CLEVELAND STATE UNIVERSITY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Bachelor of Electrical Engineering Program

ASSESSMENT ANNUAL REPORT

2009-2010 Academic Year
(08/2009 to 05/2010)

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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 Industry 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 10 and 11).

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 10 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 11) 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.

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 12). 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 13). 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 14). 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 14) was designed during fall 2007 as a result, and was first put into use at the end of fall semester 2007, generating 69 responses.

Industry Advisory Committee

The Industry 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.

The Industry Advisory Committee has met on May 7, 2010; however their report is not yet available as of this writing, and thus, has not been included in the evaluations.

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 Industry 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)	Industry 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 Industry 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)	Industry 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 414 Writing in Elect. & Comp. Eng.	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 414 Writing in Elect. And Comp. Engr.	EEC 417 Embedded Systems	EEC 430 Digital Signal Processing	EEC 440 Controls	EEC 441 Controls Lab	EEC 442 Art and Sci. of Feedback Control	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.								✓			✓		✓									

I.6 Outcomes/Objectives Matrix

The long term program objectives are impacted by the shorter term program outcomes. The following table summarizes the level of impact each outcome has on a given objective.

Impacting Outcomes / Objectives	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
1	3	3	3	2	3	2	2	2	1	1	3
2	3	3	3	2	3	2	2	2			3
3						3		2			
4							3			2	
5				3		2	3				
6								1	3	3	

3: The outcome has a direct impact on the objective.
2: The outcome has a moderate impact on the objective.
1: The outcome has a slight impact on the objective.

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 9 for detailed results from Course Evaluations, Senior Exit Survey, Senior Design Instructor Survey and Alumni Survey).

Outcomes	Overall Average Score (%) 2009-2010	Designation	Overall Average Score (%) 2008-2009
(a) Ability to apply knowledge of mathematics, science, and engineering	84	Very good	84
(b) Ability to design and conduct electrical engineering experiments	84	Very good	86
(c) Ability to design a system, component, or process to meet desired needs	82	Very good	83
(d) Ability to function on multi-disciplinary teams	81	Very good	85
(e) Ability to identify, formulate, and solve electrical engineering problems	88	Very good	82
(f) Understanding of professional and ethical responsibility	87	Very good	82
(g) Ability to communicate effectively	86	Very good	83
(h) Broad education to understand the impact of engineering solutions in a global and societal context	77	Good	79
(i) A recognition of the need for, and an ability to engage in life-long learning	81	Very good	81
(j) A knowledge of contemporary issues	67	Satisfactory	82
(k) An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice	82	Very good	87

Please note that the Industry Advisory Committee results have not been included during the 2009-2010 academic year since their report is not yet available as of this writing.

From the summary table we can see that our program in general is very successful in meeting the outcomes. In fact, nine out of the eleven Outcomes currently have the "Very good" designation, with Outcome (h) at a close "Good" designation with a score of 77, and Outcome (j) at the "Satisfactory" designation.

Compared with the 2008-2009 results, we can see that a majority of the scores have stayed about the same, with some of the scores showing minor gains or losses, except for Outcome (j) which showed a significant loss. Specifically, scores for Outcomes (a), (b), (c), (g), (h) and (i) stayed about the same, (e) and (f) showed minor improvements, and (d) and (k) showed minor reductions.

Of some concern is the decline in Outcome (j) from a score of 82 to 67. This seems to be arising mainly from the relatively low scores given by the Senior Design Instructor Surveys and the Alumni Survey. It is interesting to note that the average score for the same outcome from the Course Evaluations of senior design courses is more than 90 on average, which conflicts with the Senior Design Instructor Surveys from the same instructors. The low Alumni Survey score is therefore a bigger concern. It should however be understood that the Alumni Survey results lag programmatic improvements by several years on average, and that the recent restructuring of the university general education requirements is expected to significantly improve Outcome (j).

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.

Outcome (a): 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 2009	Spring 2010	Average of the year	Designation
Course Evaluation	80	85	83	Very good
Senior Exit Survey		93	93	Excellent
Senior Design Instructor Survey	73	84	79	Good
Alumni Survey		80	80	Very good
Industry Advisory Committee				
Overall Average			**84**	**Very good**

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. While the scores from Course Evaluation, Senior Design Instructor Survey and Alumni Survey are pretty close, around the "very good" mark, the score from Senior Exit Survey is significantly higher.

The individual scores for EEC 310 (F09 and S10), EEC 311 (F09), EEC 313 (F09) and EEC 450 (F09) are below 70 (see Appendixes 1 and 3). 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 2009	Spring 2010	Average of the year	Designation
Course Evaluation	89	89	89	Very good
Senior Exit Survey		88	88	Very good
Senior Design Instructor Survey	70	87	79	Good
Alumni Survey		78	78	Good
Industry Advisory Committee				
Overall Average			**84**	**Very good**

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. Scores from Course Evaluation and Senior Exit Survey are about 10 points higher than those from Senior Design Instructor Survey and Alumni Survey.

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 performs yearly inventories for several of its 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 2009	Spring 2010	Average of the year	Designation
Course Evaluation	84	83	84	Very good
Senior Exit Survey		90	90	Excellent
Senior Design Instructor Survey	80	80	80	Very good
Alumni Survey		74	74	Good
Industry 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 individual Course Evaluation scores for EEC 310 (S10), EEC 311 (S10) and EEC 313 (F09) are below 70 (see Appendixes 1 and 3). It is recommended that these courses are enhanced with design content.

There is also a marked discrepancy between the Senior Exit Survey and Alumni Survey scores, which needs to be investigated.

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

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

Results of Outcome (d):

Scores / Assessment Strategy	Fall 2009	Spring 2010	Average of the year	Designation
Course Evaluation	85	87	86	Very good
Senior Exit Survey		90	90	Excellent
Senior Design Instructor Survey	60	80	70	Good
Alumni Survey		77	77	Good
Industry Advisory Committee				
Overall Average			**81**	**Very good**

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. However, there is a marked discrepancy between the Senior Exit Survey and Senior Design Instructor Survey scores, which needs to be investigated.

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."

This year, senior design courses available to electrical engineering students had four sections, two in the area of control systems and one each in power systems and digital systems. The design projects were mostly real-world problems of multi-disciplinary nature even though students were not from different degree programs. For instance, the instructor of the control systems section, Dr. Gao, describes his senior design experience as: "I had seven teams and total of 17 students, each team did a unique design project based on a problem the team identified in the real world."

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

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

Results of Outcome (e):

Scores / Assessment Strategy	Fall 2009	Spring 2010	Average of the year	Designation
Course Evaluation	86	91	89	Very good
Senior Exit Survey		97	97	Excellent
Senior Design Instructor Survey	80	93	87	Very good
Alumni Survey		79	79	Good
Industry Advisory Committee				
Overall Average			**88**	**Very good**

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. However, Course Evaluation scores for EEC 430 (F09) and EEC 450 (F09) are relatively low. It is recommended that these courses are enhanced to better meet this outcome.

There is also a marked discrepancy between the Senior Exit Survey and Alumni Survey scores, which needs to be investigated.

Outcome (f): Understanding of professional and ethical responsibility

This outcome is to be realized by ESC 100 Orientation, ESC 120 Introduction to Engineering, EEC 414 Writing in Electrical and Computer Engineering and PHL 215 Engineering Ethics.

Results of Outcome (f):

Scores / Assessment Strategy	Fall 2009	Spring 2010	Average of the year	Designation
Course Evaluation	94	92	93	Excellent
Senior Exit Survey		93	93	Excellent
Senior Design Instructor Survey	80	80	80	Very good
Alumni Survey		82	82	Very good
Industry Advisory Committee				
Overall Average			**87**	**Very good**

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. Scores from Course Evaluation and Senior Exit Survey are about 10 points higher than those from Senior Design Instructor Survey and Alumni Survey.

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 414, EEC 490 and PHL215.

Results of Outcome (g):

Scores / Assessment Strategy	Fall 2009	Spring 2010	Average of the year	Designation
Course Evaluation	93	91	92	Excellent
Senior Exit Survey		90	90	Excellent
Senior Design Instructor Survey	80	93	87	Very good
Alumni Survey		75	75	Good
Industry Advisory Committee				
Overall Average			**86**	**Very good**

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. There is a marked discrepancy between the Alumni Survey scores and the other three assessment tool scores.

This outcome was initially addressed quite effectively by the integration into the program of Proskills (formerly Write-Talk) provided by Watson Associates and sustained by many of our instructors. Proskills was first experimentally introduced in fall 2002 and formally implemented in spring 2003. The Proskills program was 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 targeted the development of non-technical skills such as writing, speaking, ethics, personal networking, resumes and cover letters, project management, teamwork, interpersonal relationships, etc.

While the Proskills program has been in place for EEC 490 Senior Design courses during spring 2010, it can no longer be reliably sustained due to a lack of funds. In order to address this outcome, the department has recently introduced a formal course, EEC 414 Writing in Electrical and Computer Engineering, which was first offered during spring 2009. Students enrolled in EEC 414 must be concurrently enrolled in any content-based ECE course, excluding lab courses and senior design. In addition to various topics such as research proposals and resumes, EEC 414 evaluates and provides feedback on writing assignments provided by the content course. EEC 414 will become a required course starting fall 2010.

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 2009	Spring 2010	Average of the year	Designation
Course Evaluation	87	93	90	Excellent
Senior Exit Survey		82	82	Very good
Senior Design Instructor Survey	60	73	67	Satisfactory
Alumni Survey		68	68	Satisfactory
Industry Advisory Committee				
Overall Average			**77**	**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. 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.

The scores from Senior Design Instructor Survey and Alumni Survey are markedly below those from Course Evaluation and Senior Exit Survey, which needs to be investigated.

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 2009	Spring 2010	Average of the year	Designation
Course Evaluation	93	90	92	Excellent
Senior Exit Survey		93	93	Excellent
Senior Design Instructor Survey	60	80	70	Good
Alumni Survey		68	68	Satisfactory
Industry Advisory Committee				
Overall Average			**81**	**Very good**

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. However, similar to Outcome (h), scores from Senior Design Instructor Survey and Alumni Survey are markedly below those from Course Evaluation and Senior Exit Survey, which needs to be investigated.

Outcome (j): Knowledge of contemporary issues

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

Results of Outcome (j):

Scores / Assessment Strategy	Fall 2009	Spring 2010	Average of the year	Designation
Course Evaluation	88	93	91	Excellent
Senior Exit Survey		80	80	Very good
Senior Design Instructor Survey	60	73	67	Satisfactory
Alumni Survey		61	61	Satisfactory
Industry Advisory Committee				
Overall Average			**67**	**Satisfactory**

Conclusions and Actions Taken/Recommended:

The overall average score is "satisfactory" suggesting that this outcome has been met. It is, however, recommended that alternative assessment methods are investigated unless Course Evaluation data can be reliably collected from and PHL 215.

However, like Outcomes (h) and (i), scores from Senior Design Instructor Survey and Alumni Survey are markedly below those from Course Evaluation and Senior Exit Survey.

It is expected that the new general education structure adopted by the University will improve the attainment level of 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.

Results of Outcome (k):

Scores / Assessment Strategy	Fall 2009	Spring 2010	Average of the year	Designation
Course Evaluation	86	88	87	Very good
Senior Exit Survey		85	85	Very good
Senior Design Instructor Survey	70	97	84	Very good
Alumni Survey		72	72	Good
Industry 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 individual Course Evaluation scores for EEC 310 (S10), EEC 311 (F09) and EEC 430 (F09) are particularly low. It is recommended that these courses are enhanced regarding Outcome (k).

There is also marked discrepancy between the scores from Alumni Survey and those form the three other assessment tools used.

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 Industry Advisory Committee meetings. The Industry Advisory Committee has met during spring 2010; however, their report is not available as of this writing. Therefore, the scores for objectives are based only on the fall 2009 and spring 2010 Course Evaluations and Alumni Survey results (See Appendixes 2, 4 and 9). The following is a table that summarizes the results (all scores are normalized percentages).

Objectives	Alumni Survey 2009-2010	Fall 09 Course Evaluation	Spring 10 Course Evaluation	Overall Average Score (%) 2009-2010	Designation	Overall Average Score (%) 2008-2009
1) Practice electrical engineering in one or more of the following areas: communications, computers, controls, power electronics, and power systems	89	95	94	**93**	**Excellent**	87
2) Define and diagnose problems, and provide and implement electrical engineering solutions in industry, business, and government	88	82	89	**86**	**Very good**	77
3) Observe engineering ethics in the practice of electrical engineering		100	100	**100**	**Excellent**	83
4) Communicate effectively with technically diverse audiences	85	89	89	**88**	**Very good**	78
5) Collaborate with others as a member or as a leader in an engineering team	92	67	89	**83**	**Very good**	74
6) Develop their knowledge beyond the undergraduate level and to keep current with advancements in electrical engineering	81	67	67	**72**	**Good**	75

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 2009-2010.

From the outcomes results summary table, we can see that compared with last year's results, a majority of the scores have stayed about the same, with some of the scores showing minor gains or losses, except for Outcome (j) which showed a significant loss. Currently, nine out of eleven Outcomes have "Very good" ratings, with Outcome (h) at a very close "Good" rating with a score of 77.

Of some concern is the decline in Outcome (j) from a score of 82 to 67. While this can be attributed to low scores from Senior Design Instructor Survey and Alumni Survey, the bigger concern is the Alumni Survey result. However, Alumni Survey results lag programmatic improvements by several years on average, and the recent restructuring of the university general education requirements is expected to significantly improve Outcome (j).

From the objectives result summary table, we see that all the scores except for Objective (6) improved, significantly in many cases, with Objectives (1) through (5) achieving higher designations, at the "Very good" and "Excellent" ratings, compared to previous year. Score for Objective (6), 72, showed a minor decrease compared to the previous year.

It is interesting to contrast this with the analysis from the previous year's report, where it was seen that "all the scores except for Objective (1) declined, significantly in some cases. Score for Objective (1), 87, showed a minor increase compared to the previous year." It appears that the significant losses encountered in objective attainment during the previous academic year have been more than offset during the 2009-2010 academic year, except for Objective (6).

While the rating for Objective (6) appears to be declining, it still achieves a "Good" designation. Furthermore, the score from Alumni Survey, at 81, should provide a better indication of the achievement of Objective (6), "Develop[ing] their knowledge beyond the undergraduate level and to keep current with advancements in electrical engineering," than what can be accessed through course evaluations, measured at 67 for both semesters. Therefore, the apparent decline in this score is not a major concern.

A main concern for both the Outcomes Assessment and Objectives Assessment is the ongoing absence of Industry Advisory Committee results from the assessment reports. Over the years, Industry Advisory Committee reports have usually arrived too late to be included in the assessment reports, and when they did, they did not include any quantitative measures that could be integrated as scores. This remains an issue yet to be resolved.

The Department is continuing in its efforts to improve the quality of education by following ABET EC 2000 guidelines and "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 nearly complete. The following changes in the electrical engineering curriculum have been approved during the 2009-2010 academic year in support of Vision 2010:

- One general education course has been dropped from the curricula since we no longer need five general education courses, due to a complete reorganization and restructuring of general education requirements by the University. This provides room for additional major courses.
- A number of courses have been moved around in the schedule to accommodate the addition and removal of courses and to facilitate "early on hands on" education.
- EEC 310 Circuits I and EEC 311 Circuits II have been improved to better address our students' needs.
- EEC 361 was completely redesigned to better address our curricular requirements and students' needs.
- A sabbatical leave has been approved for a faculty member to redesign EEC 450 Communications and EEC 451 Communications Laboratory to possibly combine them into a lecture/laboratory course.
- ESC 120 Introduction to Engineering Design course has been enhanced with the addition of two new modules, Computer Skills and Computer Engineering.

APPENDIXES

Appendix 1 Course Evaluation Results for Outcomes, Fall 2009

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*													
EEC 311	*Electric Circuits II*													
EEC 313	*Electronics I*													
EEC 314	*Electronics II*													
EEC 315	*Electronics Lab*													*Not submitted*
EEC 361	*EM Energy Conversion*													
EEC 382	*Digital Systems and Lab*													
EEC 417	*Embedded Systems*													*Not offered*
EEC 430	*Digital Signal Processing*													
EEC 440	*Controls*													
EEC 441	*Controls Lab*													
EEC 447	*Applications of PLCs*													*Not offered*
EEC 450	*Communications*													
EEC 451	*Communications Lab (1 & 2)*													
EEC 470	*Power Electronics*													*Not offered*
EEC 471	*Power Elect. & Machines Lab*													
EEC 473	*Power Systems*													*Not offered*
EEC 474	*Power Electronics II*													
EEC 490	*Senior Design (1)*													
Other Courses														
ESC 120	*Introduction to Eng. Design*													*Not collected*
PHL 215	*Engineering Ethics*													*Not collected*
ESC 282	*Engineering Economy*													*Not collected*
	Average Score (%)		**80.1**	**88.7**	**84.3**	**85.0**	**86.0**	**94.0**	**93.3**	**87.0**	**93.3**	**87.5**	**86.7**	*87.8*

Appendix 2 Course Evaluation Results for Objectives, Fall 2009

Course No.	Course Description	Cr.	1	2	3	4	5	6	Average (%)
Electrical Engineering Courses									
EEC 310	*Electric Circuits I*								
EEC 311	*Electric Circuits II*								
EEC 313	*Electronics I*								
EEC 314	*Electronics II*								
EEC 315	*Electronics Lab*								*Not submitted*
EEC 361	*EM Energy Conversion*								
EEC 382	*Digital Systems and Lab*								
EEC 417	*Embedded Systems*								*Not offered*
EEC 430	*Digital Signal Processing*								
EEC 440	*Controls*								
EEC 441	*Controls Lab*								
EEC 447	*Applications of PLCs*								*Not offered*
EEC 450	*Communications*								
EEC 451	*Communications Lab (1 & 2)*								
EEC 470	*Power Electronics*								*Not offered*
EEC 471	*Power Elect. & Machines Lab*								
EEC 473	*Power Systems*								*Not offered*
EEC 474	*Power Electronics II*								
EEC 490	*Senior Design (1)*								
Other Courses									
ESC 120	*Introduction to Eng. Design*								*Not collected*
PHL 215	*Engineering Ethics*								*Not collected*
ESC 282	*Engineering Economy*								*Not collected*
	Average Score (%)		**95.2**	**82.1**	**100.0**	**88.9**	**66.7**	**66.7**	**83.3**

Appendix 3 Course Evaluation Results for Outcomes, Spring 2010

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*													
EEC 311	*Electric Circuits II*													
EEC 313	*Electronics I*													
EEC 314	*Electronics II*													
EEC 315	*Electronics Lab*													
EEC 361	*EM Energy Conversion*													*Not offered*
EEC 382	*Digital Systems and Lab*													*Not offered*
EEC 417	*Embedded Systems*													
EEC 430	*Digital Signal Processing*													*Not offered*
EEC 440	*Controls*													*Not offered*
EEC 441	*Controls Lab*													*Not offered*
EEC 447	*Applications of PLCs*													*Not submitted*
EEC 450	*Communications*													*Not offered*
EEC 451	*Communications Lab*													
EEC 470	*Power Electronics*													
EEC 471	*Power Elect. & Machines Lab*													*Not offered*
EEC 473	*Power Systems*													
EEC 474	*Power Electronics II*													*Not offered*
EEC 490	*Senior Design (2)*													
EEC 490	*Senior Design (3)*													
EEC 490	*Senior Design (5)*													
Other Courses														
ESC 120	*Introduction to Eng. Design*													*Not collected*
PHL 215	*Engineering Ethics*													*Not collected*
ESC 282	*Engineering Economy*													*Not collected*
	Average Score (%)		**84.8**	**89.1**	**83.4**	**87.3**	**90.6**	**92.0**	**91.0**	**93.0**	**90.3**	**93.0**	**87.5**	***89.3***

Appendix 4 Course Evaluation Results for Objectives, Spring 2010

Course No.	Course Description	Cr.	1	2	3	4	5	6	Average (%)
Electrical Engineering 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	*EM Energy Conversion*								*Not offered*
EEC 382	*Digital Systems and Lab*								*Not offered*
EEC 417	*Embedded Systems*								
EEC 430	*Digital Signal Processing*								*Not offered*
EEC 440	*Controls*								*Not offered*
EEC 441	*Controls Lab*								*Not offered*
EEC 447	*Applications of PLCs*								*Not submitted*
EEC 450	*Communications*								*Not offered*
EEC 451	*Communications Lab*								
EEC 470	*Power Electronics*								
EEC 471	*Power Elect. & Machines Lab*								*Not offered*
EEC 473	*Power Systems*								
EEC 474	*Power Electronics II*								*Not offered*
EEC 490	*Senior Design (2)*								
EEC 490	*Senior Design (3)*								
EEC 490	*Senior Design (5)*								
Other Courses									
ESC 120	*Introduction to Eng. Design*								*Not collected*
PHL 215	*Engineering Ethics*								*Not collected*
ESC 282	*Engineering Economy*								*Not collected*
	Average Score (%)		**94.4**	**88.9**	**100.0**	**88.9**	**88.9**	**66.7**	**88.0**

Appendix 5 Senior Exit Survey Results for Outcomes, Spring 2010

		Relative Score							
		5	*4*	*3*	*2*	*1*	*N/A*		
Outcome	*Survey Question Number*	Frequency						*Question Score*	*Outcome Score*
(a)									93%
(b)									88%
(c)									90%
(d)									90%
(e)									97%
(f)									93%
(g)									90%
(h)									82%
(i)									93%
(j)									80%
(k)									85%
AVERAGE									89%

Appendix 6 Senior Design Instructor Survey Results for Outcomes, Fall 2009

		Relative Score							
		5	4	3	2	1	N/A		
Outcome	Survey Question Number	Frequency						Question Score	Outcome Score
(a)									73%
(b)									70%
(c)									80%
(d)									60%
(e)									80%
(f)									80%
(g)									80%
(h)									60%
(i)									60%
(j)									60%
(k)									70%
AVERAGE									70%

Appendix 7 Senior Design Instructor Survey Results for Outcomes, Spring 2010

		Relative Score							
		5	*4*	*3*	*2*	*1*	*N/A*		
Outcome	*Survey Question Number*	Frequency						*Question Score*	*Outcome Score*
(a)									84%
(b)									87%
(c)									80%
(d)									80%
(e)									93%
(f)									80%
(g)									93%
(h)									73%
(i)									80%
(j)									73%
(k)									97%
AVERAGE									84%

Appendix 8 Alumni Survey Results for Outcomes, 2009-2010

		Relative Score							
		5	4	3	2	1	N/A		
Outcome	Survey Question Number	Frequency						Question Score	Outcome Score
(a)									80%
(b)									78%
(c)									74%
(d)									77%
(e)									79%
(f)									82%
(g)									75%
(h)									68%
(i)									68%
(j)									61%
(k)									72%
Average									74%

Appendix 9 Alumni Survey Results for Objectives, 2009-2010

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			85%
										85%	
		Total Number of Responsibilities Frequency									
										87%	
		EE/CE with Any Listed Responsibility							Other		
										85%	
(2)					Unempl.	Non-Eng.	Oth. Eng.	EE/CE			88%
										88%	
(4)								Yes	No		85%
										73%	
										77%	
										85%	
(5)						Ext. All	Ext. Within	Minimal			92%
										92%	
(6)			Total Number of Activities Frequency								81%
										93%	
			Any Activity						No Actvty		
										81%	

Appendix 10 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 11 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 12 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 13 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 14 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.

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

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

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