

**CLEVELAND STATE UNIVERSITY  
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING**

**Bachelor of Electrical Engineering Program**

**ASSESSMENT ANNUAL REPORT**

2008-2009 Academic Year  
*(08/2008 to 05/2009)*

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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 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 8 and 9).

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 8 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 9) 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 10). 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 11). 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 12). 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 12) was designed during fall 2007 as a result, and was first put into use at the end of fall semester 2007, generating 69 responses.

Alumni Survey has not been conducted during the 2008-2009 academic year since it was conducted during the previous academic year.

## **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.

The Industrial Advisory Committee report is not yet available as of this writing, and thus, has not been included in the evaluations.

## ***1.2 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.

<b>Outcomes</b>	<b>Assessment Tools</b>	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		✓	✓	✓	✓	✓

### ***1.3 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.

<b>Objectives</b>	<b>Assessment Tools</b>	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***

<b>Year</b>	<b>Freshman</b>	<b>Sophomore</b>	<b>Junior</b>	<b>Senior</b>
<b>Outcome</b>  <b>Electrical Engineering Program</b>	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 ANSIC			
	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)				

### I.5 Courses/Objectives Matrix

<b>Objective</b>	<b>Courses</b>																						
	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.								✓			✓		✓										

## 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 7 for detailed results from Course Evaluations, Senior Exit Survey and Senior Design Instructor Survey).

<b>Outcomes</b>	<b>Overall Average Score (%) 2008-2009</b>	<b>Designation</b>	<b>Overall Average Score (%) 2007-2008</b>
(a) Ability to apply knowledge of mathematics, science, and engineering	84	Very good	85
(b) Ability to design and conduct electrical engineering experiments	86	Very good	86
(c) Ability to design a system, component, or process to meet desired needs	83	Very good	83
(d) Ability to function on multi-disciplinary teams	85	Very good	78
(e) Ability to identify, formulate, and solve electrical engineering problems	82	Very good	85
(f) Understanding of professional and ethical responsibility	82	Very good	80
(g) Ability to communicate effectively	83	Very good	87
(h) Broad education to understand the impact of engineering solutions in a global and societal context	79	Good	73
(i) A recognition of the need for, and an ability to engage in life-long learning	81	Very good	79
(j) A knowledge of contemporary issues	82	Very good	71
(k) An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice	87	Very good	86

Please note that the Alumni Survey results have not been included during the 2008-2009 academic year since it was last conducted during the previous academic year. The Industrial Advisory Committee results have not been included either 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 all outcomes. Compared with the 2007-2008 results, we can see that a majority of the scores have stayed about the same, and some of the scores have improved markedly. Specifically, scores for Outcomes (d), (h) and (j) have improved by 7, 6 and 11 points, respectively. It should be noted that scores for Outcomes (h) and (j) were identified as minor concerns in the 2007-2008 report. These concerns seem to be alleviated by the current results.

Again, compared with the 2007-2008 results, Outcomes (d), (i) and (j) have improved from a “Good” designation to a “Very good” designation while none of the Outcomes degraded in designation. In fact, ten out of the eleven Outcomes currently have the “Very good” designation, with Outcome (h) at a very close “Good” designation with a score of 79.

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):**

<b>Scores</b>	<b>Fall 2008</b>	<b>Spring 2009</b>	<b>Average of the year</b>	<b>Designation</b>
<b>Assessment Strategy</b>				
Course Evaluation	77	80	79	Good
Senior Exit Survey		83	83	Very good
Senior Design Instructor Survey	93	87	90	Excellent
Alumni Survey				
Industrial Advisory Committee				
<b>Overall Average</b>			<b>84</b>	<b>Very good</b>

**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 and Senior Exit Survey are pretty close, around “very good,” the score from Senior Design Instructor Survey is significantly higher. This

might be an indication that this score matures over the course of a student's four-year education.

The individual scores for EEC 310 (F08 and S09), EEC 311 (F08 and S09), EEC 313 (F08) and EEC 450 (F08) 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):**

<b>Scores</b>	<b>Fall 2008</b>	<b>Spring 2009</b>	<b>Average of the year</b>	<b>Designation</b>
<b>Assessment Strategy</b>				
Course Evaluation	89	82	86	Very good
Senior Exit Survey		83	83	Very good
Senior Design Instructor Survey	90	90	90	Excellent
Alumni Survey				
Industrial Advisory Committee				
<b>Overall Average</b>			<b>86</b>	<b>Very good</b>

**Conclusions and Actions Taken/Recommended:**

The overall average score is “very good” suggesting that this outcome has been met. Scores from the three assessment tools used are relatively close, with the Senior Design Instructor Survey results being somewhat higher than the others.

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 performed 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):**

<b>Scores</b>	<b>Fall 2008</b>	<b>Spring 2009</b>	<b>Average of the year</b>	<b>Designation</b>
<b>Assessment Strategy</b>				
Course Evaluation	81	82	82	Very good
Senior Exit Survey		77	77	Good
Senior Design Instructor Survey	100	80	90	Excellent
Alumni Survey				
Industrial Advisory Committee				
<b>Overall Average</b>			<b>83</b>	<b>Very good</b>

**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 (F08), EEC 313 (S09) and EEC 314 (F07 and S08) 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 Senior Design Instructor 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.

**Results of Outcome (d):**

<b>Scores</b>	<b>Fall 2008</b>	<b>Spring 2009</b>	<b>Average of the year</b>	<b>Designation</b>
<b>Assessment Strategy</b>				
Course Evaluation	95	90	93	Excellent
Senior Exit Survey		71	71	Good
Senior Design Instructor Survey	100	80	90	Excellent
Alumni Survey				
Industrial Advisory Committee				
<b>Overall Average</b>			<b>85</b>	<b>Very good</b>

### **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 scores and the other two assessment tool 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.” [Dr. Villaseca]

This year, senior design course in electrical engineering had three sections, one each in the area of communications, control systems, and embedded systems. The design projects were 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: “In this course, students worked with practicing engineers, from Neundorder, National Instruments, and various suppliers to solve real world control problems in utility industry and motion control. They performed brilliantly and in a manner consistent with ethical standards of engineering practice. They communicated effectively with people of various backgrounds. The students functioned as a team where each has his/her own responsibility. As an instructor, I was very happy to see how the students exemplified our program objectives in this course and I believe that they are ready to take on real engineering challenges.”

### **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):**

<b>Scores</b>	<b>Fall 2008</b>	<b>Spring 2009</b>	<b>Average of the year</b>	<b>Designation</b>
<b>Assessment Strategy</b>				
Course Evaluation	81	86	84	Very good
Senior Exit Survey		82	82	Very good
Senior Design Instructor Survey	100	60	80	Very good
Alumni Survey				
Industrial Advisory Committee				
<b>Overall Average</b>			<b>82</b>	<b>Very good</b>

**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 382 (F08) and EEC 450 (F08) are relatively low. It is recommended that these courses are 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):**

<b>Scores</b>	<b>Fall 2008</b>	<b>Spring 2009</b>	<b>Average of the year</b>	<b>Designation</b>
<b>Assessment Strategy</b>				
Course Evaluation				
Senior Exit Survey		83	83	Very good
Senior Design Instructor Survey		80	80	Very good
Alumni Survey				
Industrial Advisory Committee				
<b>Overall Average</b>			<b>82</b>	<b>Very good</b>

**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 Senior Design Instructor 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 414, EEC 490 and PHL215.

**Results of Outcome (g):**

<b>Scores</b>	<b>Fall 2008</b>	<b>Spring 2009</b>	<b>Average of the year</b>	<b>Designation</b>
<b>Assessment Strategy</b>				
Course Evaluation	91	86	89	Very good
Senior Exit Survey		76	76	Good
Senior Design Instructor Survey	80	90	85	Very good
Alumni Survey				
Industrial Advisory Committee				
<b>Overall Average</b>			<b>83</b>	<b>Very good</b>

**Conclusions and Actions Taken/Recommended:**

The overall average score is “very good” suggesting that this outcome has been met. There is some discrepancy between Senior Exit Survey scores and the other two 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.

The Proskills program can no longer be sustained due to a lack of funds. In order to address this outcome, the department has recently introduced a required 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.

**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):**

<b>Scores</b>	<b>Fall 2008</b>	<b>Spring 2009</b>	<b>Average of the year</b>	<b>Designation</b>
<b>Assessment Strategy</b>				
Course Evaluation				
Senior Exit Survey		78	78	Good
Senior Design Instructor Survey		80	80	Very good
Alumni Survey				
Industrial Advisory Committee				
<b>Overall Average</b>			<b>79</b>	<b>Good</b>

**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):**

<b>Scores</b>	<b>Fall 2008</b>	<b>Spring 2009</b>	<b>Average of the year</b>	<b>Designation</b>
<b>Assessment Strategy</b>				
Course Evaluation	86	86	86	Very good
Senior Exit Survey		78	78	Good
Senior Design Instructor Survey		80	80	Very good
Alumni Survey				
Industrial Advisory Committee				
<b>Overall Average</b>			<b>81</b>	<b>Very good</b>

**Conclusions and Actions Taken/Recommended:**

The overall average score is “very 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 and some EEC courses.

**Results of Outcome (j):**

<b>Scores</b>	<b>Fall 2008</b>	<b>Spring 2009</b>	<b>Average of the year</b>	<b>Designation</b>
<b>Assessment Strategy</b>				
Course Evaluation	87	90	89	Very good
Senior Exit Survey		78	78	Good
Senior Design Instructor Survey		80	80	Very good
Alumni Survey				
Industrial Advisory Committee				
<b>Overall Average</b>			<b>82</b>	<b>Very good</b>

**Conclusions and Actions Taken/Recommended:**

The overall average score is “very good” 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.

It is expected that the new general education structure adopted by the University will further 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):**

<b>Scores</b>	<b>Fall 2008</b>	<b>Spring 2009</b>	<b>Average of the year</b>	<b>Designation</b>
<b>Assessment Strategy</b>				
Course Evaluation	82	85	84	Very good
Senior Exit Survey		83	83	Very good
Senior Design Instructor Survey	90	100	95	Excellent
Alumni Survey				
Industrial Advisory Committee				
<b>Overall Average</b>			<b>87</b>	<b>Very good</b>

### **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 (F00 and S09) 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 last conducted during the 2007-2008 academic year, hence it has not been included in the current report. The Industrial Advisory Committee has met during spring 2009; however, their report is not available as of this writing. Therefore, the scores for objectives are based only on the fall 2008 and spring 2009 Course Evaluations (See Appendixes 2 and 4). The following is a table that summarizes the results (all scores are normalized percentages).

<b>Objectives</b>	<b>Industrial Advisory Committee Report 08-09</b>	<b>Fall 08 Course Evaluation</b>	<b>Spring 09 Course Evaluation</b>	<b>Overall Average Score (%) 2008-2009</b>	<b>Designation</b>	<b>Overall Average Score (%) 2007-2008</b>
1) Practice electrical engineering in one or more of the following areas: communications, computers, controls, power electronics, and power systems		83	95	<b>89</b>	<b>Very good</b>	86
2) Define and diagnose problems, and provide and implement electrical engineering solutions in industry, business, and government		83	74	<b>79</b>	<b>Good</b>	83
3) Observe engineering ethics in the practice of electrical engineering			67	<b>67</b>	<b>Satisfactory</b>	100
4) Communicate effectively with technically diverse audiences		67	89	<b>78</b>	<b>Good</b>	90
5) Collaborate with others as a member or as a leader in an engineering team		67	81	<b>74</b>	<b>Good</b>	89
6) Develop their knowledge beyond the undergraduate level and to keep current with advancements in electrical engineering		67	83	<b>75</b>	<b>Good</b>	86

#### 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 2008-2009.

From the outcomes results summary table, we can see that compared with last year's results, most scores stayed about the same while some showed marked improvements. Minor concern about Outcomes (h) and (j), both of which had received low "Good" ratings in the 2007-2008 report, has been alleviated by the current scores. In fact, ten out of eleven Outcomes currently have "Very good" ratings, with Outcome (h) at a very close "Good" rating with a score of 79.

From the objectives result summary table, we see that all the scores except for Objective (1) declined, significantly in some cases. Score for Objective (1), 89, showed a slight increase 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) increased, significantly in many cases, achieving designations of 'Very good' and 'Excellent.' Score for Objective (1), 86, stayed at the same level as the previous year." It appears that the significant gains achieved in objective attainment during the previous academic year have been relinquished during the 2008-2009 academic year.

While ratings for Objectives (2) through (6) are still at the "Satisfactory" (Objective (3)) or "Good" (Objective (2), (4), (5) and (6)) rating, the decline, especially for Objectives (3) through (6) where it has been significant, raises some concerns. It should be noted, however, that the score for Objective (3) is derived from one single senior design course offered during spring 2009 (see Appendix 4), so it can not be considered statistically significant. The decline in score for Objective (4) may be attributed to the transition period between the elimination of the Proskills program and the institution of the new course, EEC 414 Writing in Electrical and Computer Engineering. In fact, one can see that Objective (4) score has indeed improved from 67 in fall 2008 to 89 in spring 2009. Objective (6) score is currently based on results from only four courses (see Appendixes 2 and 4), so it may not be a real issue. The decline in Objective (5) score, however, cannot be attributed to anything other than perhaps the absence of Alumni Survey results and Industrial Advisory Committee Report results for the current report, and it needs to be closely watched. In fact, the absence from the current report of both of these two relatively direct measures of Objectives remains a bigger concern.

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 already in progress. The following changes in the electrical engineering curriculum have been approved during the 2008-2009 academic year in support of Vision 2010:

- At the suggestion of the Industrial Advisory Committee, an electromagnetics course, EEC 460 Engineering Electromagnetics, has been introduced as a required course in spring semester of the third year.

- At the suggestion of the Industrial Advisory Committee and as part of our “early on, hands on” initiative, a circuits laboratory course, EEC 312 Electric Circuits Laboratory, has been introduced as a required course during spring semester of the second year.
- In order to better address writing skills of our students, a new writing course, EEC 414 Writing in Electrical and Computer Engineering, has been introduced as a required course during fall semester of the third year.
- In order to give our students more flexibility, two out of three of the following course/laboratory pairs have been designated as required courses during fall semester of fourth year: EEC 450/451 Communications/Communications Laboratory, EEC 440/441 Controls/Controls Laboratory, EEC 470/471 Power Electronics/Power Electronics Laboratory.
- EEC 470 Power Electronics has been made into a pre- or co-requisite of EEC 471 Power Electronics Laboratory (from only a prerequisite) in order to emphasize the “hands on” initiative.
- Course syllabi and textbook requirements have been posted on the Electrical and Computer Engineering Department website for better access and timely dissemination of information.

## APPENDIXES

### Appendix 1 Course Evaluation Results for Outcomes, Fall 2008

Course No.	Course Description	Cr.	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	Average (%)
EEC 310	Electric Circuits I	4	60		56								62	59.3
EEC 311	Electric Circuits II	4	66		72								77	71.7
EEC 313	Electronics I	4	63		73									68.0
EEC 314	Electronics II	4	90		90								89	89.7
EEC 315	Electronics Lab	2	93	95	87		89		95				95	92.3
EEC 361	EM Energy Conversion	4												Not Submitted
EEC 382	Digital Systems and Lab	4	85	72	79		66		93				79	79.0
EEC 417	Embedded Systems	4												Not offered
EEC 430	Digital Signal Processing	4	76		90		76						76	79.5
EEC 440	Controls	4	85	92	92		92				87	87	92	89.6
EEC 441	Controls Lab	2												Not Submitted
EEC 447	Applications of PLCs	4	82		85									83.5
EEC 450	Communications	4	46		70		65						70	62.8
EEC 451	Communications Lab (1)	2												Not Submitted
EEC 451	Communications Lab (2)	2												Not Submitted
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												Only one undergrad
EEC 490	Senior Design	4	95	95	95	95	95		85		85		95	92.5
ESC 120	Introduction to Eng. Design	2												Not co. 4.8 m6 46

## Appendix 2 Course Evaluation Results for Objectives, Fall 2008

Course No.	Course Description	Cr.	1	2	3	4	5	6	Average (%)
<b>Electrical Engineering Courses</b>									
EEC 310	<i>Electric Circuits I</i>	4	3	3					100.0
EEC 311	<i>Electric Circuits II</i>	4	2	3					83.3
EEC 313	<i>Electronics I</i>	4	3	3					100.0
EEC 314	<i>Electronics II</i>	4	1	1					33.3
EEC 315	<i>Electronics Lab</i>	2	2	2			3		77.8
EEC 361	<i>EM Energy Conversion</i>	4							<i>Not Submitted</i>
EEC 382	<i>Digital Systems/Lab</i>	4	3	3			0		66.7
EEC 417	<i>Embedded Systems</i>	4							<i>Not offered</i>
EEC 430	<i>Digital Signal Processing</i>	4	2	2					66.7
EEC 440	<i>Controls</i>	4	3	3			1	2	75.0
EEC 441	<i>Controls Lab</i>	2	3	2		2	3		83.3
EEC 447	<i>Applications of PLCs</i>	4	2	2				2	66.7
EEC 450	<i>Communications</i>	4	3	3					100.0
EEC 451	<i>Communications Lab (1)</i>	2							<i>Not Submitted</i>
EEC 451	<i>Communications Lab (2)</i>	2							<i>Not Submitted</i>
EEC 470	<i>Power Electronics</i>	4							<i>Not Submitted</i>
EEC 471	<i>Power Elect. &amp; Machines Lab</i>	4							<i>Not offered</i>
EEC 473	<i>Power Systems</i>	4							<i>Not offered</i>
EEC 474	<i>Power Electronics II</i>	4							<i>Only one undergrad</i>
EEC 490	<i>Senior Design</i>	4	3	3		2	3		91.7
<b>Other Courses</b>									
ESC 120	<i>Introduction to Eng. Design</i>	2							<i>Not collected</i>
PHL 215	<i>Engineering Ethics</i>	3							<i>Not collected</i>
ESC 282	<i>Engineering Economy</i>	3							<i>Not collected</i>
<b>Average Score (%)</b>			<b>83.3</b>	<b>83.3</b>		<b>66.7</b>	<b>66.7</b>	<b>66.7</b>	<b>73.3</b>

### Appendix 3 Course Evaluation Results for Outcomes, Spring 2009

Course No.	Course Description	Cr.	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	Average (%)
<b>Electrical Engineering Courses</b>														
EEC 310	Electric Circuits I	4	60										62	61.0
EEC 311	Electric Circuits II	4	66		72								77	71.7
EEC 313	Electronics I	4	76		64									70.0
EEC 314	Electronics II	4												Not Submitted
EEC 315	Electronics Lab	2	93	72	89				84				85	84.6
EEC 361	EM Energy Conversion	4												Not offered
EEC 382	Digital Systems and Lab	4												Not offered
EEC 414	Writing in Elec. & Comp. Eng.	2												Not Submitted
EEC 417	Embedded Systems	4	77	79	79				77		80		78	78.3
EEC 430	Digital Signal Processing	4												Not offered
EEC 440	Controls	4	88		82		91						93	88.5
EEC 441	Controls Lab	2	88	89	94		93		92				93	91.5
EEC 442	Art & Sci. of Feedback Control	4	80		80		80				92	90	85	84.5
EEC 447	Applications of PLCs	4	78		80									79.0
EEC 450	Communications	4												Not offered
EEC 451	Communications Lab	2												Not offered
EEC 470	Power Electronics	4	79	79	79		79		79				79	79.0
EEC 471	Power Elect. & Machines Lab	4	86	91	90		86		93				91	89.5
EEC 473	Power Systems	4												Not Submitted
EEC 474	Power Electronics II	4												Not offered
EEC 490	Senior Design (3)	4	79	74	84	85	83		85				75	80.7
EEC 490	Senior Design (4)	4	92	93	92	95	92		90				92	92.3
<b>Other Courses</b>														
ESC 120	Introduction to Eng. Design	2												Not collected
PHL 215	Engineering Ethics	3												Not collected
ESC 282	Engineering Economy	3												Not collected
<b>Average Score (%)</b>			<b>80.2</b>	<b>82.4</b>	<b>82.1</b>	<b>90.0</b>	<b>86.3</b>		<b>85.7</b>		<b>86.0</b>	<b>90.0</b>	<b>84.8</b>	<b>85.3</b>

## Appendix 4 Course Evaluation Results for Objectives, Spring 2009

Course No.	Course Description	Cr.	1	2	3	4	5	6	Average (%)
<b>Electrical Engineering Courses</b>									
EEC 310	<i>Electric Circuits I</i>	4	3	3					100.0
EEC 311	<i>Electric Circuits II</i>	4	3	3					100.0
EEC 313	<i>Electronics I</i>	4	3	3					100.0
EEC 314	<i>Electronics II</i>	4							<i>Not Submitted</i>
EEC 315	<i>Electronics Lab</i>	2	3	2			3		88.9
EEC 361	<i>EM Energy Conversion</i>	4							<i>Not offered</i>
EEC 382	<i>Digital Systems and Lab</i>	4							<i>Not offered</i>
EEC 414	<i>Writing in Elec. &amp; Comp. Eng.</i>	2							<i>Not Submitted</i>
EEC 417	<i>Embedded Systems</i>	4	3	2			2		77.8
EEC 430	<i>Digital Signal Processing</i>	4							<i>Not offered</i>
EEC 440	<i>Controls</i>	4	3	2			2		77.8
EEC 441	<i>Controls Lab</i>	2	3	2		3	3		91.7
EEC 442	<i>Art &amp; Sci. of Feedback Control</i>	4	3	2				3	88.9
EEC 447	<i>Applications of PLCs</i>	4	2	1					50.0
EEC 450	<i>Communications</i>	4							<i>Not offered</i>
EEC 451	<i>Communications Lab</i>	2							<i>Not offered</i>
EEC 470	<i>Power Electronics</i>	4	2	2					66.7
EEC 471	<i>Power Elect. &amp; Machines Lab</i>	4	3	2			2		77.8
EEC 473	<i>Power Systems</i>	4							<i>Not Submitted</i>
EEC 474	<i>Power Electronics II</i>	4							<i>Not offered</i>
EEC 490	<i>Senior Design (3)</i>	4	3	2		3	3		91.7
EEC 490	<i>Senior Design (4)</i>	4	3	3	2	2	2	2	77.8
<b>Other Courses</b>									
ESC 120	<i>Introduction to Eng. Design</i>	2							<i>Not collected</i>
PHL 215	<i>Engineering Ethics</i>	3							<i>Not collected</i>
ESC 282	<i>Engineering Economy</i>	3							<i>Not collected</i>
<b>Average Score (%)</b>			<b>94.9</b>	<b>74.4</b>	<b>66.7</b>	<b>88.9</b>	<b>81.0</b>	<b>83.3</b>	<b>81.5</b>

**Appendix 5 Senior Exit Survey Results for Outcomes, Spring 2009**

Outcome	Survey Question Number	Relative Score					Question Score	Outcome Score
		5	4	3	2	1		
		Frequency						
(a)	4	6	8	3	1		81%	83%
	5	6	9	2	1		82%	
	6	10	4	3	1		86%	
(b)	7	7	7	3	1		82%	82%
(c)	8	7	4	5	1	1	77%	77%
(d)	9	5	5	4	0	3	71%	71%
(e)	10	8	5	4	1		82%	82%
(f)	11	7	7	4			83%	83%
(g)	12	7	6	2	1	2	77%	76%
	13	5	6	5	2		76%	
(h)	14	5	7	5	1		78%	78%
(i)	15	9	6	3			87%	87%
(j)	16	5	7	3	2		78%	78%
(k)	17	9	5	3	1		84%	83%
	18	8	5	4	1		82%	
<b>AVERAGE</b>							80%	80%

## Appendix 6 Senior Design Instructor Survey Results for Outcomes, Fall 2008

		<i>Relative Score</i>							
		5	4	3	2	1			
<b>Outcome</b>	<b>Survey Question Number</b>	<b>Frequency</b>					<b>Question Score</b>	<b>Outcome Score</b>	
<b>(a)</b>	1		1				80%	<b>93%</b>	
	2	1					100%		
	3	1					100%		
<b>(b)</b>	4	1					100%	<b>90%</b>	
	5		1				80%		
<b>(c)</b>	6	1					100%	<b>100%</b>	
<b>(d)</b>	7	1					100%	<b>100%</b>	
<b>(e)</b>	8	1					100%	<b>100%</b>	
<b>(f)</b>	9						0		
<b>(g)</b>	10		1				80%	<b>80%</b>	
	11		1				80%		
<b>(h)</b>	12						0		
<b>(i)</b>	13			1			60%	<b>60%</b>	
<b>(j)</b>	14						0		
<b>(k)</b>	15	1					100%	<b>90%</b>	
	16		1				80%		
<b>AVERAGE</b>							89%	<b>65%</b>	

## Appendix 7 Senior Design Instructor Survey Results for Outcomes, Spring 2009

		<i>Relative Score</i>							
		5	4	3	2	1	N/A		
<i>Outcome</i>	<i>Survey Question Number</i>	<i>Frequency</i>						<i>Question Score</i>	<i>Outcome Score</i>
<b>(a)</b>	1	1						100%	<b>87%</b>
	2		1					80%	
	3		1					80%	
<b>(b)</b>	4		1					80%	<b>90%</b>
	5	1						100%	
<b>(c)</b>	6		1					80%	<b>80%</b>
<b>(d)</b>	7		1					80%	<b>80%</b>
<b>(e)</b>	8			1				60%	<b>60%</b>
<b>(f)</b>	9		1					80%	<b>80%</b>
<b>(g)</b>	10	1						100%	<b>90%</b>
	11		1					80%	
<b>(h)</b>	12		1					80%	<b>80%</b>
<b>(i)</b>	13		1					80%	<b>80%</b>
<b>(j)</b>	14		1					80%	<b>80%</b>
<b>(k)</b>	15	1						100%	<b>100%</b>
	16	1						100%	
<b>AVERAGE</b>								85%	<b>82%</b>

## Appendix 8 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*

<b>Program Outcome</b>	<b>Student Learning Outcome</b>	<b>Method of Assessment (Assignment-Problem)</b>	<b>Average Score (%)</b>	<b>Program Outcome Score (%)</b>
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## Appendix 9 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.

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

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

Department of Electrical and Computer Engineering

### Senior Exit Survey for Electrical 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 11 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**

	<b>Excellent</b>	<b>Above Average</b>	<b>Average</b>	<b>Below Average</b>	<b>Poor</b>	<b>No Basis for Judgment</b>
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 12 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  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)       Attended workshops or short courses  
 Participated in on-job training       Attended technical or professional conferences  
 Joined a professional association       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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Ability to apply knowledge of science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Ability to apply knowledge of engineering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Ability to design experiments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Ability to conduct experiments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Ability to analyze and interpret data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Ability to design a system, component, or process to meet a need	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Ability to work in a multi-disciplinary team	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Ability to identify, formulate, and solve engineering problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Understanding of ethical and professional responsibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Ability to communicate effectively in oral presentations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Ability to communicate effectively in writing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Understanding the impact of engineering solutions in a global/societal context	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Knowledge of contemporary issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Ability to use the up-to-date techniques necessary for engineering practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Ability to use computers and modern software as problem-solving tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Ability to use reference materials to solve problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Knowledge of advanced topics in my discipline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**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).**

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