CLEVELAND STATE UNIVERSITY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Bachelor of Electrical Engineering Program

ASSESSMENT ANNUAL REPORT

2007-2008 Academic Year
(08/2007 to 05/2008)

Prepared by:

Dr. Murad Hizlan, Assoc. Prof. & ABET Coordinator
Department of Electrical and Computer Engineering
Fenn College of Engineering

05/30/2008

Table of Contents

I. Overview of Assessment Process 1
I.1 Assessment Methods 1
Course Evaluation 1
Senior Exit Survey 2
Senior Design Instructor Survey 2
Alumni Survey 3
Industrial Advisory Committee 3
I.2 Outcomes/Assessment Matrix 4
I.3 Objectives/Assessment Matrix 5
I.4 Courses/Outcomes Matrix 6
I.5 Courses/Objectives Matrix 7
II. Assessment Results Relative to Outcomes 8
Outcome (a) 9
Outcome (b) 10
Outcome (c) 11
Outcome (d) 12
Outcome (e) 13
Outcome (f) 13
Outcome (g) 14
Outcome (h) 15
Outcome (i) 16
Outcome (j) 16
Outcome (k) 17
III. Summary of Assessment Results Relative to Objectives 18
IV. Conclusions and Further Actions 20

Appendixes

Appendix 1 Course Evaluation Results for Outcomes, Fall 2007 21
Appendix 2 Course Evaluation Results for Objectives, Fall 2007 22
Appendix 3 Course Evaluation Results for Outcomes, Spring 2008 23
Appendix 4 Course Evaluation Results for Objectives, Spring 2008 24
Appendix 5 Senior Exit Survey Results for Outcomes, Spring 2008 25
Appendix 6 Senior Design Instructor Survey Results for Outcomes, Spring 2008 26
Appendix 7 Alumni Survey Results for Outcomes, 2007-2008 27
Appendix 8 Alumni Survey Results for Objectives, 2007-2008 28
Appendix 9 A Sample Course Evaluation Form for Outcomes 29
Appendix 10 Course Evaluation Form for Objectives 30
Appendix 11 Senior Exit Survey Sheet (version 2, revised 4/23/03) 31
Appendix 12 Senior Design Instructor Survey Sheet (version 2, revised 4/23/03) 33
Appendix 13 Electrical and Computer Engineering Alumni Survey Sheet (rev. 4, 12/14/07) .. 35

I. Overview of Assessment Process

According to the Accreditation Board for Engineering and Technology (ABET) EC2000, the assessment process is an on-going spiral process that starts with the development of the objectives and outcomes, followed by annual assessment of the status of meeting the objectives and outcomes with all educational means, primarily the offering of courses, and, based on the assessment findings, subsequent adjustment of educational practice to better meet the objectives and outcomes. This process continues in a spiral manner in the sense that each cycle of the process is expected to result in a higher quality of education offered by the institution.

I.1 Assessment Methods

The Department of Electrical and Computer Engineering utilizes five distinct assessment tools: Course Evaluation, Senior Exit Survey, Design Instructor Survey, Alumni Survey, and Industrial Advisory Committee Survey. Each one of these tools will be described in detail later.

Results collected by the five instruments are compiled and analyzed by the Engineering Criteria Department Coordinator. The compiled results are presented in the Annual Assessment Report to the department faculty for their review, and the faculty holds discussions about the findings. Weak points of the curriculum are identified and remedies are proposed.

A summary of the faculty review discussions and recommended remedial actions are compiled in the Reviews and Actions by the Engineering Criteria Department Coordinator and distributed to all faculty members of the department. Any recommended changes related to assessment methods and tools are made by the Engineering Criteria Department Coordinator. Any recommended changes related to courses are made by the respective course coordinators. Any recommended curriculum changes are officially brought before the Department, College and University for their approval.

Course Evaluation

This activity is performed at the end of each semester. Each course is designated to meet certain outcomes and objectives (see Courses/Outcomes Matrix in Section I.4 and Courses/Objectives in Section I.5). The instructor of each course is required to fill out a Course Evaluation Form for Outcomes and a Course Evaluation Form for Objectives (see Appendixes 9 and 10).

During fall semester 2006, the Course Evaluation Form for Outcomes was completely changed and redeveloped. This change was in response to a criticism by ABET as a result of its review of our BS programs in 2004 and a criticism by the CSU Office of Assessment in the 2005 Assessment Report Review. In the past, the course evaluation form for outcomes was rather subjective, lacking concrete measures for the success of meeting the program outcomes (see Appendixes 8 and 9 of 2004-2005 report). The new Course Evaluation Form for Outcomes follows the “rubrics” method for student learning assessment, as garnered from the Electrical and Computer Engineering Department Head Association by Dr. Villaseca, former department chairman. Each form is created by the course instructor using a set of student learning outcomes that are associated with a set of program outcomes for that course (see Appendix 9 for a sample form). The score for each student learning outcome is an average of the scores for relevant

quizzes, tests, exams, homework, etc. The score of each program outcome is an average of the scores for all student learning outcomes associated with that particular program outcome. This form greatly increases the objectiveness of the assessment since the measures for meeting the outcomes are direct and the instructors simply determine the "rubrics." The instructor makes appropriate changes in the course according to the indications of the assessment scores.

The Course Evaluation Form for Objectives (Appendix 10) uses a score from 0 to 3 points, as determined by the course instructor, for each objective. Scoring for meeting an objective (3 for "completely met" and 0 for "not met") is intended to be relative to the "extent [that objective is] intended for the course." Total number of points and the percentage of the maximum total number of points are calculated. On the form, the instructor is also provided a space to write any necessary explanation to support the evaluation, to provide an assessment of the students' knowledge of the prerequisite topics, and to provide recommendations on how to change the course in order to better meet the program outcomes and/or objectives.

As it is, the Course Evaluation Form for Objectives is rather subjective. The Engineering Criteria Department Coordinator is currently investigating possible ways to make it less subjective, perhaps similar to what was done for the Course Evaluation Form for Outcomes. Any changes, if made, will be implemented during the 2008-2009 academic year.

Senior Exit Survey

This activity is performed every year at the end of the spring semester. Each graduating senior student is asked to fill out a Senior Exit Survey Form (see Appendix 11). The forms are distributed and collected by one of the department secretaries. The student is first asked to answer three general questions about quality of the academic program, the courses, and the faculty. For these 3 questions, a score from 1 to 5 is given, with 1 for "poor" and 5 for "excellent." The student is then asked to answer 15 questions regarding whether, in their opinion, the outcomes of the curriculum are met. For these 15 questions, a score from 0 to 5 points is given, with 5 for "strongly agree," 1 for "strongly disagree," and 0 for "no basis for judgment." At the end, the student is asked to comment on the strength of the Electrical Engineering program and on how the Electrical Engineering program could be improved.

Senior Design Instructor Survey

This activity is ordinarily performed every year at the end of spring semester, unless senior design is offered in the fall, in which case it is also performed at the end of fall semester. Each instructor teaching the Senior Design course (EEC490) is asked to fill out a Senior Design Instructor Survey form (see Appendix 12). Forms are distributed to and collected from the instructors by the Engineering Criteria Department Coordinator.

The instructor is asked to answer 16 questions regarding the students' ability as stipulated by the outcomes of the curriculum, acquired through the curriculum, and manifested in the senior design process. For these 16 questions, a score from 0 to 5 points is given, with 5 for "excellent," 1 for "poor," and 0 for "no basis for judgment." At the end, the instructor is asked to recommend changes, if any, to the Senior Design course and/or to the curriculum of the Electrical Engineering Program.

Alumni Survey

This activity is performed by the department every odd year at the end of the fall semester, with the responses collected throughout the following spring semester. Each surveyed alumnus is asked to (anonymously) fill out a form of 30 questions (see Appendix 13). Questions 2 through 10 relate to the Program Objectives and 11 through 28 relate to the Program Outcomes, where each outcome is rated on a scale of 1 to 5 as being met. Question 29 inquires about an overall rating of the quality of the program, and Question 30 provides as space for any additional comments by the alumnus.

In the past, the alumni survey was conducted by the Fenn College of Engineering for each department. Later, the college survey was supplemented by individual departmental attachments. First such survey with an attachment from the Electrical and Computer Engineering Department was conducted in fall 2005. In an attempt to further improve the process, individual departments were asked to design and conduct their own alumni surveys.

The current Alumni Survey Sheet (Appendix 13) was designed during fall 2007 as a result, and was first put into use at the end of fall semester 2007, generating 69 responses.

Industrial Advisory Committee

The Industrial Advisory Committee meets every year. The department chairperson organizes this activity. Invitation letters and material related to curriculum objectives and outcomes are sent to the committee members in advance of the meeting. During the meeting the committee members are presented with samples of senior design presentations and reports. All faculty members are expected to participate in this meeting. Committee members and faculty members exchange opinions and ideas regarding curriculum outcomes and objectives. After meeting, the committee submits a report of their ratings as to the level at which each outcome and objective is met based on their observations from the annual meeting.

I.2 Outcomes/Assessment Matrix

The assessment tools (strategies) include Course Evaluation (questionnaire), Senior Exit Survey (questionnaire), Design Instructor Survey (questionnaire), Alumni Survey (questionnaire), and Industrial Advisory Committee (meetings). The outcomes and the assessment strategies for outcomes are summarized in the following table.

Outcomes / **Assessment Tools**	Course Evaluation (Questionnaire)	Senior Exit Survey (Questionnaire)	Design Instructor Survey (Questionnaire)	Alumni Survey (Questionnaire)	Industrial Advisory Committee (Meetings)
(a) Apply knowledge of mathematics, science and engineering	✓	✓	✓	✓	✓
(b) Design and conduct electrical engineering experiments, as well as analyze and interpret data	✓	✓	✓	✓	✓
(c) Design a system, component, or process to meet desired needs	✓	✓	✓	✓	✓
(d) Function on multi-disciplinary teams	✓	✓	✓	✓	✓
(e) Identify, formulate, and solve electrical engineering problems	✓	✓	✓	✓	✓
(f) Understanding of professional and ethical responsibility	✓	✓	✓	✓	✓
(g) Communicate effectively	✓	✓	✓	✓	✓
(h) Understand the impact of engineering solutions in a global and societal context	✓	✓	✓	✓	✓
(i) Engage in life-long learning	✓	✓	✓	✓	✓
(j) Knowledge of contemporary issues	✓	✓	✓	✓	✓
(k) Use the techniques, skills, and modern engineering tools	✓	✓	✓	✓	✓

I.3 Objectives/Assessment Matrix

The assessment tools (strategies) include Course Evaluation (questionnaire), Alumni Survey (questionnaire), and Industrial Advisory Committee (meetings). The objectives and the assessment strategies for objectives are summarized in the following table.

Objectives / **Assessment Tools**	Course Evaluation (Questionnaire)	Senior Exit Survey (Questionnaire)	Design Instructor Survey (Questionnaire)	Alumni Survey (Questionnaire)	Industrial Advisory Committee (Meetings)
1) Practice electrical engineering in one or more of the following areas: communications computers, controls, power electronics, and power systems	✓			✓	✓
2) Define and diagnose problems, and provide and implement electrical engineering solutions in an industrial environment	✓			✓	✓
3) Observe engineering ethics in the practice of electrical engineering	✓			✓	✓
4) Communicate effectively with technically diverse audiences	✓			✓	✓
5) Collaborate with others as a member or as a leader in an engineering team	✓			✓	✓
6) Develop their knowledge beyond the undergraduate level and to keep current with advancements in electrical engineering	✓			✓	✓

I.4 Courses/Outcomes Matrix

Year	Freshman							Sophomore							Junior								Senior				
Electrical Engineering Program / **Outcome**	ENG 101/102 English I/II	MTH 181/182 Calculus I/II	CHM 261/266 General Chemistry I/Lab I	PHY 243 University Physics I (WAC)	ESC 100 & CSC 121 Orientation	ESC 151 ANSI C	ESC 120 Introduction to Engineering	MTH 283/284 M-V Calculus & Matrices	PHY 244 University Physics II (WAC)	ESC 250 Differential Equations	EEC 310/311 Electric Circuits I\II	EEC 313 Electronics I	ESC 310 Statistics and Probability	General Education Electives (Three)	EEC 314/315 Electronics II and Lab	EEC 361 Electromechanical Energy Con.	EEC 382 Digital Systems and Lab	ESC 203 Static and Dynamics	ESC 282 Engineering Economy	EEC 470 Power Electronics	General Education Electives (Two)	PHL 215 Engineering Ethics (WAC)	EEC 440/441 Controls and Lab	EEC 450/451 Communications and Lab	EEC 471 Power Elect. & Machines Lab	EEC 490 Senior Design	EEC Technical Electives (Three)
(a) Knowledge of mathematics, science, and engineering		✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
(b) Design and conduct experiments, analyze and interpret data			✓	✓			✓		✓				✓		✓		✓			✓			✓	✓	✓	✓	
(c) Ability to design a system, component, or process											✓	✓			✓		✓			✓			✓	✓	✓	✓	✓
(d) Ability to function on multi-disciplinary teams																										✓	
(e) Ability to identify, formulate, and solve electrical engineering problems						✓				✓							✓	✓		✓			✓	✓	✓	✓	✓
(f) Understanding of professional and ethical responsibility					✓		✓															✓					
(g) Ability to communicate effectively	✓		✓	✓			✓		✓						✓					✓		✓	✓	✓	✓	✓	
(h) Broad education to understand the impact of engineering solutions in a global and societal context														✓					✓		✓	✓					
(i) Recognition of the need for, and an ability to engage in life-long learning														✓							✓					✓	✓
(j) Knowledge of contemporary issues														✓							✓	✓					
(k) Ability to use the techniques, skills, and modern engineering tools						✓					✓	✓			✓		✓			✓			✓	✓	✓	✓	✓

I.5 Courses/Objectives Matrix

Electrical Engineering Program / Objective	Courses																			
	EEC 310 Electric Circuits I	EEC 311 Electric Circuits II	EEC 313 Electronics I	EEC 314 Electronics II	EEC 315 Electronics Lab	EEC 361 Electromechanical Energy Con.	EEC 382 Digital Systems and Lab	EEC 417 Embedded Systems	EEC 430 Digital Signal Processing	EEC 440 Controls	EEC 441 Controls Lab	EEC 447 Advanced PLC Applications	EEC 450 Communications	EEC 451 Communications Lab	EEC 470 Power Electronics	EEC 471 Power Electronics Lab	EEC 473 Power Systems	EEC 474 Power Electronics II	EEC 490 Senior Design	EEC 492 Special Topics in E&CE
1. Practice electrical engineering in one or more of the following areas: communications, computers, controls, power electronics, and power systems.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2. Define and diagnose problems, and provide and implement electrical engineering solutions in industry, business, and government.	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3. Observe engineering ethics in the practice of electrical engineering.																	✓	✓		
4. Communicate effectively with technically diverse audiences											✓							✓	✓	
5. Collaborate with others as a member or as a leader in an engineering team.					✓			✓		✓	✓			✓		✓			✓	
6. Develop their knowledge beyond the undergraduate level and to keep current with advancements in electrical engineering.										✓										

II. Assessment Results Relative to Outcomes

Scores are percentages that are obtained by normalizing scores to their maximums. The designations are:

- 90 to 100: Excellent
- 80 to 90: Very Good
- 70 to 80: Good
- 60 to 70: Satisfactory
- < 60: Unsatisfactory

The following table is a summary of the overall average scores of all outcomes. The overall average score is an average of scores obtained by various assessment tools during two semesters. (See Appendixes 1 to 8 for detailed results from Course Evaluations, Senior Exit Survey, Senior Design Instructor Survey and Alumni Survey).

Outcomes	Overall Average Score (%)	Designation	Overall Average Score 2006-2007
(a) Ability to apply knowledge of mathematics, science, and engineering	79	Good	86
(b) Ability to design and conduct electrical engineering experiments	81	Very good	88
(c) Ability to design a system, component, or process to meet desired needs	76	Good	82
(d) Ability to function on multi-disciplinary teams	78	Good	86
(e) Ability to identify, formulate, and solve electrical engineering problems	85	Very good	85
(f) Understanding of professional and ethical responsibility	80	Very good	82
(g) Ability to communicate effectively	82	Very good	89
(h) Broad education to understand the impact of engineering solutions in a global and societal context	70	Good	76
(i) A recognition of the need for, and an ability to engage in life-long learning	77	Good	85
(j) A knowledge of contemporary issues	67	Satisfactory	77
(k) An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice	81	Very good	89

From this table we can see that our program in general is very successful in meeting all outcomes, except Outcome (j). Compared with the 2006-2007 results, we can see that scores have in general declined, except for Outcome (e).

Rather than an indication of decline in the quality of education, this overall decline in scores is mainly an artifact of the inclusion of the Alumni Survey results in the 2007-2008 analysis, whereas it was not available for the 2006-2007 analysis, Alumni Survey, by nature, compiles data that is representative of the status of the program several years back on the average, whereas other assessment tools are indicative of the current status of the program. As such, any improvement in quality that takes place over the recent years is not reflected by the Alumni Survey. In fact, an analysis of individual strategy scores for each outcome, as presented below, shows that Alumni Survey scores are consistently and appreciably lower than scores for other strategies.

Another contributor to the apparent decline in scores is the absence of Senior Design Instructor Survey results, (unavailable as of this writing), which is intended to measure the "ability [of the student] as stipulated by the outcomes of the curriculum, acquired through the curriculum, and manifested in the senior design process."

Finally, the absence of the Industrial Advisory Committee report (unavailable as of this writing) leaves out another very significant measure that is related to the current status of the quality of program as viewed by the end consumers of our product.

It is expected that once this report is revised with the missing data, average scores for the outcomes will significantly increase, reflecting a better (although still not perfect, due to Alumni Survey results) indication of the current status of the program.

One point of real concern is Outcome (j), which received only a "satisfactory" rating. This particular outcome is usually left to be dealt with outside of the department, through general education and other support courses offered by the university. The fact the University is moving to offer a significantly revised and expectedly better general education structure in the near future should help with this outcome. However, it is also recommended that the department take measures to include more contemporary issues within the course contents.

In the following, detailed scores for each outcome are presented (if an assessment instrument is not available, no entry is shown in the score table.) Then, conclusions are drawn from the scores and necessary actions are recommended or actions already taken are described.

<u>Outcome (a)</u>: Ability to apply knowledge of mathematics, science, and engineering to general electrical engineering and, in particular, to one or more of the following areas: communications, computers, controls, power electronics, and power systems.

This outcome is to be realized by all EEC courses and supporting engineering science (ESC) courses. It also relies heavily on the background acquired by the students during their first two years of study in the courses taken from the departments of Mathematics, Physics and Chemistry.

Results of Outcome (a):

Scores / Assessment Strategy	Fall 2007	Spring 2008	Average of the year	Designation
Course Evaluation	80	82	81	Very good
Senior Exit Survey		82	82	Very good
Senior Design Instructor Survey				
Alumni Survey		74	74	Good
Industrial Advisory Committee				
Overall Average			**79**	**Good**

Relevant Comments from Instructors

Instructor of EEC 314, Spring 2008:
"[The students] can't do basic circuit calculations with necessary speed/accuracy."

Conclusions and Actions Taken/Recommended:

The overall average score is "good" suggesting that this outcome has been met. While the scores from Course Evaluation and Senior Exit Survey match and are very good, the score from Alumni Survey, although good, is relatively lower. This might be an indication that there has been progress over the years in meeting this outcome.

The individual scores for EEC 310 (F07), EEC 311 (F07, S08) and EEC 450 (F07) are below 70 (see Appendixes 1 and 3). The EEC 314 instructor's recurring comments (above) also indicate that improvements in circuit courses are needed. It is recommended that these courses are enhanced for this outcome.

Outcome (b): Ability to design and conduct electrical engineering experiments, as well as to analyze and interpret data

This outcome is to be realized by all EEC laboratory courses as well as some other EEC courses.

Results of Outcome (b):

Scores / Assessment Strategy	Fall 2007	Spring 2008	Average of the year	Designation
Course Evaluation	93	87	90	Excellent
Senior Exit Survey		74	74	Good
Senior Design Instructor Survey				
Alumni Survey		78	78	Good
Industrial Advisory Committee				
Overall Average			**81**	**Very good**

Relevant Comments from Instructors

Instructor of EEC 315, Spring 2008:
"Experiments were conducted in a group of 2-3 students. Circuit connections and experimental results provided a good understanding of topics such as semi-conductor devices, component understanding (Op-amp, transistors) and working with software tools to simulate circuit conditions, etc. Working in group was effective to give students collaborating with other team members and taking lead in finishing the given task in time."

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. Senior Exit Survey results, and to a lesser degree, Alumni Survey results are lower than Course Evaluation results. This discrepancy should be investigated.

Our teaching laboratories have been undergoing continuous enhancement through purchasing new instruments and adding computers for laboratory use. Other changes in the curriculum, in particular, tighter coordination between lecture and corresponding laboratory courses, or integration thereof, have resulted in greatly enhanced learning experience for our students.

The department has completed inventories for several instructional laboratories, in particular Electronics/Communications Laboratory, Digital Laboratory and Controls Laboratory. Plans have been put into action for the repair or replacement of defective instruments and components. However, there has been an ongoing need for a technician supporting the instructional laboratories.

Outcome (c): Ability to design a system, component, or process to meet desired needs

This outcome is to be realized by all EEC courses.

Results of Outcome (c):

Scores / Assessment Strategy	Fall 2007	Spring 2008	Average of the year	Designation
Course Evaluation	82	85	84	Very good
Senior Exit Survey		68	68	Satisfactory
Senior Design Instructor Survey				
Alumni Survey		77	77	Good
Industrial Advisory Committee				
Overall Average			**76**	**Good**

Conclusions and Actions Taken/Recommended:

The overall average score is "good" suggesting that this outcome has been met. However, the individual Course Evaluation scores for EEC 311 (F07 and S08), EEC 313 (F07) and EEC 314 (F07 and S08) are relatively low (around 70). It is recommended that these courses are enhanced with design content.

There is also a marked discrepancy between the Course Evaluation Scores and Senior Exit Survey scores, which need to be investigated.

Outcome (d): Ability to function on multi-disciplinary teams

This outcome is to be realized by EEC 490, Senior Design course.

Results of Outcome (d):

Scores / Assessment Strategy	Fall 2007	Spring 2008	Average of the year	Designation
Course Evaluation				
Senior Exit Survey		75	75	Good
Senior Design Instructor Survey				
Alumni Survey		80	80	Very good
Industrial Advisory Committee				
Overall Average			**78**	**Good**

Conclusions and Actions Taken/Recommended:

The overall average score is "good" suggesting that this outcome has been met. Senior design is the only course where a multidisciplinary team is possible. Fall 2002 semester was the first time when a multi-disciplinary team was formed.

A view, also shared by the Industry Advisory Committee, has developed over the years among the senior design instructors: "It is not indispensable to involve students from different degree program disciplines to have multidisciplinary teams if the Design Project itself requires students to deal with problems outside their own disciplinary degree program." [Dr. Villaseca]

This year, senior design course in electrical engineering had one section in the area of Power Systems. The design projects were of multi-disciplinary nature even though students were not from different degree programs. The instructor of this section, Dr. Villaseca, has previously described his senior design experience as: "Students were asked to consider financial and economic issues, environmental impacts, social impacts, political and regulatory constraints and/or incentives, engineering design labor costs, all beyond the application of strictly electrical engineering knowledge. For this, the students naturally

divided themselves to do research in these areas and to reconcile their influence with the electrical engineering alternatives. This, in effect, required that one (or two at the most) students in each of these areas, (in a team of 5 students), to rise their level of expertise in non-electrical engineering areas pertinent to their project and negotiate options compatible to a successful design."

Outcome (e): Ability to identify, formulate, and solve electrical engineering problems

This outcome is to be realized by primarily by higher level EEC courses (including, but not limited to 400-level courses).

Results of Outcome (e):

Scores / Assessment Strategy	Fall 2007	Spring 2008	Average of the year	Designation
Course Evaluation	88	91	90	Excellent
Senior Exit Survey		84	84	Very good
Senior Design Instructor Survey				
Alumni Survey		80	80	Very good
Industrial Advisory Committee				
Overall Average			**85**	**Very good**

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. However, Course Evaluation score for EEC 430 (F07) is relatively low. It is recommended that this course is enhanced to better meet this outcome.

Outcome (f): Understanding of professional and ethical responsibility

This outcome is to be realized by ESC 100 Orientation, ESC 120 Introduction to Engineering and PHL 215 Engineering Ethics.

Results of Outcome (f):

Scores / Assessment Strategy	Fall 2007	Spring 2008	Average of the year	Designation
Course Evaluation				
Senior Exit Survey		81	81	Very good
Senior Design Instructor Survey				
Alumni Survey		78	78	Good
Industrial Advisory Committee				
Overall Average			**80**	**Very good**

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. There is good correlation between Senior Exit Survey and Alumni Survey results. It was recommended in the 2003/2004 report that course evaluations be conducted on the relevant courses, ESC100, ESC120 and PHL215, so that the overall score could be more accurate.

Over the years, it has been extremely difficult, if not impossible, to collect course evaluations from out-of-department courses. This year, no course evaluation data supporting Outcome (f) has been collected. It is recommended that alternative assessment methods are investigated unless Course Evaluation data can be reliably collected from out-of-department courses.

Outcome (g): Ability to communicate effectively

This outcome is to be realized primarily by EEC lab courses, EEC 490 and PHL215.

Results of Outcome (g):

Scores / Assessment Strategy	Fall 2007	Spring 2008	Average of the year	Designation
Course Evaluation	94	88	91	Excellent
Senior Exit Survey		81	81	Very good
Senior Design Instructor Survey				
Alumni Survey		74	74	Good
Industrial Advisory Committee				
Overall Average			**82**	**Very good**

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. However, the score is lower compared with score from the 06-07 report (89). This is primarily due to the inclusion of Alumni Survey scores this year. The discrepancy between Course Evaluation scores and Alumni Survey scores can probably be explained by the significant program enhancements supporting this outcome over the recent years. In particular, integration into the program of Proskills (formerly Write-Talk) provided by Watson Associates and sustained by many of our instructors has been very effective. Proskills was first experimentally introduced in fall 2002 and formally implemented in spring 2003.

The Proskills program is a communication skill development program designed to address many of the most important communication and interpersonal skills required for successful carriers in engineering. The program targets the development of non-technical skills such as writing, speaking, ethics, personal networking, resumes and cover letters, project management, teamwork, interpersonal relationships, etc.

Program activities for Proskills are integrated into the required classes that typically involve all students. For each designated course, lectures and exercises are given during one class session in the semester. Student work is evaluated for writing and speaking skills, and feedback is provided to each student. The program also incorporates an assessment methodology to track on-going student skill development and documents results for use by school administrators.

Proskill activities continued during the 2007-2008 academic year with the involvement of several courses and instructors.

Outcome (h): Broad education to understand the impact of engineering solutions in a global and societal context

This outcome is to be realized by the general education electives, and ESC 282 Engineering Economy and PHL 215 Engineering Ethics.

Results of Outcome (h):

Scores / Assessment Strategy	Fall 2007	Spring 2008	Average of the year	Designation
Course Evaluation				
Senior Exit Survey		69	69	Satisfactory
Senior Design Instructor Survey				
Alumni Survey		70	70	Good
Industrial Advisory Committee				
Overall Average			**70**	**Good**

Conclusions and Actions Taken/Recommended:

The overall average score is "good" suggesting that this outcome has been met. As mentioned under Outcome (f), it is very difficult to obtain course evaluations from out-of-department courses, especially courses as diverse as general education electives. This year, no Course Evaluation data regarding Outcome (h) has been collected. It is therefore recommended that alternative assessment methods are investigated unless Course Evaluation data can be reliably collected from at least ESC 282 and PHL 215.

Outcome (i): Recognition of the need for, and an ability to engage in life-long learning

This outcome is to be realized by general education electives, EEC490 Senior Design and EEC technical electives.

Results of Outcome (i):

Scores / Assessment Strategy	Fall 2007	Spring 2008	Average of the year	Designation
Course Evaluation		81	81	Very good
Senior Exit Survey		74	74	Good
Senior Design Instructor Survey				
Alumni Survey		75	75	Good
Industrial Advisory Committee				
Overall Average			**77**	**Good**

Conclusions and Actions Taken/Recommended:

The overall average score is "good" suggesting that this outcome has been met.

Outcome (j): Knowledge of contemporary issues

This outcome is to be realized by general education electives and PHL215 Engineering Ethics.

Results of Outcome (j):

Scores / Assessment Strategy	Fall 2007	Spring 2008	Average of the year	Designation
Course Evaluation				
Senior Exit Survey		68	68	Satisfactory
Senior Design Instructor Survey				
Alumni Survey		66	66	Satisfactory
Industrial Advisory Committee				
Overall Average			**67**	**Satisfactory**

Conclusions and Actions Taken/Recommended:

The overall average score is "satisfactory" suggesting that this outcome has been met. There is no Course Evaluation data available for this outcome this year. It is recommended that alternative assessment methods are investigated unless Course Evaluation data can be reliably collected from and PHL 215.

While the average score is satisfactory, it is clear that much improvement is required in this outcome. The new general education structure adopted by the University will be a step in the right direction when implemented. It is also recommended that the departmental courses are enhanced with contemporary issues in order to improve this outcome.

Outcome (k): An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice

This outcome is to be realized by all EEC courses except EEC361.

.

Results of Outcome (k):

Scores / Assessment Strategy	Fall 2007	Spring 2008	Average of the year	Designation
Course Evaluation	85	85	85	Very good
Senior Exit Survey		79	79	Good
Senior Design Instructor Survey				

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. However, the individual Course Evaluation scores for EEC 311 (F07 and S08) are particularly low. It is recommended that this course is enhanced regarding Outcome (k).

III. Summary of Assessment Results Relative to Objectives

Scores are percentages that are obtained by normalizing scores to their maximums. The designations are:

- 90 to 100: Excellent
- 80 to 90: Very Good
- 70 to 80: Good
- 60 to 70: Satisfactory
- < 60: Unsatisfactory

According to our assessment strategies, success in objectives is assessed through the use of Course Evaluations, Alumni Survey and Industrial Advisory Committee meetings. The Departmental Alumni Survey was conducted during fall 2007-spring 2008. The Industrial Advisory Committee has met during fall 2007; however, their findings have not yet been submitted as of the writing of this report. Therefore, the scores for objectives are based only on the 2007-2008 Departmental Alumni Survey and the fall 2007-spring 2008 Course Evaluations (See Appendixes 2 and 4). The following is a table that summarizes the results (all scores are normalized percentages).

Objectives	06-07 Alumni Survey	Fall 07 Course Evaluation	Spring 08 Course Evaluation	Overall Average Score (%)	Designation	Overall Average Score 2006-2007
1) Practice electrical engineering in one or more of the following areas: communications, computers, controls, power electronics, and power systems	82 (Questions 3 & 4: 82% of respondents practice EE in one or more areas listed.)	90	82	**85**	**Very good**	86
2) Define and diagnose problems, and provide and implement electrical engineering solutions in industry, business, and government	89 (Questions 3 & 6: 89% of respondents perform one or more of the actions listed as EEs.)	81	74	**81**	**Very good**	80
3) Observe engineering ethics in the practice of electrical engineering		100		**100**	**Excellent**	100
4) Communicate effectively with technically diverse audiences	80 (Questions 7 & 8: 80% of respondents answered "yes" to 7 or 8.)	100		**90**	**Excellent**	80
5) Collaborate with others as a member or as a leader in an engineering team	90 (Question 9: 82% of respondents have more than minimal interaction.)	87	87	**88**	**Very good**	86
6) Develop their knowledge beyond the undergraduate level and to keep current with advancements in electrical engineering	86 (Question 10: 86% of respondents performed one or more activities listed.)			**86**	**Very good**	69

IV. Conclusions and Further Actions

From above assessment results and analyses, we can conclude that our Program of Bachelor of Electrical Engineering has met all outcomes and objectives in the academic year 2006-2007.

From the outcomes results summary table, we can see that compared with last year's results, most scores declined. As explained earlier, this can be attributed to the inclusion of the Alumni Survey results, and the absence of Senior Design Instructor Survey and Industrial Advisory Committee results in this year's analyses, rater than a real decline in the quality of the program. However, one real concern remains with regards to scores for Outcome (j), which only received a "Satisfactory" rating. As detailed earlier, in addition to the expected improvement due to the new general education structure, the department should also make an effort to improve the content of contemporary issues in departmental courses.

From the objectives result summary table, we see that all the scores, except for Objective (1) increased, significantly in many cases, achieving designations of "Very good" and "Excellent." Score for Objective (1) declined by one point to 85, which is statistically insignificant.

Communication skills (Objective (4)) and engineering ethics (Objective (3)) were identified as weak based on 2001-2002 assessment. To address these two problems, Watson Associates' Proskills program has been implemented and the score for communication skills has steadily increased over the years 2002-2003, 2004-2005 and 2006-2007. This year's score has also increased by 10 points compared to last year, achieving a rating of "Excellent." This indicates that the Proskills program is working and should continue. Score for ethics objective has remained steady at 100 ("Excellent") from last year.

The most significant improvement has been in Objective (6), where the designation increased from "Satisfactory" to "Very good." Overall, the Department has done very well in achieving the program objectives and improving the objective scores. The department faculty will continue to follow the ABET EC 2000 guidelines to improve the remaining scores from "Very Good" to "Excellent".

The Department is continuing in its efforts to improve the quality of education by following "Vision 2010," a resolution outlining the principles of improving teaching passed by department faculty in October 2005. That document was initiated to address the perceived problems of our way of educating our students, and it is in line with ABET EC2000. The spirit of the document involves the implementation of "problem-oriented teaching and active learning," and "early-on and hands-on" principles for the undergraduate curricula programs.

Implementation of proposed issues in Vision 2010 is already in progress. We are moving ahead in revising the curriculum so that EEC 310 Circuits I can be taught one semester earlier (second semester) for "early-on" exposure, and an accompanying lab course can be created for "hands-on" experience. Other changes in the curriculum and courses will follow in support of Vision 2010.

APPENDIXES

Appendix 1 Course Evaluation Results for Outcomes, Fall 2007

Course No.	Course Description	Cr.	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	Average (%)
Electrical Engineering Courses														
EEC 310	***Electric Circuits I***	4	68		78								67	71.0
EEC 311	***Electric Circuits II***	4	66		69				89				69	73.3
EEC 313	***Electronics I***	4	75		70									72.5
EEC 314	***Electronics II***	4	78		81									79.5
EEC 315	***Electronics Lab***	2	95	94	85		89		95				95	92.2
EEC 361	***EM Energy Conversion***	4	78											78.0
EEC 382	***Digital Systems and Lab***	4	81	91	84		84						90	86.0
EEC 417	***Embedded Systems***	4												*Not offered*
EEC 430	***Digital Signal Processing***	4	76		84		76						76	78.0
EEC 440	***Controls***	4	89		82		91						93	88.8
EEC 441	***Controls Lab***	2												*Not Submitted*
EEC 447	***Applications of PLCs***	4	80		80									80.0
EEC 450	***Communications***	4	62		75		84						77	74.5
EEC 451	***Communications Lab (1)***	2	87	92	92		92		93				93	91.5
EEC 451	***Communications Lab (2)***	2	89	92	90		93		95				94	92.2
EEC 470	***Power Electronics***	4	96	96	99		96		98				96	96.8
EEC 471	***Power Elect. & Machines Lab***	4												*Not offered*
EEC 473	***Power Systems***	4												*Not offered*
EEC 474	***Power Electronics II***	4												*Not offered*
EEC 490	***Senior Design***	4												*Not offered*
Other Courses														
ESC 120	***Introduction to Eng. Design***	2												*Not collected*
PHL 215	***Engineering Ethics***	3												*Not collected*
ESC 282	***Engineering Economy***	3												*Not collected*
	Average Score (%)		**80.0**	**93.0**	**82.2**		**88.1**		**94.0**				**85.0**	***87.1***

Appendix 2 Course Evaluation Results for Objectives, Fall 2007

Course No.	Course Description	Cr.	1	2	3	4	5	6	Average (%)
Electrical Engineering Courses									
EEC 310	***Electric Circuits I***	4	3	2					83.3
EEC 311	***Electric Circuits II***	4	2	3					83.3
EEC 313	***Electronics I***	4	3	3					100.0
EEC 314	***Electronics II***	4							*Not Submitted*
EEC 315	***Electronics Lab***	2	3	3	3	3	3		100.0
EEC 361	***EM Energy Conversion***	4	2						66.7
EEC 382	***Digital Systems/Lab***	4	3	2					83.3
EEC 417	***Embedded Systems***	4							*Not offered*
EEC 430	***Digital Signal Processing***	4	2	2					66.7
EEC 440	***Controls***	4	3	2			2		77.8
EEC 441	***Controls Lab***	2	3	2		3	2		83.3
EEC 447	***Applications of PLCs***	4	2	2					66.7
EEC 450	***Communications***	4	3	2					83.3
EEC 451	***Communications Lab (1)***	2	3	3			3		100.0
EEC 451	***Communications Lab (2)***	2	3	3			3		100.0
EEC 470	***Power Electronics***	4							*Not Submitted*
EEC 471	***Power Elect. & Machines Lab***	4							*Not offered*
EEC 473	***Power Systems***	4							*Not offered*
EEC 474	***Power Electronics II***	4							*Not offered*
EEC 490	***Senior Design***	4							*Not offered*
Other Courses									
ESC 120	***Introduction to Eng. Design***	2							*Not collected*
PHL 215	***Engineering Ethics***	3							*Not collected*
ESC 282	***Engineering Economy***	3							*Not collected*
	Average Score (%)		**89.7**	**80.6**	**100.0**	**100.0**	**86.7**		**91.4**

Appendix 3 Course Evaluation Results for Outcomes, Spring 2008

Course No.	Course Description	Cr.	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(l)	(j)	(k)	Average (%)
Electrical Engineering Courses														
EEC 310	***Electric Circuits I***	4	84		94								84	87.3
EEC 311	***Electric Circuits II***	4	69		72				90				72	75.8
EEC 313	***Electronics I***	4												*Not Submitted*
EEC 314	***Electronics II***	4	74		72									73.0
EEC 315	***Electronics Lab***	2	88	79	86		88						90	86.2
EEC 361	***EM Energy Conversion***	4												*Not offered*
EEC 382	***Digital Systems and Lab***	4												*Not offered*
EEC 417	***Embedded Systems***	4	74	79	81				76		81		76	77.8
EEC 430	***Digital Signal Processing***	4												*Not offered*
EEC 440	***Controls***	4												*Not offered*
EEC 441	***Controls Lab***	2												*Not offered*
EEC 447	***Applications of PLCs***	4	82		81									81.5
EEC 450	***Communications***	4												*Not Submitted*
EEC 451	***Communications Lab***	2	90	96	95		95		95				95	94.3
EEC 470	***Power Electronics***	4												*Not Submitted*
EEC 471	***Power Elect. & Machines Lab***	4	96	96	96		96		96				96	96.0
EEC 473	***Power Systems***	4	84	84			84		84				84	84.0
EEC 474	***Power Electronics II***	4												*Not offered*
EEC 490	***Senior Design (3)***	4												*Not Submitted*
Other Courses														
ESC 120	***Introduction to Eng. Design***	2												*Not collected*
PHL 215	***Engineering Ethics***	3												*Not collected*
ESC 282	***Engineering Economy***	3												*Not collected*
	Average Score (%)		**82.3**	**86.8**	**84.6**		**90.8**		**88.2**		**81.0**		**85.3**	***85.6***

Appendix 4 Course Evaluation Results for Objectives, Spring 2008

Course No.	Course Description	Cr.	1	2	3	4	5	6	Average (%)
Electrical Engineering Courses									
EEC 310	***Electric Circuits I***	4	3	2					83.3
EEC 311	***Electric Circuits II***	4	2	3					83.3
EEC 313	***Electronics I***	4							*Not Submitted*
EEC 314	***Electronics II***	4	2	1					50.0
EEC 315	***Electronics Lab***	2	2	2			3		77.8
EEC 361	***EM Energy Conversion***	4							*Not offered*
EEC 382	***Digital Systems and Lab***	4							*Not offered*
EEC 417	***Embedded Systems***	4	3	2			2		77.8
EEC 430	***Digital Signal Processing***	4							*Not offered*
EEC 440	***Controls***	4							*Not offered*
EEC 441	***Controls Lab***	2							*Not offered*
EEC 447	***Applications of PLCs***	4	2	2					66.7
EEC 450	***Communications***	4							*Not Submitted*
EEC 451	***Communications Lab***	2	3	3			3		100.0
EEC 470	***Power Electronics***	4							*Not Submitted*
EEC 471	***Power Elect. & Machines Lab***	4	3	3			3		100.0
EEC 473	***Power Systems***	4	2	2			2		66.7
EEC 474	***Power Electronics II***	4							*Not offered*
EEC 490	***Senior Design (3)***	4							*Not Submitted*
Other Courses									
ESC 120	***Introduction to Eng. Design***	2							*Not collected*
PHL 215	***Engineering Ethics***	3							*Not collected*
ESC 282	***Engineering Economy***	3							*Not collected*
	Average Score (%)		**81.5**	**74.1**			**86.7**		**80.7**

Appendix 5 Senior Exit Survey Results for Outcomes, Spring 2008

		Relative Score							
		5	***4***	***3***	***2***	***1***	***N/A***		
Outcome	***Survey Question Number***	**Frequency**						***Question Score***	***Outcome Score***
(a)	4	6	9	2			1	85%	**82%**
	5	5	8	3				83%	
	6	7	4	5	1			80%	
(b)	7	3	8	4	2			74%	**74%**
(c)	8	3	4	8	1	1		68%	**68%**
(d)	9	4	7	5		1		75%	**75%**
(e)	10	6	8	3				84%	**84%**
(f)	11	6	7	3	1			81%	**81%**
(g)	12	5	9	2	1			81%	**81%**
	13	5	7	3	1		1	80%	
(h)	14	2	6	8		1		69%	**69%**
(i)	15	3	8	5		1		74%	**74%**
(j)	16		10	4		2	1	68%	**68%**
(k)	17	6	7	3		1		80%	**79%**
	18	4	9	3		1		78%	
AVERAGE								77%	**76%**

Appendix 6 Senior Design Instructor Survey Results for Outcomes, Spring 2008

Unavailable as of the writing of this report.

Appendix 7 Alumni Survey Results for Outcomes, 2007-2008

		Relative Score							
		5	***4***	***3***	***2***	***1***	***N/A***		
Outcome	***Survey Question Number***	**Frequency**						***Question Score***	***Outcome Score***
(a)	11	23	33	4	2	0	5	85%	**86%**
	12	21	35	4	1	0	6	85%	
	13	30	25	5	2	0	5	87%	
(b)	14	12	21	19	4	0	12	75%	**78%**
	15	13	23	16	4	0	12	76%	
	16	21	29	11	1	0	6	83%	
(c)	17	18	22	18	5	0	6	77%	**77%**
(d)	18	16	32	14	1	0	5	80%	**80%**
(e)	19	17	33	10	3	0	5	80%	**80%**
(f)	20	16	29	17	2	0	4	78%	**78%**
(g)	21	14	22	20	7	1	4	73%	**74%**
	22	16	20	22	6	0	4	74%	
(h)	23	10	15	31	5	0	7	70%	**70%**
(i)	28	15	24	12	8	1	7	75%	**75%**
(j)	24	7	16	27	8	2	8	66%	**66%**
(k)	25	7	25	21	6	2	7	70%	**78%**
	26	23	28	9	3	0	4	83%	
	27	20	29	12	1	1	5	81%	
Average								78%	**76%**

Appendix 8 Alumni Survey Results for Objectives, 2007-2008

Objective	*Survey Question Number*	*Relative Score*								*Question Score*	*Objective Score*
		7	***6***	***5***	***4***	***3***	***2***	***1***	***0***		
(1)					***Unempl.***	***Non-Eng.***	***Oth. Eng.***	***EE/CE***			**82%**
	3				1	5	4	57		**85%**	
		Total Number of Responsibilities Frequency									
	4 within EE/CE Group	1	2	2	6	11	12	21	2	**96%**	
(2)					***Unempl.***	***Non-Eng.***	***Oth. Eng.***	***EE/CE***			**89%**
	Frequency of Non-Admin in 6				0	3	4	54		**89%**	
(4)								***Yes***	***No***		
	7							48	18	**73%**	**80%**
	8							47	20	**70%**	
	Yes to 7 or 8 (No to 7 and 8)							53	13	**80%**	
(5)						***Ext. All***	***Ext. Within***	***Minimal***			**90%**
	9					47	13	7		**90%**	
(6)			***Total Number of Activities Frequency***								**86%**
	10		8	8	11	10	12	10	10	**86%**	

Appendix 9 A Sample Course Evaluation Form for Outcomes

This form has similar style but different contents for each course. Shown below is a sample from EEC 450 Communications.

EEC 450 Communications Fall 2007

Quantitative Measure of Student Success in Mastering Outcomes – EE and CE

Program Outcome	Student Learning Outcome	Method of Assessment (Assignment-Problem*)	Average Score (%)	Program Outcome Score (%)
(a) An ability to apply knowledge of mathematics, science, and engineering to general electrical engineering and, in particular, to one or more of the following areas: communications, computers, controls, power electronics, and power systems.	**Outcome 1:** An ability to understand the concepts of analog communications.	I-2, I-5, F-1	83	62
	Outcome 2: An ability to understand the concepts of digital communications.	I-8	78	
	Outcome 3: An ability to recognize and interpret common analog communication systems.	I-7	40	
	Outcome 4: An ability to recognize and interpret common digital communication systems.	F-4, F-10	65	
	Outcome 5: An ability to understand the theoretical foundations of noise.	II-3	63	
	Outcome 6: An ability to understand the theoretical foundations of system performance.	F-9	42	
(c) An ability to design a system, component, or process to meet desired needs.	**Outcome 9:** An ability to design simple analog communication systems.	Design Project	75	75
	Outcome 10: An ability to design simple digital communication systems.	Design Project	75	
(e) An ability to identify, formulate, and solve electrical engineering problems.	**Outcome 7:** An ability to analyze analog communication systems.	I-1, I-3, I-4, I-6, F-2, F-3	84	84
	Outcome 8: An ability to analyze digital communication systems.	II-1, II-2, II-4, II-5, II-6, F-5, F-6, F-7, F-8	83	
(k) An ability to use the techniques, skills, and modem engineering tools necessary for electrical engineering practice.	**Outcome 9:** An ability to design simple analog communication systems.	Design Project	75	77
	Outcome 10: An ability to design simple digital communication systems.	Design Project	75	
	Outcome 11: An ability to understand and apply engineering standards.	Standards Assignment	80	

* I: Midterm Test 1 II: Midterm Test 2 F: Final Examination

Appendix 10 Course Evaluation Form for Objectives

ABET Course Evaluation for Electrical Engineering Objectives by Instructor

Course number and name _____Term and year_____

For the following objectives, check the items that are specified for the course. Then for each objective that is checked, evaluate the level to which you believe that objective was met *to the extent intended for the course*. The total number of points is the sum of all points of the checked items in the table. The maximum total number of points is the maximum number of points for all checked items in column one.

	Objective	Completely (3)	Mostly (2)	Somewhat (1)	Not met (0)
(1) ☐	Practice electrical engineering	☐	☐	☐	☐
(2) ☐	Define and diagnose problems, and provide and implement computer engineering solutions in industry, business, and government	☐	☐	☐	☐
(3) ☐	Observe engineering ethics in the practice of electrical engineering	☐	☐	☐	☐
(4) ☐	Communicate effectively with technically diverse audiences	☐	☐	☐	☐
(5) ☐	Collaborate with others as a member or as a leader in an engineering team	☐	☐	☐	☐
(6) ☐	Develop their knowledge beyond the undergraduate level and to keep current with advancements in electrical engineering	☐	☐	☐	☐
	Total Number of Points				
	Percentage of the Maximum Total Number of Points				

In the space below, provide any necessary explanation to support your evaluation given above. If relevant, also provide an assessment of the students' knowledge of the prerequisite topics. Provide recommendations on how you should change the course in order to better meet the program objectives. Please type.

Evaluated by: _____

Signature: _____ Date: _____

Appendix 11 Senior Exit Survey Sheet (version 2, revised 4/23/03)

Department of Electrical and Computer Engineering

Senior Exit Survey for <u>Electrical</u> Engineering

1 In general, the department has provided a _____ quality academic program?

Excellent				Poor
5	4	3	2	1

2 The Electrical & Computer Engineering courses are of _____academic quality.

Excellent				Poor
5	4	3	2	1

3 The Electrical & Computer Engineering faculty are

Excellent				Poor
5	4	3	2	1

In my studies of Electrical Engineering at Cleveland State University I have:	**Strongly Agree**				**Strongly Disagree**	**No Basis for Judgment**
4. Gained the ability to apply knowledge of mathematics.	5	4	3	2	1	0
5. Gained the ability to apply knowledge of science.	5	4	3	2	1	0
6. Gained the ability to apply knowledge of engineering.	5	4	3	2	1	0
7. Gained the ability to design and conduct experiments, as well as to analyze and interpret data	5	4	3	2	1	0
8. Gained the ability to design a system, component, or process to meet desired needs.	5	4	3	2	1	0
9. Gained the ability to function on multi-disciplinary teams	5	4	3	2	1	0
10. Gained the ability to identify, formulate, and solve engineering problems.	5	4	3	2	1	0
11. Gained the understanding of professional and ethical responsibility.	5	4	3	2	1	0
12. Gained the ability to communicate effectively in oral presentations.	5	4	3	2	1	0
13. Gained the ability to communicate effectively in writing.	5	4	3	2	1	0
14. Gained the broad education necessary to understand of the impact engineering solutions in a global and societal context	5	4	3	2	1	0

15. Gained a recognition of the need for, and an ability to engage in life-long learning	5	4	3	2	1	0
16. Gained a knowledge of contemporary issues	5	4	3	2	1	0
17. Gained the ability to use computers and modern software packages as problem-solving tools.	5	4	3	2	1	0
18. Gained the ability to use reference materials to solve problems.	5	4	3	2	1	0

Comments on the strength of the Electrical Engineering program.

Comments on how the Electrical Engineering program could be improved.

Appendix 12 Senior Design Instructor Survey Sheet (version 2, revised 4/23/03)

Cleveland State University
Department of Electrical and Computer Engineering

Assessment Survey for the Faculty Teaching Senior Design for Electrical Engineering

	Excellent	Above Average	Average	Below Average	Poor	No Basis for Judgment
1. The students' ability to apply knowledge of mathematics	5	4	3	2	1	0
2. The students' ability to apply knowledge of science	5	4	3	2	1	0
3. The students' ability to apply knowledge of engineering	5	4	3	2	1	0
4. The students' ability to design and conduct experiments	5	4	3	2	1	0
5. The students' ability to analyze and interpret data	5	4	3	2	1	0
6. The students' ability to design a system, component, or process to meet a need	5	4	3	2	1	0
7. The students' ability to function on multi-disciplinary teams	5	4	3	2	1	0
8. The students' ability to identify, formulate, and solve engineering problems	5	4	3	2	1	0
9. The students' understanding of ethical and professional responsibility	5	4	3	2	1	0
10. The students' ability to communicate effectively in oral presentations	5	4	3	2	1	0
11. The students' ability to communicate effectively in writing	5	4	3	2	1	0
12. The students' broad education necessary to understand the impact of engineering solutions in a global and societal context	5	4	3	2	1	0

13. The students' recognition of the need for, and an ability to engage in life-long learning	5	4	3	2	1	0
14. The students' knowledge of contemporary issues	5	4	3	2	1	0
15. The students' ability to use computers and modern software packages as problem-solving tools	5	4	3	2	1	0
16. The students' ability to use reference materials to solve problems	5	4	3	2	1	0

17. Based on your experience teaching senior design this year, what changes to senior design would you recommend?

18. Based on your experience teaching senior design this year, what changes to the curriculum would you recommend to better prepare students for the senior design course?

Submitted by _____

Senior Design Project Area _____

Date _____

Appendix 13 Electrical and Computer Engineering Alumni Survey Sheet (rev. 4, 12/14/07)

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
CLEVELAND STATE UNIVERSITY

ALUMNI SURVEY

All individual responses will be kept confidential. Only results statistically compiled from the entire population will be shared.

Information in this boxed section is optional, and will only be used to update our database.

Name _____ Email Address _____ Phone _____
Last First MI

Address (if different from that on the envelope)
Street Address _____ City _____ State _____ Zip _____

Employer Name _____ Position/Title _____

1. What is your year of graduation with a bachelor's degree?

_____

2. Does your current professional role at work *directly* involve Electrical or Computer Engineering?

☐ Yes ☐ No

3. What is your current position? *(Mark only one)*

☐ Within electrical or computer engineering
☐ Within another engineering field
☐ Outside engineering *(skip to question 5)*
☐ Unemployed *(skip to question 10)*

4. Which of the following topical areas do your professional responsibilities fall under? *(Mark all that apply)*

☐ Communications
☐ Computers
☐ Controls
☐ Networks
☐ Power Electronics
☐ Power Systems
☐ Software
☐ Other _____

5. What is the type of position you hold? *(Mark only one)*

☐ Consulting
☐ Product Design
☐ Product Support
☐ Customer Service/Support
☐ Manufacturing/Production
☐ Software Development
☐ Research or Development
☐ Marketing/Sales
☐ Operations/Maintenance
☐ Management
☐ Testing
☐ Other

6. How would you best characterize your current professional responsibilities? *(Mark all that apply)*

☐ Research-oriented; you lead a team of engineers in finding new problem areas to set direction for your company
☐ Assisting in research; you are part of a team of engineers that formulate new directions for your company
☐ Product development; you are involved in translating research ideas in your company into realizable products
☐ Technical support; you are involved in helping people diagnose problems with engineering systems and in solving such problems
☐ Documentation; you are involved in writing technical documentation intended to help your company's customers understand engineering systems
☐ Administrative; you are involved in administrative activities in your company

7. Do your professional responsibilities involve writing documentation that is intended for non-engineers?

☐ Yes ☐ No

8. Do your professional responsibilities involve meeting with or giving presentations to non-engineers?

☐ Yes ☐ No

9. How would you best characterize your mode of work?

☐ Minimal interaction with few people in the company
☐ Extensive interaction with several people in the company
☐ Extensive interaction with a variety of people, both within and outside the company

10. Since graduation, have you? ***(Mark all that apply)***

☐ Enrolled in graduate course(s)
☐ Participated in on-job training
☐ Joined a professional association
☐ Attended workshops or short courses
☐ Attended technical or professional conferences
☐ Regularly read technical or professional journals and magazines

How well did your undergraduate studies at Cleveland State University prepare you in the following areas?

		Very Well	Well	Moderately	Poorly	Very Poorly	N/A
11.	Ability to apply knowledge of mathematics	☐	☐	☐	☐	☐	☐
12.	Ability to apply knowledge of science	☐	☐	☐	☐	☐	☐
13.	Ability to apply knowledge of engineering	☐	☐	☐	☐	☐	☐
14.	Ability to design experiments	☐	☐	☐	☐	☐	☐
15.	Ability to conduct experiments	☐	☐	☐	☐	☐	☐
16.	Ability to analyze and interpret data	☐	☐	☐	☐	☐	☐
17.	Ability to design a system, component, or process to meet a need	☐	☐	☐	☐	☐	☐
18.	Ability to work in a multi-disciplinary team	☐	☐	☐	☐	☐	☐
19.	Ability to identify, formulate, and solve engineering problems	☐	☐	☐	☐	☐	☐
20.	Understanding of ethical and professional responsibility	☐	☐	☐	☐	☐	☐
21.	Ability to communicate effectively in oral presentations	☐	☐	☐	☐	☐	☐
22.	Ability to communicate effectively in writing	☐	☐	☐	☐	☐	☐
23.	Understanding the impact of engineering solutions in a global/societal context	☐	☐	☐	☐	☐	☐
24.	Knowledge of contemporary issues	☐	☐	☐	☐	☐	☐
25.	Ability to use the up-to-date techniques necessary for engineering practice	☐	☐	☐	☐	☐	☐
26.	Ability to use computers and modern software as problem-solving tools	☐	☐	☐	☐	☐	☐
27.	Ability to use reference materials to solve problems	☐	☐	☐	☐	☐	☐
28.	Knowledge of advanced topics in my discipline	☐	☐	☐	☐	☐	☐

29. Overall, the education that you received at Cleveland State was of:

☐ High quality ☐ Moderate quality ☐ Low quality

30. Please write any additional comments you may have about your educational experience at Cleveland State University (you may attach an additional sheet of paper).

Thank you for your participation in this survey. Your feedback is greatly appreciated!