Improve guidelines for reverse engineering project reports. Improve guidelines for ENGR 195 research reports.	Reverse engineering project reports were more standardized in fall 2004 pilot than in previous pilot

Program outcomes	Measurable outcomes: What will the student know or be able to do?	Courses Reflecting the Outcomes	Methods of Teaching/Learning	How do you measure each of the desired behaviors listed in column 2?	What are findings in assessing general outcomes (column 1)?	Proposed improvements (and changes) based on available assessment findings?	Impact of changes?
(h) The broad education necessary to understand the impact of engineering solutions in a global and societal context	-Students will demonstrate awareness of global impact of engineering on society and environment.	ENGR 195	Lectures, literature surveys and case studies.	Homework, project reports, project presentations, and outcome surveys.	Students indicate a preliminary understanding in outcome surveys and in project presentations.	Use more real world examples in ENGR 195 (including products investigated in ENGR 196) when studying impact of engineering on society.	

Program outcomes	Measurable outcomes: What will the student know or be able to do?	Courses Reflecting the Outcomes	Methods of Teaching/Learning	How do you measure each of the desired behaviors listed in column 2?	What are findings in assessing general outcomes (column 1)?	Proposed improvements (and changes) based on available assessment findings?	Impact of changes?
(k) Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	Students will be able to use engineering tools like ProE, Matlab, Excel, and PSpice to complete engineering assignments. Students will be able to use Front Page to develop web pages. Students will be able to perform library and web searches. Students will be able to use PowerPoint in presentations.	ENGR 195, ENGR 196, ENGR 197	Lectures, classroom assignments, tutorials, homework, and laboratory work.	Graded assignments, lab reports, tests, project presentations, and outcome surveys.	Products produced indicate at least minimal proficiency in use of tools such as Front Page, PowerPoint, Excel, PSpice, library databases, and ProENGINEER. Survey of pilot reverse engineering project participants indicated that the project enhanced ProE proficiency. Outcome surveys indicate students are confident of MATLAB mastery (ratings above 3.75).	Extend reverse engineering projects to all sections of ENGR 196 to enhance ProE applications and give more experience with PowerPoint.	

Summary of Student Satisfaction Survey Results
Freshman Engineering Program
2003-2005

	Questions	Spring 2003	Fall 2003	Spring 2004	Fall 2004	Spring 2005
1.	Quality of Academic Advising	3.88 (95)	3.97 (139)	3.95 (129)	3.96 (143)	4.19 (101)
2.	Quality of student support in adjusting to college	3.56 (81)	3.77 (124)	3.72 (129)	3.78 (134)	3.77 (102)
3.	Scheduling of ENGR 195, 196, 197	3.76 (104)	3.80 (141)	3.78 (129)	3.99 (145)	4.08 (104)
4.	Classroom environment conducive to learning	3.82 (103)	3.86 (145)	3.91 (129)	4.07 (147)	4.14 (106)
5.	Quality of Engineering and Technology computer labs	3.85 (105)	3.60 (141)	3.99 (129)	4.00 (146)	4.07 (106)
6.	Quality of ENGR 196/197 help sessions in aiding classroom performance	3.48 (61)	3.61 (88)	3.54 (129)	3.53 (93)	3.77 (76)
7.	Opportunities for networking with fellow students and faculty through professional societies such as ASME, IEEE, AIAA, SWE, NSBE, SAE, etc.	3.25 (63)	3.60 (103)	3.73 (129)	3.81 (110)	3.58 (72)
8.	Career planning assistance, department selection (ME/ECE/others) and study skills development	3.43 (71)	3.38 (117)	3.57 (129)	3.51 (119)	3.63 (88)
9.	Overall freshman experience on the IUPUI campus	3.57 (97)	3.75 (138)	3.79 (129)	3.90 (139)	4.0 (103)
10.	Overall quality of Freshman Engineering education	3.65 (100)	3.80 (142)	3.78 (129)	4.01 (140)	4.12 (105)
11.	Quality of Instruction (new question for Spring 2004)	N/A	N/A	3.89 (129)	3.93 (145)	4.20 (106)

Analysis

Student satisfaction data for the Freshman Engineering Program summarized above show an improvement in student satisfaction for nearly all categories both in the Fall and Spring semesters, 2004-2005, when compared with those of corresponding semesters of the previous academic year.

-In both spring and fall semesters satisfaction was relatively high in the areas of academic advising, class scheduling, classroom and computer lab environment, quality of instruction, and overall freshman engineering education.

-Efficacy of help sessions varies with the time of day the CNC labs are available for tutoring. During the spring 2005 semester satisfaction with help session increased and this may have been due to the fact that Tuesday afternoon was available for tutoring and an experienced student tutor for C programming and Matlab was also available at that time. In the future, a lab space for student projects may also become a student help site.

-Opportunities for networking with fellow students and faculty through professional societies such ASME, IEEE, etc has shown a steady rise from Spring 2003 but fell again in Spring 2005. It appears that opportunities for networking with students through professional societies ebbs and flows with the strength of the student organizations. Several engineering student societies were relatively inactive during the 2004-2005 academic year. In the freshman learning community class, we continue to place emphasis on participation in student organizations because of the benefits gained. We have been using a freshman student listserv and hope to establish a freshman student advisory board next year.

-Hopefully the inclusion of more hands-on project work in the freshman curriculum will also help to familiarize students with engineering disciplines.

-Assistance with career planning and department selection is an area we hope to incorporate in academic advising; especially many students at this stage are not sure what kind of engineering they are interested in. We continue to promote internship opportunities in the learning community and through the freshman listserv.

-The survey indicates that students need ongoing help in adjusting to college. Perhaps more needs to be done in other classes and co-curricular activities in addition to the ENGR 195 class (which most students take in the fall semester).

FRESHMEN ENGINEERING RETENTION STATISTICS
Prepared by Nancy Lamm
June 2005

Students Entering Freshman Engineering during 1999-2000 Academic Year
As of July, 2003

Academic Standing	Beginners	Transfers Other Schools	IUPUI Transfers	EDDP*
Graduated or at Senior Status in Engineering	14	26	15	12
Still in Engineering at Freshman – Junior Level	5	10	5	1
Known to have Transferred to Another University	5	2	2	1
Graduated or at Senior Status at IUPUI in Major other than Engineering	8 (Includes 2 AS degrees in Tech).	3	2	11 (at Butler)
At IUPUI in another Major at Freshman – Junior Level	3	5	4	
Dropped Out	19	24	8	10
Total	**54**	**70**	**36**	**35**
Percentage Retained in Engr	**35.2%**	**51.4%**	**55.6%**	**37.1%**

*IUPUI- Butler University Dual Degree Program

Students Entering Freshman Engineering During 1999-2000 Academic Year And Later Moved to ECE or ME Department As of July, 2003

Academic Standing	Beginners	Transfers Other Schools	IUPUI Transfers	EDDP*
Graduated or at Senior Status in Engineering	14	23	14	12
Still in Engineering at Freshman – Junior Level	3	5	3	
Graduated or at Senior Status at IUPUI in Major other than Engineering		1		
At IUPUI in another Major at Freshman – Junior Level		1	2	
Dropped Out		4		
Total	**17**	**34**	**19**	**12**
Percentage Retained in Engr	**100%**	**82.4%**	**89.5%**	**100%**

*IUPUI- Butler University Dual Degree Program

Students Entering Freshman Engineering during 2000-2001 Academic Year As of June, 2004

Academic Standing	Beginners	Transfers Other Schools	IUPUI Transfers	EDDP*
Graduated or at Senior Status in Engineering	16	30	12	12
Still in Engineering at Freshman – Junior Level	3	13	4	
Known to have Transferred to Another University	4	6	2	1
Graduated or at Senior Status at IUPUI in Major other than Engineering	3	4		9 (at Butler)
At IUPUI in another Major at Freshman – Junior Level	2	2	1	2
Dropped Out	14	46	4	6
Total	**42**	**101**	**23**	**30**
Percentage Retained in Engr	**45.2%**	**42.6%**	**69.6%**	**40.0%**

*IUPUI- Butler University Dual Degree Program

Students Entering Freshman Engineering During 2000-2001 Academic Year And Later Moved to ECE or ME Department As of June, 2004

Academic Standing	Beginners	Transfers Other Schools	IUPUI Transfers	EDDP*
Graduated or at Senior Status in Engineering	16	30	12	12
Still in Engineering at Freshman – Junior Level	2	4	3	
Graduated or at Senior Status at IUPUI in Major other than Engineering	1			
At IUPUI in another Major at Freshman – Junior Level	1			
Dropped Out				1
Total	**20**	**34**	**15**	**13**
Percentage Retained in Engr	**90%**	**100%**	**100%**	**92.3%**

*IUPUI- Butler University Dual Degree Program

Students Entering Freshman Engineering during 2001-2002 Academic Year
As of June, 2005

Academic Standing	Beginners	Transfers Other Schools	IUPUI Transfers	EDDP*
Graduated or at Senior Status in Engineering	21	29	14	12
Still in Engineering at Freshman – Junior Level	5	9	8	
Known to have Transferred to Another University	5	2	3	2
Graduated or at Senior Status at IUPUI in Major other than Engineering	5	6	6	15
At IUPUI in another Major at Freshman – Junior Level	11	6	3	
Dropped Out	17	19	7	9
Total	**64**	**71**	**41**	**38**
Percentage Retained in Engr	**40.6%**	**53.5%**	**53.7%**	**31.6%**

*IUPUI- Butler University Dual Degree Program

Students Entering Freshman Engineering During 2001-2002 Academic Year And Later Moved to ECE or ME Department As of June, 2005

Academic Standing	Beginners	Transfers Other Schools	IUPUI Transfers	EDDP*
Graduated or at Senior Status in Engineering	21	29	14	12
Still in Engineering at Freshman – Junior Level	4	2	6	
Graduated or at Senior Status at IUPUI in Major other than Engineering	1	1	1	
At IUPUI in another Major at Freshman – Junior Level			1	
Dropped Out	1	1		
Total	**27**	**33**	**22**	**12**
Percentage Retained in Engr	**92.6%**	**93.9%**	**90.9%**	**100%**

*IUPUI- Butler University Dual Degree Program

Summary Percentages of Students Retained in Engineering

Admission Category	Students Entering 1999-2000 % Retained	Students Entering 2000-2001 % Retained	Students Entering 2001-2002 % Retained
Beginners	35.2%	45.2%	40.6%
Transfers from Other Schools	51.4%	42.5%	53.5%
IUPUI Transfers	55.6%	69.5%	53.6%
EDDP*	37.1%	40.0%	30.5%
Overall Retention (All Students)	**45.12% (n = 195)**	**40.82 (n = 196)**	**45.79 (n = 214)**

*IUPUI- Butler University Dual Degree Program

DEPARTMENT OF MECHANICAL ENGINEERING 2005 ASSESSMENT NARRATIVE

ME Assessment Web Site: http://www.engr.iupui.edu/me/fassessment.shtml

Prepared by: H.U. Akay
May 31, 2005

A program assessment process has been in place in the Department of Mechanical Engineering since Fall 2000 for continuous evaluation and improvement of its undergraduate program. This process has been influenced by the requirements of the Accreditation Board for Engineering and Technology (ABET) together with the assessment processes of IUPUI and the School of Engineering and Technology. Consistent with the criteria set by ABET, a set of *Program Educational Objectives* has been prepared that describe the expected accomplishments of graduates during the first few years after graduation as well a set of *Program Outcomes* that describe what students are expected to perform by the time of graduation. Our Bachelor of Science in Mechanical Engineering (B.S.M.E.) degree has been reviewed by ABET for re-accreditation in Fall 2004, for which a comprehensive self-study report has been prepared. Even though we have not yet received the official report from ABET, regarding the results of the review, all indications are that we will receive the maximum allowable re-accreditation period (six years) from ABET. More details are in the full ABET self-study report which is accessible from http://www.engr.iupui./edu/me/fabetreport.shtml), for which a summary is available at http://www.planning.iupui.edu/prac/03-04schoolreports/ET/ME.pdf.

Our Program Outcomes have been made to be consistent with the IUPUI Principles of Undergraduate Learning (PULs), a set of campus-wide adopted principles which describe the fundamental intellectual competence and cultural and ethical awareness that every graduate of an IUPUI baccalaureate degree program should. A matrix showing the linkage between our program outcomes and the IUPUI PULs prepared for this purpose showed that there is a sufficient linkage between the program outcomes and PULs as can be found at http://www.engr.iupui.edu/me/fpuls.shtml.

The tools that we have in place to assess effectiveness of our program and to make changes when needed fall into direct and indirect evidence categories. Among the indirect evidence category, we regularly conduct and analyze several surveys as follows:

1. Course learning outcomes surveys in all courses conducted at the end of each semester to determine self-assessment of students on how well the course outcomes are met
2. Exit surveys on program outcomes conducted at the time of graduation to obtain self-assessment of the graduates on how well the program outcomes are met
3. Annual student satisfaction survey conducted annually to determine student satisfaction with the program
4. Undergraduate Student Advisory Board that provides input on student satisfaction and needs
5. Alumni survey for measuring the impact of program outcomes in the performance of graduates

The tools in the direct evidence category consist of:

1. Industrial Advisory Board that provides input on performance and expected qualifications of graduates
2. Employer survey for measuring effectiveness of the program outcomes in the work force
3. Fundamentals of Engineering (FE) exam results on students who take it in their senior year. This is a nationalized exam, which gives comparisons of our students' sores against the national averages
4. Feedback forms for course outcomes survey results completed and submitted at the end of each semester by the faculty teaching the courses
5. Jury evaluations in key courses that involve final project reports or presentations in front of an audience of faculty, industry guests, and fellow students
6. Instructor's assessment of student performance in course outcomes via evaluation of key exams, projects and homework against the course outcomes
7. Industry feedback of performance of our coops and interns. A new process has been initiated at the School level, which is expected to give good data on our student's performance in the workplace

Collection and assessment of these data are continuing and the appropriate enhancements are being made regularly.

MECHANICAL ENGINEERING BS 2005 ASSESSMENT REPORT

Prepared by: Hasan Akay with ME Assessment Committee

June 2005

1 Program Outcomes	2 Principles of Undergraduate Learning (PUL)	3 Measurable Outcomes	4 Courses Reflecting the Outcomes	5 Mode of Learning/ Teaching Strategies	6 Tools Used for Assessment	7 Assessment Findings	8 Changes (a) – Implemented (b) – Planned	9 Impact
a Demonstrate and apply knowledge of mathematics, science, and engineering with: i) calculus*based physics in depth; ii) mathematics through multivariate calculus, differential equations, and linear algebra; and iii) probability and statistics; mechanical engineering sciences.	2a, 2b, 3a, 3b	Ability to solve basic linear equations using linear algebra, differential equations; probability and statistics; and to apply them in solid and fluid mechanics and heat transfer.	MATH 261, 262 ME 270, 274, 330, 340.	Mode of Teaching: * Class Lectures * Labs & Tutorials in class * Homework, outside class	* Tests * Homework * Rubrics of ME courses * Course outcomes survey * Faculty feedback * Student satisfaction survey * Program outcomes (exit) survey * Alumni survey	* Surveys indicated that there is room for improvement.	* Computer simulations with Matlab are used in almost all these courses. **(a)** * More statistics and probability related work. **(a)** * More tutoring services. **(a)** and **(b)** * Continue to revise and update curriculum. **(a)**	Exit surveys indicate 80% satisfactory above the threshold of 4.0 (out of 5.0) for all categories except in probability and statistics. A new statistics course has been added to the curriculum.

1 Program Outcomes	2 Principles of Undergraduate Learning (PUL)	3 Measurable Outcomes	4 Courses Reflecting the Outcomes	5 Mode of Learning/ Teaching Strategies	6 Tools Used for Assessment	7 Assessment Findings	8 Changes (a) – Implemented (b) – Planned	9 Impact
b Conduct and design experiments methodically, analyze data, and interpret results.	1, 3	From the quality of generated lab reports, which showed that the students are able to conduct experiments and analyze data using basic statistics such as regression analysis.	ME 272, 310, 314, 340, 372.	***** Derivation of theoretical formulas on which experiments are based. ***** Demonstration of experiments. * Illustration of how to use computer in analysis, charting and report utility. * Assign lab reports to be written individually, and sometimes in groups.	* Tests * Homework * Rubrics of ME courses * Course outcomes survey * Faculty feedback * Student satisfaction survey * Program outcomes (exit) survey * Alumni survey	* Lack of multiple experiment stations in labs. * Quantity and quality of experiments need improvement.	* Need to upgrade and provide more experiment stations. **(a)** * Standardized report writing. **(a)** * Introduce more design of experiments to the lab experiments **(a)** and **(b)**	Exit surveys indicate 75% satisfaction above the threshold of 4.0 (out of 5.0) – a drop from 80% in previous years. This is attributed to students being more aware of the program outcomes.

1 Program Outcomes	2 Principles of Undergraduate Learning (PUL)	3 Measurable Outcomes	4 Courses Reflecting the Outcomes	5 Mode of Learning/ Teaching Strategies	6 Tools Used for Assessment	7 Assessment Findings	8 Changes (a) – Implemented (b) – Planned	9 Impact
c. Design a system, component, or process to meet desired needs, with specific ability to design mechanical systems and thermal systems.	1c, 1d, 1e, 2a, 2b, 2d, 2e, 3b, 3c, 4a, 4c, 5b, 6a, 6b	Students will design technically competent, functional, and socially acceptable mechanical and thermal systems. Students will creatively generate multiple design ideas based on functional decomposition, and evaluate them based on customer requirements.	ME students are required to take the design sequence of ME 262, 372, 462, and ME 414 They also solve design problems in other courses when assigned.	ME 262, 372, and 462 are design courses with specific training in design process, techniques, and implementation. ME 262 teaches design process and mechanism design. ME 372 teaches machine element design for motion and strength. ME 462 is the capstone design course that requires completion of a challenging design project. ME414 teaches design of thermal system	* Design project reports and presentations in courses * Assessment of ME 462 and ME414 work by a jury of faculty, professional engineers, and peers * Tests * Homework * Rubrics of ME courses * Course outcomes survey * Faculty feedback * Student satisfaction survey * Program outcomes (exit) survey * Alumni survey * Industrial	The quality of design projects is improving. Design should be introduced early in curriculum. Thermal design opportunities are insufficient. Quality of reporting is inconsistent.	ME 414, a new elective course on thermal design, introduced for Fall 2002. **(a)** Standardized format of project reports. **(a)** Major revisions were made in ME 262, 372, 462 contents. **(a)** and **(b)** Seminar speakers module was added to ME462. **(a)** and **(b)** ME 414 has become a mandatory course in ME curriculum starting from Fall 2003. **(a)**	Exit surveys indicate 80% satisfaction above the threshold of 4.0 (out of 5.0) for mechanical systems, and 3.7 (out of 5.0) for thermal systems. It is still relatively low, but its impact is expected to be in noticed in 2007.

					advisory board			

1 **Program Outcomes**	2 **Principles of Undergraduate Learning (PUL)**	3 **Measurable Outcomes**	4 **Courses Reflecting the Outcomes**	5 **Mode of Learning/ Teaching Strategies**	6 **Tools Used for Assessment**	7 **Assessment Findings**	8 **Changes (a) – implemented (b) – Planned**	9 **Impact**
d Function in teams to carry out multidisciplinary projects.	1c, 4c, 5c	Students will be able to work in multidisciplinary projects effectively.	ENGR 195, ENGR 196, ME414, ME 482 and ME 462.	* Design teams in ME414 and ME 462. * Group Discussions * Project based learning * Laboratory experiments	* ME 462 Capstone Design Rubrics * Tests * Homework * Lab and project reports * Rubrics of ME courses * Course outcomes survey * Faculty feedback * Student satisfaction survey * Program outcomes (exit) survey * Alumni survey	Need more emphasis on team work. There is room for improvement.	Introduction of multidisciplinary projects in ME 462 capstone design course. **(a)** and **(b)**	Exit surveys indicate more than 80% satisfaction above the threshold of 4.0 (out of 5.0)

1 Program Outcomes	2 Principles of Undergraduate Learning (PUL)	3 Measurable Outcomes	4 Courses Reflecting the Outcomes	5 Mode of Learning/ Teaching Strategies	6 Tools Used for Assessment	7 Assessment Findings	8 Changes (a) – Implemented (b) – Planned	9 Impact
e Identify, formulate, and solve engineering problems.	1b, 1d, 2a*e, 3a, 3c, 4a*c	Students will be able to translate a need into a design project. Starting with textbook problems, students will be able translate word problem into an engineering solution.	ME students are required to take ENGR 197; and ME 200, 262, 270, 272, 274, 310, 314, 330, 340, 372, 414, 462 and 482.	ENGR 197, and ME 200, 262, 270, 272, 274, 310, 314, 330, 340, 372, 414, 462 and 482 are traditional lecture type classes. They also include lab exercises, where instructors lecture on the subject and students solve homework problems. In design courses, instructors teach students how to turn customer requirements into a product. Students design the product based on these requirements.	* Project reports * Tests * Homework * Lab and project reports * Presentations * Rubrics of ME courses * Course outcomes survey * Faculty feedback * Student satisfaction survey * Program outcomes (exit) survey * Alumni survey	Satisfactory, but also needs further improvement.	More tutoring services for basic engineering science courses. **(a)** and **(b)** Increase undergraduate student involvement in research. **(a)** and **(b).**	Exit surveys indicate more than 80% satisfaction above the threshold of 4.0 (out of 5.0) A newly established undergraduate research institute within the school is expected to help improvements in this area.

1 Program Outcomes	2 Principles of Undergraduate Learning (PUL)	3 Measurable Outcomes	4 Courses Reflecting the Outcomes	5 Mode of Learning/ Teaching Strategies	6 Tools Used for Assessment	7 Assessment Findings	8 Changes (a) – Implemented (b) – Planned	9 Impact
f Understand professional and ethical responsibilities.	1b, 2a, 2b, 2e, 3b, 3c, 4b, 5b, 5c and 6a	Students should be able to accept professional and ethical responsibilities for their deeds. .	ME 401 and ME 462.	Professional speakers in ME 462. Case studies in ethics. Participation in professional society meetings.	* Tests * Homework * Course outcomes survey * Faculty feedback * Program outcomes (exit) survey * Alumni survey * Fundamental of Engineering (FE) Exam. * Undergraduate Student and Industrial Advisory Boards.	There is room for improvement.	Introduction of more outside speakers and case studies. **(a)** and **(b)** Revised Co*op/Internship programs to attract more students into professionalism at earlier stages. **(a).**	Exit surveys indicate more than 80% satisfactory above the threshold of 4.0 (out of 5.0) Increase in the number coop and internship applicants.

1 Program Outcomes	2 Principles of Undergraduate Learning (PUL)	3 Measurable Outcomes	4 Courses Reflecting the Outcomes	5 Mode of Learning/ Teaching Strategies	6 Tools Used for Assessment	7 Assessment Findings	8 Changes (a) – Implemented (b) – Planned	9 Impact
g Communicate effectively in writing and orally.	1a, 1c	Students will be able to write effective lab and project reports. Students will be able to give good oral presentations of work. Students will be able to prepare effective posters to demonstrate work.	ENGR 195, ME 262, ME 274, ME 310, ME 314, ME 340, ME 372, ME414, ME 462, ME 482, TCM 360	Traditional lectures. Project reports in ME 262, ME 372, ME414, ME 462, ME 482. Lab reports in ME 274, ME 340, ME 310, ME 314, ME 340, ME 372. Presentations in ENGR 195, ME414, ME 462, TCM 360.	* Homework * Lab and project reports * Presentations * Rubrics of ME courses * Course outcomes survey * Faculty feedback * Program outcomes (exit) survey * Alumni survey * Assessment rubrics in lab and project reports. * Alumni surveys * Essays in ME 401 and general education courses.	Course outcomes surveys indicate satisfactory performance in several courses. Alumni surveys indicate the need for improvement. Assessment rubrics in key courses indicate satisfactory performance.	Standardized lab report format and grading rubrics. **(a)** Standardized project report format and grading rubrics in design courses. **(a)** Exemplary student project samples are made available on the department Web site. **(a)** Introduced written and oral communication into curriculum at an earlier stage than before. **(a)** Emphasized importance of communication in additional courses. **(a)** Participated in jury evaluations of technical communication	Exit surveys indicate more than 90% satisfaction above threshold of 4.0 (out of 5.0). Still one of the highest of all outcomes a – k.

							presentations of students in TCM 360, ME 414, ME 450, ME 462 courses and the coop/intern programs.	

1 Program Outcomes	2 Principles of Undergraduate Learning (PUL)	3 Measurable Outcomes	4 Courses Reflecting the Outcomes	5 Mode of Learning/ Teaching Strategies	6 Tools Used for Assessment	7 Assessment Findings	8 Changes (a) – Implemented (b) – Planned	9 Impact
h Understand the impact of engineering solutions in a global and societal context through broad education.	2c, 4b, 5a, 5b, 6a, 6b	Students should be aware of environmental and societal impact of their engineering solutions. Students should consider safety aspects of their designs. Students should be aware of global issues. Graduates should be more effective in public policy making.	All general education electives taken from liberal arts (18 credit hours). ENGR 195, ME 372, ME 401, ME414, ME 462.	Traditional lectures. Seminar speakers on the subject. Group discussions. Presentations in ENGR 195. Presentations, essays, and discussions in ME 401. Study of design impacts on environment, safety, and society in ME 372, ME414 and 462. Lectures and essays in general education courses.	* Project reports * Presentations * Rubrics of ME courses * Course outcomes survey * Faculty feedback * Student satisfaction survey * Program outcomes (exit) survey * Alumni survey * Essays required on the topic in major project reports * Essays in ME 401 and general education courses.	More awareness to be created with emphasis in more courses. There is a need to make the general education courses restricted to these general topics.	Created assessment methods to track the student response in ME 401, ME 372, ME414, ME 462 courses. **(a)** Planned to collaborate with liberal arts to select and assess a set of courses addressing these topics. **(b)** Reorganized general education electives list to cover these topics to be in effect starting Fall 2003. **(a)**	Exit surveys indicate more than 80% satisfactory above threshold of 4.0 (out of 5.0). Recently dropped below 4.0, which is attributed to better student awareness of program outcomes.

1 Program Outcomes	2 Principles of Undergraduate Learning (PUL)	3 Measurable Outcomes	4 Courses Reflecting the Outcomes	5 Mode of Learning/ Teaching Strategies	6 Tools Used for Assessment	7 Assessment Findings	8 Changes (a) – Implemented (b) – Planned	9 Impact
i Recognize the need to engage in lifelong learning.	1b	Students will realize the importance of continuing education to keep*up with ever changing technology after graduation. Students will view graduate school as an important part of professional growth. Students will plan early to pursue advanced degrees.	ME 344, TCM 360, and ME 462.	Seminar speakers in ME 462. Speakers of student chapters of professional societies. Emphasis of continuing education in various courses. Emphasis on FE (student in*training) exam in senior courses.	* Course outcome surveys * Faculty feedback * Program outcomes (exit) survey * Alumni surveys * ME 462 final project assessment	Course outcomes surveys indicate satisfactory performance. Assessment rubric in ME 462 indicates satisfactory performance with room to improve. Very few students sign*up for FE exam, because of time crunch in senior year and no immediate incentive.	Added a seminar component to ME 462 capstone design course. **(a)** Emphasized more on FE exams and graduate studies. **(a)** and **(b)** More outside speakers to be invited to stress the topic. **(a)** and **(b)** Planned a combined five*year BS/MS program in ME. **(a)** Offered an FE Exam preparation course to ME and ECE students for the first time. **(a)**	Exit surveys indicate more than 80% satisfactory above the threshold of 4.0 (out of 5.0).

1 **Program Outcomes**	2 **Principles of Undergraduate Learning (PUL)**	3 **Measurable Outcomes**	4 **Courses Reflecting the Outcomes**	5 **Mode of Learning/ Teaching Strategies**	6 **Tools Used for Assessment**	7 **Assessment Findings**	8 **Changes (a) – Implemented (b) – Planned**	9 **Impact**
j Demonstrate knowledge of contemporary issues.	3c, 4b, 5a, 5b, 6a	Student work shows awareness of contemporary issues. Graduates and employers report of satisfaction with knowledge of contemporary issues.	ME 401, ECON 201 and general education electives.	ME 401 covers ethical and related issues. General education courses including ECON E201 cover contemporary issues. Study of design impacts on environment, safety, and society in ME 372 and 462.	* Homework, discussions and exams in ME 401 * Course outcomes survey * Faculty feedback. * Program outcomes (exit) survey * Alumni and employer surveys * Incorporation of environmental, safety and social impact considerations in ME 462 design project	Anecdotal evidence that students are aware of most issues, but insufficient coordination to ensure coverage of important issues.	Plan to require a general education course that covers contemporary issues relevant to engineering. **(a)** and **(b)**	Exit surveys indicate more than 70% satisfaction above threshold of 4.0 (out of 5.0) – somewhat on the lower end.

1 Program Outcomes	2 Principles of Undergraduate Learning (PUL)	3 Measurable Outcomes	4 Courses Reflecting the Outcomes	5 Mode of Learning/ Teaching Strategies	6 Tools Used for Assessment	7 Assessment Findings	8 Changes (a) – implemented (b) – planned	9 Impact
k The ability to use the techniques, skills, and modern engineering tools necessary for engineering practice with: i) engineering analysis tools; ii) engineering design and manufacturing tools; iii) Internet and library resources; and iv) mathematical computing analysis tools.	1e, 3b*c, 4a	Completion of assigned projects using various technologies and engineering tools.	ENGR 195, 196, 197 ME 262, 272, 330, 340, 372, 310, 314, 482 and most of the ME electives.	ENGR 195, 196, 197 ME 262, 272, 340, 372, 310, 314, and 482 have labs where instructors lecture on the subject, students practice on the technologies. Numerical simulations are introduced in ME330 and most ME Electives.	* Lab reports * Project reports * Homework assignments * Completion of assigned tasks was assessed using a departmental lab report assessment rubrics * Homework, discussions and exams in ME 401 * Course outcomes survey * Faculty feedback * Program outcomes (exit) survey * Alumni and employer surveys	Adequate engineering computing tools are covered. More student training is needed.	Tools to be introduced at earlier stages so that they can be well practiced. **(a)** and **(b)**.	Exit surveys indicate more than 80% satisfaction above the threshold of 4.0 (out of 5.0) for information and math tools. Satisfaction is somewhat lower in using engineering analysis and design tools categories.

DEPARTMENT OF MECHANICAL ENGINEERING
GRADUATE PROGRAM ASSESSMENT

Prepared by Hasan Akay
June 2005

8.1 Introduction

In order to bring a continuous improvement process to graduate program, we have devised a number of assessment tools to monitor and improve the quality of graduate learning and graduate supervision similar to what we have in the undergraduate program. Graduate Education and Research Committee coordinates the graduate assessment activities, including student performance. Currently, we utilize the following assessment tools for the graduate program:

- Course Learning Outcomes for all graduate courses, including the thesis and independent project courses, completed in spring 2001.
- Course Learning Outcomes Surveys, to assess student learning through self-reports of students each semester designed to measure learning of outcomes in graduate courses, conducted since fall 2001.
- Jury evaluations of reports and presentations of Master's theses and projects by a jury of advisors based on the outcomes defined for thesis and project work since fall 2001.
- Feedback solicited from faculty of individual courses on the results of course outcomes surveys offered since fall 2001.
- Solicit feedback from industry via Industrial Advisory Board since fall 2001.

Since the Ph.D. program is new, these assessment tools have been originally developed for our Master's degree program. These will soon be extended to the Ph.D. program with some changes. In this chapter, we will present the analysis of some of the data collected using the developed tools.

8.2 Master's Degree Program Objectives

The Educational Objectives of the Master's degree program of the Department of Mechanical Engineering are to educate Master's students who will be able to:

1. Demonstrate breadth and depth of knowledge in mechanical engineering and related fields
2. Competently use advanced mathematical and computational methods as well as engineering analysis methods
3. Conduct sound research in multidisciplinary fields of mechanical engineering
4. Practice effective oral and written communication skills
5. Assume leadership positions in government and private organizations
6. Pursue professional advancement through life-long learning
7. Pursue Ph.D. degree to assume positions in academia or research and development organizations

8.3 Master's Degree Program Outcomes

Since the Master's degree program has both thesis and non-thesis options, our graduate program outcomes are linked to the learning outcomes of the Master's research course (*ME 698 Master's Research*) for thesis option students and to the independent project course (*ME 597 Mechanical Engineering Projects I*) for non-thesis option students. We have monitored satisfaction of these outcomes via jury evaluations since fall 2001 and provided feedback to advisors of students for improvements.

8.3.1 Thesis Option

In thesis option, for successful completion of the Master's thesis research, *ME 698 Master's Research*, the students are expected to:

1. Clearly identify the problem investigated
2. Conduct comprehensive literature survey
3. Demonstrate creativity
4. Use sound engineering principles
5. Conduct high quality research
6. Competently collect, analyze and interpret the data
7. Demonstrate completeness in research
8. Demonstrate effectiveness in writing
9. Demonstrate effectiveness in presenting orally

8.3.2 Non-Thesis Option

In non-thesis option, for successful completion of the Master's independent project work, *ME 597 Mechanical Engineering projects I*, the students are expected to:

1. Clearly identify the problem investigated
2. Demonstrate creativity
3. Demonstrate the use of a sound methodology
4. Use sound engineering principles
5. Demonstrate completeness of project
6. Demonstrate effectiveness in writing
7. Demonstrate effectiveness in presenting orally

The differences between the outcomes of thesis and non-thesis works are in the research and literature search areas, as thesis work requires more in-depth investigation.

8.4 Assessment Process

Our assessment work at the graduate level has started with an ad hoc committee formed for the assessment of student learning at the graduate level in the Purdue School of Engineering and Technology under the leadership of Associate Dean Nasser Paydar. The committee membership included Russell Eberhart, Maher Rizkalla, and Charles Yokomoto from the Department of Electrical and Computer Engineering (ECE), Hasan Akay and Jie Chen from the Department of Mechanical Engineering (ME), and Edward Berbari from the Bioengineering program. After several meetings of the ad hoc graduate assessment committee, the three programs developed a

process for assessing student learning by considering the assessment of Master's theses and independent projects.

In addition to course outcomes surveys, the decision to use the assessment of Master's theses and projects was based on a paper by Patricia D. Murphy, "Assessing Student Learning in Graduate Programs," where she mentions the assessment of dissertations, theses, scientific papers, or comprehensive study papers as one of the ways that faculty at 40 masters programs were using. These two courses (*ME 698* and *ME 597*) are considered as final mastery of the experience in the field, integrating and synthesizing the knowledge learned in the program as in capstone design courses. Since this type of evaluation method was being used to assess student learning in the undergraduate capstone design courses, the committee was able to develop scoring rubrics very quickly by adapting the undergraduate capstone project rubric to the assessment of Master's course project reports and theses.

8.5 Assessment of Student Learning

8.5.1 Course Outcomes Surveys

The course learning outcomes are used by the faculty to monitor student performance in exams, quizzes, HW, and projects. As in the undergraduate program, student learning is further monitored by receiving self-assessment from students at the end of each semester in the form of Course Outcomes Surveys (see Table 7.1 for a sample). In these surveys, students are asked to rate their perceived competency in each outcome from 1 to 5 (5 being the highest, 1 being the lowest competency). A threshold of 3.75 has been set as a minimum goal to reach by the Graduate Education Committee. This threshold was decided to be a reasonably high goal to reach based on the early results received. It proved to be a challenging goal to maintain over the years.

Shown in Figure 8.1, are the overall averages of all course outcomes survey results in each semester since Fall 2001, indicating the overall averages in each semester above or close to the 3.75 threshold, while at least 50% of the total outcomes are above the 3.75 threshold in each semester. Our goal is to increase that to more than 75% as is the case in all semesters except spring 2003, fall 2003 and fall 2004. Faculty teaching the courses are continuously asked to reflect on the survey results via the feedback forms we have and make appropriate changes.

Master's Thesis Research and Master's Project Courses

After the ad hoc Graduate Assessment Committee completed its work on its process, its members worked on developing scoring rubrics for master's thesis research and course projects. For thesis research, the faculty agreed to assess the following:

- ***Problem Identification.*** The quality of the written description of the problem investigated
- ***Literature Survey.*** The quality of the literature survey conducted for the thesis or project
- ***Creativity.*** The degree which creativity was demonstrated in the solution of the problem
- ***Use of Engineering Principles.*** The soundness of the engineering principles used and understood
- ***Research Quality:*** The quality of the investigative research demonstrated by the student
- ***Collection, Analysis, and Interpretation of the Data.*** The completeness and quality of the data collection, analysis and interpretation of the data
- ***Completeness of the Research.*** The degree of completeness of the research work

- ***Effectiveness of the Written Report.*** The overall effectiveness of the written report
- ***Effectiveness of the Oral Presentation.*** The overall effectiveness of the student's oral presentation of his/her work

For master's course projects, the items to be assessed are the following:

- ***Problem Identification.*** The quality of the written description of the problem investigated
- ***Creativity.*** The degree of creativity demonstrated
- ***Methodology.:*** The effectiveness of the methodology used
- ***Use of Engineering Principles.*** The soundness of the engineering principles used and understood
- ***Completeness.*** The degree of completeness of the project work and quality of the methods used
- ***Effectiveness of the Written Report:*** The overall effectiveness of the written report
- ***Effectiveness of the Oral Presentation.*** The overall effectiveness of the student's oral presentation of his/her work

8.5.2 Scoring Scale for Jury Evaluations

Projects and theses are assessed through a combination of reading the printed work and listening to an oral presentation. More than one faculty, usually, the advisory committee of the students evaluated each project or thesis. In order to achieve some degree of inter-rater reliability, the faculty have agreed to use the following scale:

5 = Excellent
4 = Very Good
3 = Good
2 = Fair
1 = Poor

While further enhancement of inter-rater reliability could be obtained by defining the terms "excellent," "very good," etc., the faculty felt that these terms were sufficient since faculty already have a general understanding of them.

The faculty decided that a score of 3.5 or better on a scored item indicated that the item was satisfied. This particular number was chosen because it rests midway between Very Good and Good and the high standards of evaluators.

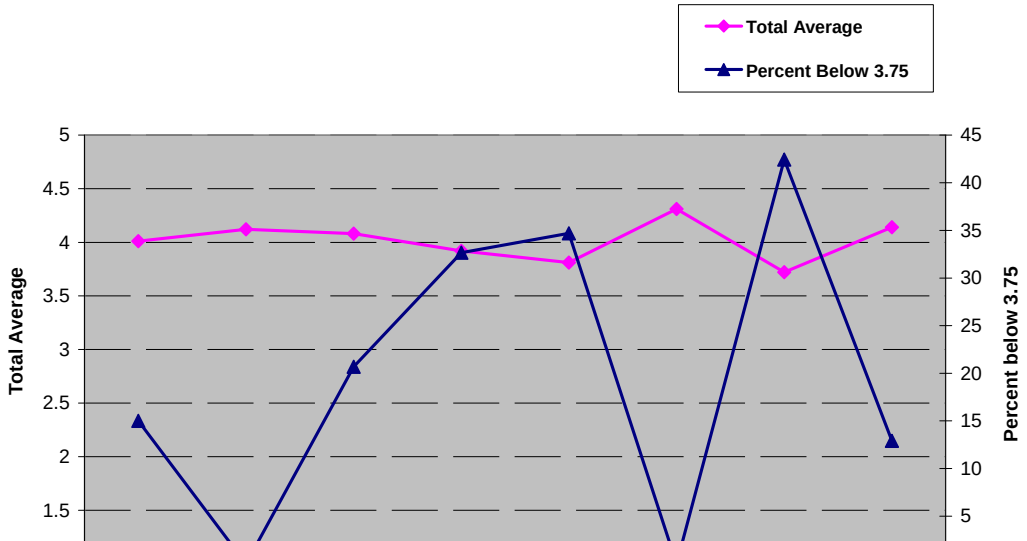

Figure 8.1 Summary of Course Outcomes Surveys of all ME graduate courses since Fall 2001.

8.5.3 Results From the 2002 – 2005

Table 8.1 is a summary of the assessment of master's thesis research course, *ME 698*, in the years 2002 – 2005. As shown in the table, 21 students were assessed with multiple raters, typically student's advisory committee. Of these, two students have scores below our threshold of 3.5. However, the overall average of all the students is above 3.76 while the average of all the students in all the categories is 3.5 except for *Literature Search*, which was slightly below the threshold indicating that this is an area where some improvement is needed. This indicates the need to emphasize regular journal article reading among the graduate students. Further, the item with the next lowest score is *Effectiveness of the Written Report* (3.55). While this item barely meets the minimum score of 3.5, the faculty feels this is an area where our graduate students can be trained better in. Following the defense exams, students are usually asked by the advisory committee to make major changes in their reports to improve their writing. Thus, evaluations after the corrections proposed by advisors would probably result with higher scores on this category. The *TCM 460 Engineering Communication in Academic Contexts* course, which some of the students are required to take, is expected to improve the overall writing quality.

Table 8.2 shows the results for the assessment of Master's course projects for the years 2002-2005. As shown in the table, 11 students were assessed with multiple raters. While three students have scored below 3.5, the Overall Average column demonstrates that the average across all 11 students met the desired goal of 3.5/5.0 on each item. The overall average score on all items was 3.72 which was above the set threshold. The item with the lowest score is *Effectiveness of the Written Report* (3.52). This seems to support the findings of the Master's thesis research assessment above.

Tables 8.3 and 8.4 further show the percent of the student population below the set threshold in the different categories. The results indicate the same trend as mentioned above. The highest percentages were seen in the *Effectiveness of the Written Report* (50% - thesis, 45% - projects) and *Literature Search* (41%) indicating there is room for improvement in these areas. Our goal is to have at least 75% be above the threshold.

8.6 Improvements Needed or Planned

Faculty need to emphasize regular journal article reading and emphasize literature search while the students write their theses. Also, faculty need to recommend technical writing courses to students who may derive benefit from them. This may help both international and domestic students.

Table 8.1 Jury assessment of thesis research work in ME 698 (*shaded area indicates threshold is met).*

Semester	Student	Problem Identification	Literature Survey	Creativity	Use of Engineering Principles	Research Quality	Data Collection, Analysis, and Interpretation	Complete-ness of Research	Effective-ness of Written Report	Effective-ness of Oral Presentation	Overall Average
Spr '02	1	4.00	4.25	4.25	4.25	5.00	4.33	4.00	3.50	3.50	**4.12**
	2	4.50	4.00	3.00	4.00	3.75	3.75	3.75	4.50	4.00	**3.92**
Sum '02	3	3.67	3.67	3.67	3.67	3.67	3.00	3.33	3.33	4.33	**3.59**
	4	3.00	3.67	4.00	4.33	4.33	4.00	4.00	3.67	3.67	**3.85**
	5	4.25	3.00	3.75	4.00	4.00	4.00	4.25	3.75	4.00	**3.89**
Fall '02	6	4.33	3.33	4.33	4.33	4.67	3.67	4.67	3.33	2.67	**3.93**
	7	4.33	3.33	4.33	4.33	4.67	3.67	4.67	3.33	2.67	**3.93**
Spr '03	8	3.67	3.67	3.33	4.00	3.67	4.00	4.33	3.00	3.67	**3.70**
	9	3.33	3.67	4.00	4.00	3.67	3.67	3.67	3.67	4.33	**3.78**
Sum '03	10	4.00	2.33	4.33	3.67	4.00	3.67	3.67	3.33	3.33	**3.59**
Fall '03	11	3.67	3.00	3.33	3.67	3.67	4.33	4.00	3.33	4.00	**3.67**
	12	2.33	2.67	3.33	2.67	3.00	2.33	2.67	2.33	3.33	**2.74**
	13	4.00	3.00	4.00	4.33	4.33	4.33	3.67	4.00	3.67	**3.93**
	14	3.50	3.67	4.00	4.33	4.67	4.00	4.00	3.67	2.67	**3.83**
	15	4.00	3.67	4.33	3.33	4.33	4.00	4.00	4.00	4.33	**4.00**
Spr '04	16	2.67	3.00	3.00	3.67	3.33	2.67	3.67	3.00	2.67	**3.07**
	17	4.00	4.00	3.00	3.00	3.00	4.00	4.00	5.00	3.00	**3.67**
Sum '04	18	4.33	3.67	4.67	3.67	4.33	4.33	4.67	4.33	4.33	**4.26**
	19	3.67	3.00	3.33	4.33	4.33	3.67	3.33	3.00	3.67	**3.59**
Fall '04	20	4.00	3.67	4.33	4.00	4.00	3.33	4.00	3.67	3.33	**3.81**
Sum '05	21	3.33	4.33	4.00	4.00	4.00	3.67	4.33	3.00	4.00	**3.85**
	22	4.33	3.67	3.67	4.33	4.67	4.33	4.00	3.33	4.00	**4.04**
	Average	**3.77**	**3.47**	**3.82**	**3.91**	**4.05**	**3.76**	**3.94**	**3.55**	**3.60**	**3.76**

Table 8.2 Jury assessment of project work outcomes in *ME 597* (*shaded area indicates threshold is met).*

Semester	Student	Problem Identification	Creativity	Methodology	Use of Engineering Principles	Complete-ness	Effective-ness of the Written Report	Effectiveness of the Oral Presentation	Overall Average
Fall '01	1	4.80	4.40	4.80	4.60	4.50	3.50	4.80	**4.49**
Spr '02	2	3.50	3.50	4.00	3.50	4.00	3.50	4.50	**3.79**
	3	4.50	3.50	4.00	4.00	4.50	4.50	3.50	**4.07**
Fall '03	4	3.83	3.67	3.83	4.33	4.00	3.25	3.67	**3.80**
	5	4.33	3.83	4.17	4.17	4.17	4.00	4.17	**4.12**
Spr '04	6	3.67	3.67	3.67	3.50	3.33	3.20	2.83	**3.41**
	7	4.67	4.00	3.83	4.00	3.60	3.60	4.17	**3.98**
	8	3.50	3.50	4.00	3.50	3.50	3.00	4.00	**3.57**
Fall '04	9	3.17	2.67	2.67	2.33	2.50	3.50	3.50	**2.90**
	10	3.80	3.40	3.60	3.20	3.80	3.33	4.00	**3.59**
	11	3.30	2.80	3.00	3.00	2.90	3.33	3.90	**3.18**
	Average	**3.92**	**3.54**	**3.78**	**3.65**	**3.71**	**3.52**	**3.91**	**3.72**

Table 8.3 Percent below the threshold (theses).

Problem Identification	Literature Survey	Creativity	Use of Engineering Principles	Research Quality	Data Collection, Analysis, and Interpretation	Completeness of Research	Effectiveness of Written Report	Effectiveness of Oral Presentation	Overall Average
23%	41%	32%	14%	14%	18%	18%	50%	36%	9%

Table 8.4 Percent below the threshold (projects).

Problem Identification	Creativity	Methodology	Use of Engineering Principles	Completeness	Effectiveness of Written Report	Effectiveness of Oral Presentation	Overall Average
18%	27%	18%	27%	27%	45%	9%	27%

DEPARTMENT OF MECHANICAL ENGINEERING TECHNOLOGY 2005 ASSESSMENT NARRATIVE

Prepared by Heather Woodward, Jamie Workman-Germann and MET Faculty
June 2005

The MET Department has continued its assessment efforts, this year focusing on streamlining and updating our assessment processes. Our program is current assessing against the majority of our course curriculum using the capstone design project and a comprehensive exam. We are working towards adding surveys, course projects and final exams to provide real-time assessment information, while reducing the number of courses actively assessed to a core set focused on specific ABET TAC Criterion. As part of this process, our department mission and vision statement and program objectives have been updated and are listed below. The department is currently in the process of refining the measurable learning objectives (MLOs) and course mapping to ABET TAC Criterion.

MET Mission Statement

The mission of the Department of Mechanical Engineering Technology (MET) at IUPUI is to educate and graduate students who will become the finest practitioners, managers, and leaders in Mechanical/Manufacturing Engineering Technology.

MET Vision Statement

The MET Department will ensure that its graduates are proficient in the principles of science and engineering as they relate to practical applications required to meet the demands of industry in Indiana, the nation, and the world. The MET Department will be recognized as an innovative leader through its diverse faculty, staff, and students, and its excellence in learning, discovery, and engagement.

MET Program Objectives

MET/CIMT Graduates will:

- Work within accepted standards of professional integrity and conduct.
- Support constituents by applying technical knowledge, continuous improvement and problem solving techniques and hands-on skills in all areas of the mechanical/manufacturing disciplines.
- Communicate effectively in a written and verbal manner.
- Pursue ongoing professional development, professional growth and increasing professional responsibility.
- Work effectively in independent and collaborative scenarios within industries.
- Demonstrate sensitivity to the environmental, diverse, cultural and contemporary aspects of their work.

There have been many significant curriculum changes in the past year, including a migration towards ‘hybrid’ and/or courses that are administered completely in an on-line format. Additionally, many courses have had individual and group projects and case studies added in order to provide earlier assessment of student performance in focused areas. There have also been significant additions of labs to several courses to emphasize specific technical areas, and additional plant trips added in order to provide an increased real-world perspective to our students.

DEPARTMENT OF MECHANICAL ENGINEERING TECHNOLOGY 2005 ASSESSMENT REPORT

Prepared by Heather Woodward, Jamie Workman-Germann and MET Faculty

June 2005

General outcomes:	Associated PUL(s)	Measurable outcomes	Courses where outcomes taught	Courses where outcomes assessed	Assessment method used	Changes planned/put into place	Impact / further change needed
ABET Criterion 1, item a; Demonstrate an appropriate mastery of the knowledge, techniques, skills and modern tools of their discipline.	1(d), 1(e), 3(b), 4(a)	There are sets of generally accepted skills that are used within in the MET discipline such as machine and manufacturing process analysis and design.	CGT110 IET104 IET150 IET350 MET102 MET105 MET111 MET141 MET142 MET220 MET230 MET240 MET242 MET320 MET320 MET344 MET350 MET384 MET414	MET220 MET350 MET414	Final Exams, Comprehensive Exam, Senior Design Capstone Project	IET104 introduced more extensive analysis case studies, on-line study guides IET150 Implemented Excel labs with course for application experience IET350 Introduced additional case studies MET105, updated lab manual, implemented more extensive Excel labs MET141 modified laboratory manual based on student feedback and movement toward on-line delivery MET142 Added individual research assignments and presentations. MET240 implemented new text. MET 242 revision to laboratory manual to reflect equipment changes	Need to map most recent (2005) comprehensive exam data to course improvements

General outcomes:	Associated PUL(s)	Measurable outcomes	Courses where outcomes taught	Courses where outcomes assessed	Assessment method used	Changes planned/put into place	Impact / further change needed
ABET Criterion 1, item b; Apply current knowledge and adapt to emerging applications in mathematics, science, engineering and technology.	2(a), 2(b), 2(d), 2(e), 3(c), 4(a), 4(c)	This outcome is typically determined by a student's ability to process information related to the MET discipline and arrive at appropriate conclusions using current and emerging technology solutions. Students learn these skills through laboratory assignments, course work and case studies.	CGT110 IET104 IET150 IET350 MET102 MET111 MET220 MET230 MET320 MET344 MET350 MET384 MET414	MET414	Comprehensive Exam, Capstone Design Project	IET104 introduced more extensive analysis case studies, on-line study guides IET150 Implemented New Established course for complete On-Line delivery. Established consistent on-line and in-class curriculum, including syllabus, quizzes, case studies and exams. IET350 Developed for on-line delivery. Introduced SWOT analysis to project list. MET320 added field trip to local company. MET344: Developed for on-line delivery, added literature review case study.	Need to map most recent (2005) comprehensive exam data to course improvements.

General outcomes:	Associated PUL(s)	Measurable outcomes	Courses where outcomes taught	Courses where outcomes assessed	Assessment method used	Changes planned/put into place	Impact / further change needed
ABET Criterion 1, item c; Conduct, analyze and interpret experiments and apply experimental results to improve processes.	1(b), 2(a), 2(c), 2(e), 4(a)	Students ability to conduct experiments, perform appropriate analysis form proper conclusions based on this analysis.	CGT110 IET104 IET150 IET350 MET102 MET105 MET111 MET141 MET142 MET220 MET230 MET242 MET320 MET344 MET350 MET384 MET414	MET220 MET350 MET414	Final Exams, Comprehensive Exam, Senior Design Capstone Project	IET150: Added excel lab to course curriculum MET141 modified laboratory manual based on student feedback and movement toward on-line delivery MET211 and MET213 added additional labs. MET220 and MET230 added lab experiments (none before). MET141 modified laboratory manual based on student feedback and movement toward on-line delivery MET142 Added individual research assignments and presentations. MET240 implemented new text. MET 242 revision to laboratory manual to reflect equipment changes MET350, added course project and lab experiment MET384 added new lab experiment.	Need to map most recent (2005) comprehensive exam data to laboratory improvements.

General outcomes:	Associated PUL(s)	Measurable outcomes	Courses where outcomes taught	Courses where outcomes assessed	Assessment method used	Changes planned/put into place	Impact / further change needed
ABET Criterion 1, item d; Apply creativity in the design of systems, components or processes appropriate to program objectives.	2(b), 2(d), 3(c), 4(a), 4(c), 6(b)	Students should be able to design machines and processes by creatively applying fundamental skills learned in the curriculum.	CGT110 IET104 IET150 IET350 MET102 MET111 MET220 MET230 MET320 MET344 MET350 MET384 MET414	MET414	Comprehensive Exam, Senior Design Capstone Project	IET350 Introduced SWOT analysis to project list. MET111, MET213: Based on student performance requirements and final exam performance, added additional labs MET220: added lab experiments (none before). MET230: added lab experiments (none before). MET320 added field trip to local company MET344: Developed for on-lien delivery, added literature review case study. MET350, added course project and lab experiment MET384 added new lab experiment	Need to map most recent (2005) comprehensive exam data to laboratory improvements.

General outcomes:	Associated PUL(s)	Measurable outcomes	Courses where outcomes taught	Courses where outcomes assessed	Assessment method used	Changes planned/put into place	Impact / further change needed
ABET Criterion 1, item e; Function effectively on teams.	1(c), 5(c)	Students should be able to function effectively within a team environment.	Humanities and Social Science Electives IET104 IET350 MET141 MET142 MET220 MET230 MET242 MET320 MET350 MET384 MET414 TCM370	TCM 370 IET350	Group Project Group Case Study	IET350: Introduced Stock Market Group project for on-line class with very positive student feedback. MET141 Implemented group research projects and presentations	Need to develop team participation rubric + student survey

General outcomes:	Associated PUL(s)	Measurable outcomes	Courses where outcomes taught	Courses where outcomes assessed	Assessment method used	Changes planned/put into place	Impact / further change needed
ABET Criterion 1, item f; Identify, analyze and solve technical problems.	1(b), 1(d), 2(a)-(d), 4(a), 4(c)	Generally accepted problem types from with the MET discipline are used to determine analytical abilities. Students should also be able to apply knowledge in the analysis of technical case studies.	CGT110 Humanities and Social Science Electives IET104 IET150 IET350 MET102 MET105 MET111 MET141 MET142 MET220 MET230 MET240 MET242 MET320 MET344 MET350 MET384 MET414	MET220 MET350 MET414	Final Exams, Comprehensive Exam, Senior Design Capstone Project	Additional case studies added to IET104, IET150, IET350, and MET344. MET141 modified laboratory manual based on student feedback and movement toward on-line delivery, Implemented New Text (based on student evaluations), Establishing course for complete On-Line delivery including laboratory experiments. Implemented chapter end exams for all materials. MET142 Added individual research assignments and presentations. Added field trip to local company, setting up course for hybrid on-line delivery.	Very position student feedback for on-line delivery and additional case studies.

General outcomes:	Associated PUL(s)	Measurable outcomes	Courses where outcomes taught	Courses where outcomes assessed	Assessment method used	Changes planned/put into place	Impact / further change needed
ABET Criterion 1, item g; Communicate effectively.	1(a), 1(c), 3(a), 5(c)	Communication skills are evaluated based on industry expectations of recent MET graduates.	CGT110 IET104 MET102 MET105 MET111 MET141 MET142 MET220 MET230 MET242 MET250 MET320 MET344 MET350 MET384 MET414 TCM220 TCM340 TCM370	MET414	Comprehensive Exam, Senior Design Capstone Project	Additional case studies added to IET104, IET150, IET350, and MET344. Oral presentation added to IET364, IET474. MET141 Implemented group research projects and presentations MET142 added individual research assignments and presentations	Working with TCM dept to develop lab based exercise in TM220

General outcomes:	Associated PUL(s)	Measurable outcomes	Courses where outcomes taught	Courses where outcomes assessed	Assessment method used	Changes planned/put into place	Impact / further change needed
ABET Criterion 1, item h; Recognize the need for and possess the ability to pursue lifelong learning.	3(a)	Evaluate student's ability to investigate a topic outside of typical MET curriculum using global research tools.	IET104 MET102 MET111 MET344 MET384 MET414	MET414	Senior Design Capstone Project	No changes	Need to develop survey to assess continued student learning

General outcomes:	Associated PUL(s)	Measurable outcomes	Courses where outcomes taught	Courses where outcomes assessed	Assessment method used	Changes planned/put into place	Impact / further change needed
ABET Criterion 1, item i; Understand professional, ethical and societal responsibilities.	2(a), 3(b), 5(b), 6(a)	Evaluation of course objectives and review case studies / safety requirements.	Humanities and Social Science Electives Humanities and Social Science Electives IET104 MET102 MET111 MET220 MET230 MET344 MET374 MET384 MET414	MET414	Comprehensive Exam, Senior Design Capstone Project	No changes	Need to develop assessment criteria for senior capstone to evaluate professional considerations.

General outcomes:	Associated PUL(s)	Measurable outcomes	Courses where outcomes taught	Courses where outcomes assessed	Assessment method used	Changes planned/put into place	Impact / further change needed
ABET Criterion 1, item j; Recognize contemporary professional, societal and global issues and be aware of and respect diversity.	2(e), 3(b), 3(c), 4(b), 5(a)-(c), 6(a)	Respect diversity: Increased awareness of personality types and individual differences.	Humanities and Social Science Electives IET104 MET102 MET111 MET220 MET230 MET320 MET344 MET350 MET374 MET384 MET414	MET414	Comprehensive Exam, Senior Design Capstone Project	No changes.	Need to develop assessment criteria and/or survey for senior capstone to evaluate recognition of global considerations.

General outcomes:	Associated PUL(s)	Measurable outcomes	Courses where outcomes taught	Courses where outcomes assessed	Assessment method used	Changes planned/put into place	Impact / further change needed
ABET Criterion 1, item k; Have a commitment to quality, timeliness and continuous improvement.	1(e), 2(e), 3(a), 4(c), 6(a)	Students will understand and demonstration of basic quality principles through case studies and design projects.	IET104 IET150 MET102 MET105 MET111 MET220 MET230 MET320 MET320 MET344 MET350 MET384 MET414	IET104	Case Study	Additional SPC and JIT case study added to IET104. American Society for Quality (ASQ) Student Chapter Formed on IUPUI campus	Need additional timeliness and quality assessment in other courses

DEPARTMENT OF ORGANIZATIONAL LEADERSHIP AND SUPERVISION 2005 ASSESSMENT REPORT NARRATIVE

Prepared by Tim Diemer

June 2005

Four major initiatives during the academic year demonstrate the commitment of the Department of Organizational Leadership and Supervision [OLS] to best practices in assessment technique. The first is the launch of assessment workshops for part time faculty members. A second initiative is development of a standard format that faculty members use to report assessment results semester by semester. A third initiative is a project to promote development of honors classes within the Purdue School of Engineering and Technology. Fourth is a project to assist in the development of assessment techniques at an international partner university.

Workshops for part time faculty

The OLS department retains a small core of full time faculty members and relies on as many as 22 part time faculty members each semester to deliver its curriculum. A key strategy in quality monitoring and control across all sections of OLS classes is embedding the IUPUI Principles of Undergraduate Learning [PUL] into all instructional objectives.

The involvement of part time faculty in the PUL approach to quality control is essential to the department's success. However, it became clear during discussions in 2003 that communication via email with references to Web links was not an effective means of promoting this strategy. The department decided to double its efforts to promote PUL consistency with a series of on campus workshops led by the full time faculty for the benefit of the part time faculty. An indirect result of this promotion, as it turned out, was to heighten awareness among full time faculty members of the importance of the PUL approach.

The plan to promote the PUL approach to assessment among the part time faculty was energized when one of the full time OLS faculty members, Charles Feldhaus, was awarded an IUPUI grant to support this effort in 2004. The OLS department held its first workshop for associate faculty members during February, 2004. Three additional workshops were offered during academic year 2004-2005. The workshops addressed three topics, the PUL approach to assessment, teaching and learning strategies, and curriculum development.

Standard PUL reports

A standard reporting format for PUL assessment results was prepared by Timothy Diemer and Robert Wolter and established as a standard department procedure during fall semester, 2004. All faculty members, both full time and part time, are now asked to submit a standard assessment report at the end of each semester. The report asks for a complete description of the PUL assessment process used by each faculty member during the semester. Some high quality, detailed assessment reports have been submitted as a result. The effort continues to encourage all faculty members to comply with this core effort to establish consistency throughout the OLS curriculum using the PUL approach.

The standard PUL assessment report format and a requirement for semester reports both from full time and part time faculty members has predictably resulted in a substantial increase in assessment data. One pattern that was revealed in recent assessment results has been shortcomings in student performance in the following category:

> PUL 1.a.] Core Communication... The ability of students to ... express ideas and facts to others effectively in a variety of written formats.

Accordingly, during academic year 2004-2005, OLS department faculty planned or installed a number of improvements intended to affect student performance within this category:

- A requirement attached to selected assignments that students use the writing center on campus, or the writing center within the school's Technical Communications program, to get advice on revising first drafts of their reports.
- Provision of more detailed guidelines for accuracy in language use. This includes a detailed scoring rubric showing students the categories of language use, such as grammar, spelling, and organizational pattern, that affect the score for selected assignments.
- Specific written feedback to students for selected assignments includes links to Web pages within the Purdue University Online Writing Center. These links to specific pages provide the student with a more detailed explanation, along with examples of correct usage, of a particular writing problem that damaged the score for the assignment.
- Using PUL assessment data, the department has begun an analysis of the progression of PUL skill building from the 200 to the 300 to the 400 level course offerings. The process has become part of monthly departmental meetings.

Preliminary data gathered during spring semester 2005 suggest a slight improvement in the category of, "The ability of students to ... express ideas and facts to others effectively in a variety of written formats." However, more data is required from results during the coming year before the impact of the improvements can be accurately described.

Honors sections

A third initiative of the OLS department during academic year 2004-2005 was to take a lead role in promoting development of honors classes within the Purdue School of Engineering and Technology. This initiative was also led by Charles Feldhaus and supported by an IUPUI grant. Paving the way, the OLS department launched honors sections of some of its core courses during spring semester 2005. A PUL based procedure was established to evaluate student performance in the honors component of these classes. A scoring rubric was developed that instructors use to evaluate the extent to which the honor student's project demonstrated competence in PUL categories 1, 2 and 4.

International connections

A fourth assessment project during the academic year was initiated by Timothy Diemer, assistant professor in the department. Under the terms of an IUPUI grant, four senior administrators from Malaysia's Universiti Tenaga Nasional (UNITEN) visited IUPUI to attend a series of workshops and briefings focused on the topic of best practices in assessment of the outcomes of higher education. The relationship between IUPUI and UNITEN began in 1994 when the School of Engineering and Technology assisted in installing academic infrastructure for the newly established Malaysian university under the terms of contract that extended from 1994 to 1998. In recognition of a continuing relationship since the end of the formal contract period, senior administrators at UNITEN have made use of expertise at IUPUI in their efforts to establish world class assessment practices. During the 2004 visit to Indiana, the Malaysian administrators participated in the IUPUI 2004 Assessment Institute and attended briefings with senior faculty members and administrators at IUPUI, Indiana University, Bloomington, and Purdue University, West Lafayette. The long term goal of the 2004 visit is development of best practices in outcome-based assessment techniques at UNITEN.

PUL Assessment results

A summary of PUL assessment results is included in this report as a separate document.

Submitted by Timothy Diemer, May, 2005

DEPARTMENT OF ORGANIZATIONAL LEADERSHIP AND SUPERVISION 2005 ASSESSMENT REPORT
Writen by Tim Diemer
May, 2005

PUL and a selection of OLS classes where PUL was assessed.		Examples of methods used to measure PUL performance.	Scoring rubric on file?	Performance goal.	Findings.	Recommendations.
1.Core Communication and Quantitative Skills: The ability of students to write, read, speak and listen, perform quantitative analysis, and use information resources and technology--the foundation skills necessary for all IUPUI students to succeed.						
OLS 100, OLS 252, 263, 274, 327	(a) to express ideas and facts to others effectively in a variety of written formats, (b) to comprehend, interpret, and analyze texts, (c) to evaluate the logic, validity, and relevance of data (d) to solve problems that are quantitative in nature, (e) to make efficient use of information resources and technology for personal and professional needs.	Five page paper on personal philosophy of leadership. Students were required to visit the IUPUI writing center to have paper reviewed prior to submitting final draft of writing assignment.	yes	80% percent of students would show a 5-10 point increase in score after revision through the IUPUI writing center.	Last semester students were *advised* to visit the writing center during the process of writing their leadership paper, but use of the writing center was not required. This year all students were required to do so. This semester, 80% of students increased their individual scores from 1 to 5 points on leadership paper.	Learning goal was met. Professor will continue to monitor competence for this PUL using this method. Assessment loop closed on this particular assessment activity.
		50 question multiple-choice/True-False test based on selected portions of the text book. The selected portions were identified as essential elements of learning and retention for the OLS 252 class in Human Behaviors in Organizations. PUL 1, outcome b, was selected because of its focus on the ability to comprehend, interpret, and analyze texts.	n/a	The instructional objective of the assignment was to have 70% of the students score 70% or higher on the exam.	70% is the minimum score that signifies competence with PUL 1 and outcome b. 65% of students achieved that score.	Student performance did not meet instructional objectives. It will be necessary to track outcomes over several semesters to determine the long term effectiveness of the final exam in determining competence with PUL 1 outcome b.

PUL and a selection of OLS classes where PUL was assessed.		Examples of methods used to measure PUL performance.	Scoring rubric on file?	Performance goal.	Findings.	Recommendations.
	Core Communication and Quantitative Skills [Continued]	This assessment was designed to evaluate skill with a writing competency: Mechanical correctness, including spelling and grammar. This competency was examined because mechanical correctness -accuracy in spelling, grammar, punctuation, capitalization and paragraph format- had detracted from student scores in previous writing assignments and was deemed a “problem that could be improved,” during OLS department meetings. Students were given an assignment that required knowledge of course content, but accurate language use was also emphasized as an important part of the evaluation criteria for the entire assignment. During the spring 2005 class, students were also given a copy of guidelines for accurate language use and the rubric used to score language use. They were encouraged to consider these guidelines before submitting the assignment and to use the rubric to proofread the paper.	yes	The goal was improved accuracy in spelling, grammar, punctuation, capitalization and paragraphing compared to the previous semester.	Scores for the same assignment for Fall 2004 showed a mean score of 3.8 in the category of "mechanical correctness." The result for students during spring 2005 was a mean score of 3.95.	A pattern of improvement in the area of writing mechanics is developing and continued research must be completed in the years to come to see if access to the writing rubric will continue to effect improvement of the mechanical writing skills of OLS 263 students.

PUL and a selection of OLS classes where PUL was assessed.		Examples of methods used to measure PUL performance.	Scoring rubric on file?	Performance goal.	Findings.	Recommendations.
2. Critical Thinking: The ability of students to analyze carefully and logically information and ideas from multiple perspectives.						
OLS 263, 327, 368	(a) to analyze complex issues and make informed decisions (b) to synthesize information in order to arrive at reasoned conclusions (c) to evaluate the logic, validity, and relevance of data (d) to solve challenging problems (e) to use knowledge and understanding in order to generate and explore new questions	The students were assigned a role-play. The role-play involved a sexual harassment complaint and how a manager goes about investigating such matters. The students were divided into four groups. Each group was assigned one of four roles representing four distinct characters in the role-play. The role-play involved acting out six separate scenes. For each scene, different students acted out the assigned roles. The scenes involved a manager's actions in investigating a sexual harassment complaint by one employee (female) against another employee (male.)	yes	The goal of the assignment was to place the students in a simulated work situation and to challenge them to analyze the situation, respond to it, and draw conclusions that will resolve the issues involved. The assignment is specifically designed to challenge the students to engage in critical thinking skills as outlined in PUL #2, a. through d. At least 80% of the students should successful complete the assignment and thereby demonstrate competence with this PUL and related outcomes.	All of the 16 students turned in the post-assessment document. Of these, all students gave an adequate response, reflecting a 100% successful completion rate.	Overall, instructional objectives were met. However, further refinement of the assessment questions should be considered. Although all students provided adequate responses, none demonstrated a superior ability to think critically. On the other hand, students appear to demonstrate better comprehension and ability to think critically through this exercise than they do on tests. Students are required to turn in these assessments by the end of the semester rather than within a week after the activity. This requirement should be changed so that their reflection on the exercise is more immediate following the exercise.

PUL and a selection of OLS classes where PUL was assessed.		Examples of methods used to measure PUL performance.	Scoring rubric on file?	Performance goal.	Findings.	Recommendations.
3. Integration and Application of Knowledge: The ability of students to use information and concepts from studies in multiple disciplines in their intellectual, professional, and community lives.						
	(a) to enhance their personal lives (b) to meet professional standards and competencies (c) to further the goals of society	A term paper assignment requires that students write a report for an imaginary employer about to expand its operations into a selected foreign country. The task is to describe cultural differences specific to that country compared to one's own culture and indicate how those differences might affect organizational behavior. The expectation is that the report will demonstrate mastery of course content and general knowledge of related content drawn from previous OLS classes and/or other social science or business classes. Skill with report writing technique, gained though university level writing classes, is required for successful completion of this assignment.	yes	75% of the class is expected to earn scores in the A to B range for this assignment, thereby showing good overall knowledge of course content and ability to apply it accurately to the hypothetical situation.	Performance was short of the goal. 66% of 89 students scored in the A to B range.	Shortcomings in the report including weaknesses with PUL 1 (ability to express ideas clearly in written format) and PUL 4 in the sense of the personal organization required to complete a term paper. The findings include several scores of zero. The department has launched a process to analyze its curriculum and identify opportunities for better integration of PUL skills from the 200 level to the senior level.

PUL and a selection of OLS classes where PUL was assessed.		Examples of methods used to measure PUL performance.	Scoring rubric on file?	Performance goal.	Findings.	Recommendations.
4. Intellectual Depth, Breadth, and Adaptiveness: The ability of students to examine and organize disciplinary ways of knowing and to apply them to specific issues and problems.						
OLS 263, 327	(a) Intellectual depth describes the demonstration of substantial knowledge and understanding of at least one field of study (b) intellectual breadth is demonstrated by the ability to compare and contrast approaches to knowledge in different disciplines (c) adaptiveness is demonstrated by the ability to modify one's approach to an issue or problem based on the contexts and requirements of particular situations	Students will reflect and develop an end-of-term written paper titled "Personal Ethics Action Plan".	yes	Instructional objectives should be met by 100% of the students finishing this course. Doing so will enable them to have the necessary knowledge to prepare the course assignment "Personal Ethics Action Plan."	1) There was a 100% success rate after excluding one student who has an incomplete and one student who earned an "FN" and did not participate in class the final six weeks of the course. There were 26 students total. There was a 92.3% success rate if these two students are counted. 2) A grade of "C" would recognize competence with the PUL and related outcomes.	

PUL and a selection of OLS classes where PUL was assessed.		Examples of methods used to measure PUL performance.	Scoring rubric on file?	Performance goal.	Findings.	Recommendations.
5. Understanding Society and Culture: The ability of students to recognize their own cultural traditions and to understand and appreciate the diversity of the human experience, both within the USA and internationally.						
OLS 263, 327	(a) to compare and contrast the range of diversity and universality in human history, societies, and ways of life (b) to analyze and understand the interconnectedness of global and local concerns (c) to operate with civility in a complex social world	Given a set of interview questions, students must identify a coworker, neighbor, international student, or acquaintance who can serve as a "cultural informant." The cultural informant for this purpose is someone who was born into a culture substantially different from one's own culture as defined by textbook charts that compare mainstream cultural traits of various countries. The student conducts an interview with the cultural informant, then analyzes the results using textbook models for describing and comparing cultural differences. The students writes a report of findings and conclusions.	yes	Allowing for revisions based on instructor feedback, 80% of the class is expected to earn scores in the A to B range for this assignment.	Performance fell a bit short of the goal. 70% of 93 students during academic year 2004-2005 scored in the range of A or B.	Video tape examples of successful interviews and excerpts from successful reports should be presented 2 weeks or more before the assignment is due. Some time and resources will be required to develop this modification.

PUL and a selection of OLS classes where PUL was assessed.		Examples of methods used to measure PUL performance.	Scoring rubric on file?	Performance goal.	Findings.	Recommendations.
6. Values and Ethics: The ability of students to make judgments with respect to individual conduct, citizenship, and aesthetics						
OLS 263	(a) to make informed and principled choices regarding conflicting situations in their personal and public lives and to foresee the consequences of these choices (b) to recognize the importance of aesthetics in their personal lives and to society	Students will reflect and develop an end-of-term written paper titled "Personal Ethics Action Plan".	yes	Instructional objectives should be met by 100% of the students finishing this course. Doing so will enable them to have the necessary knowledge to prepare the course assignment "Personal Ethics Action Plan ."	1) There was a 100% success rate after excluding one student who has an incomplete and one student who earned an "FN" and did not participate in class the final six weeks of the course. There were 26 students total. There was a 92.3% success rate if these two students are counted. 2) A grade of "C" would recognize competence with the PUL and related outcomes.	