CLEVELAND STATE UNIVERSITY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Bachelor of Computer Engineering Program

ASSESSMENT ANNUAL REPORT

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

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Table of Contents

Appendixes

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 Computer Engineering program and on how the Computer 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 Computer 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.

I.2 Outcomes/Assessment Matrix

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

Outcomes / **Assessment Tools**	Course Evaluation (Questionnaire)	Senior Exit Survey (Questionnaire)	Design Instructor Survey (Questionnaire)	Alumni Survey (Questionnaire)	Industrial Advisory Committee (Meetings)
(a) Apply knowledge of mathematics, science and engineering	✓	✓	✓	✓	✓
(b) Design and conduct computer 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 computer engineering problems	✓	✓	✓	✓	✓
(f) Understanding of professional and ethical responsibility	✓	✓	✓	✓	✓
(g) Communicate effectively	✓	✓	✓	✓	✓
(h) Understand the impact of engineering solutions in a global and societal context	✓	✓	✓	✓	✓
(i) Engage in life-long learning	✓	✓	✓	✓	✓
(j) Knowledge of contemporary issues	✓	✓	✓	✓	✓
(k) Use the techniques, skills, and modern engineering tools	✓	✓	✓	✓	✓

I.3 Objectives/Assessment Matrix

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

Objectives / **Assessment Tools**	Course Evaluation (Questionnaire)	Senior Exit Survey (Questionnaire)	Design Instructor Survey (Questionnaire)	Alumni Survey (Questionnaire)	Industrial Advisory Committee (Meetings)
1) Practice computer engineering	✓			✓	✓
2) Define and diagnose problems, and provide and implement computer engineering solutions in an industrial environment	✓			✓	✓
3) Observe engineering ethics in the practice of computer 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 computer engineering	✓			✓	✓

I.4 Courses/Outcomes Matrix

Year	Freshman							Sophomore									Junior									Senior						
Computer 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	CIS 260 Introduction to Programming	ESC 120 Introduction to Engineering	MTH 284 Matrices for Engineers	PHY 244 University Physics II (WAC)	ESC 250 Differential Equations	EEC 310/311 Electric Circuits NII	EEC 313 Electronics I	CIS 265 Data Structures and Algorithms	CIS 334 Fundamentals of Microcomputer Arch.	CIS 340 C/C++ for Systems Programming	ESC 310 Statistics and Probability	General Education Elective	EEC 316 Electronic Devices Lab	EEC 382 Digital Systems and Lab	EEC 414 Writing in Electrical & Computer Engr.	CIS 345 Architecture and OS	MTH 220 Discrete Mathematics	EEC 483 Computer Organizations	ESC 282 Engineering Economy	PHL 215 Engineering Ethics (WAC)	ESC XXX Engineering Science Elective	General Education Electives (Three)	EEC 480/481 Modern Digital Design/Lab	EEC 482 Computer Engineering Lab	EEC 484 Computer Networks	EEC 485 High Performance Architectures	EEC 490 Senior Design	EEC Technical Electives (Three)	General Education Elective
(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 computer 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

Computer Engineering Program / Objective	Courses																		
	EEC 310 Electric Circuits I	EEC 311 Electric Circuits II	EEC 313 Electronics I	EEC 316 Electronics Lab	EEC 382 Digital Systems and Lab	EEC 414 Writing in Elect. & Comp. Engr.	EEC 417 Embedded Systems	EEC 430 Digital Signal Processing	EEC 440 Controls	EEC 442 Art and Sci. of Feedback Control	EEC 447 Advanced PLC Applications	EEC 450 Communications	EEC 480/481 Modern Digital Design/Lab	EEC 482 Computer Engineering Lab	EEC 483 Computer Organization	EEC 484 Computer Networks	EEC 485 High Performance Architectures	EEC 490 Senior Design	EEC 492 Special Topics in E&CE
1. Practice computer 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 computer engineering solutions in industry, business, and government.	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3. Observe engineering ethics in the practice of computer 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 computer 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).

Outcomes	Overall Average Score (%) 2008-2009	Designation	Overall Average Score (%) 2007-2008
(a) Ability to apply knowledge of mathematics, science, and engineering	82	Very good	79
(b) Ability to design and conduct computer engineering experiments	78	Good	81
(c) Ability to design a system, component, or process to meet desired needs	88	Very good	85
(d) Ability to function on multi-disciplinary teams	82	Very good	83
(e) Ability to identify, formulate, and solve computer engineering problems	83	Very good	84
(f) Understanding of professional and ethical responsibility	79	Good	83
(g) Ability to communicate effectively	77	Good	81
(h) Broad education to understand the impact of engineering solutions in a global and societal context	82	Very good	73
(i) A recognition of the need for, and an ability to engage in life-long learning	81	Very good	80
(j) A knowledge of contemporary issues	82	Very good	72
(k) An ability to use the techniques, skills, and modern engineering tools necessary for computer engineering practice	87	Very good	88

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

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, 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) and 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 computer 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 2008	Spring 2009	Average of the year	Designation
Course Evaluation	89	83	81	Very good
Senior Exit Survey		73	73	Good
Senior Design Instructor Survey	90	70	80	Very good
Alumni Survey				
Industrial Advisory Committee				
Overall Average			**78**	**Good**

Conclusions and Actions Taken/Recommended:

The overall average score is a high "good" suggesting that this outcome has been met. Scores from the Senior Exit Survey is somewhat lower than the other two assessment tools. This discrepancy may have to be investigated.

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

The department has performs yearly inventories for several of its instructional laboratories. 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 2008	Spring 2009	Average of the year	Designation
Course Evaluation	81	80	81	Very good
Senior Exit Survey		83	83	Very good
Senior Design Instructor Survey	100	100	100	Excellent
Alumni Survey				
Industrial 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, the individual Course Evaluation scores for EEC 310 (F08) and EEC 313 (S09) 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 Design Instructor Survey scores and the other two assessment tool 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):

Scores / Assessment Strategy	Fall 2008	Spring 2009	Average of the year	Designation
Course Evaluation	95	90	93	Excellent
Senior Exit Survey		63	63	Satisfactory
Senior Design Instructor Survey	100	80	90	Excellent
Alumni Survey				
Industrial Advisory Committee				
Overall Average			**82**	**Very good**

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. However, 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 computer engineering had two sections, one in the area of Embedded Systems and the other, Digital Systems. The design projects were of multi-disciplinary nature even though students were not from different degree programs.

Outcome (e): Ability to identify, formulate, and solve computer 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 2008	Spring 2009	Average of the year	Designation
Course Evaluation	84	87	86	Very good
Senior Exit Survey		73	73	Good
Senior Design Instructor Survey	100	80	90	Excellent
Alumni Survey				
Industrial Advisory Committee				
Overall Average			**83**	**Very good**

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. However, Course Evaluation score for EEC 382 (F08) is relatively low. It is recommended that this course is enhanced to better meet this outcome.

Outcome (f): Understanding of professional and ethical responsibility

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

Results of Outcome (f):

Scores / Assessment Strategy	Fall 2008	Spring 2009	Average of the year	Designation
Course Evaluation				
Senior Exit Survey		77	77	Good
Senior Design Instructor Survey		80	80	Very good
Alumni Survey				
Industrial Advisory Committee				
Overall Average			**79**	**Good**

Conclusions and Actions Taken/Recommended:

The overall average score is a high "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 490 and PHL215.

Results of Outcome (g):

Scores / Assessment Strategy	Fall 2008	Spring 2009	Average of the year	Designation
Course Evaluation	91	83	87	Very good
Senior Exit Survey		70	70	Good
Senior Design Instructor Survey	80	70	75	Good
Alumni Survey				
Industrial Advisory Committee				
Overall Average			**77**	**Good**

Conclusions and Actions Taken/Recommended:

The overall average score is a high “good” suggesting that this outcome has been met. There is some discrepancy between the Course Evaluation scores and the other two assessment tool scores.

This outcome was initially addressed quite effect

Conclusions and Actions Taken/Recommended:

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

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

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

Results of Outcome (i):

Scores / Assessment Strategy	Fall 2008	Spring 2009	Average of the year	Designation
Course Evaluation	88	86	87	Very good
Senior Exit Survey		87	87	Very good
Senior Design Instructor Survey	60	80	70	Good
Alumni Survey				
Industrial 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, the Senior Design Instructor Survey results are markedly lower that the scores from the other assessment tools.

Outcome (j): Knowledge of contemporary issues

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

Results of Outcome (j):

Scores / Assessment Strategy	Fall 2008	Spring 2009	Average of the year	Designation
Course Evaluation	87	90	89	Very good
Senior Exit Survey		77	77	Good
Senior Design Instructor Survey		80	80	Very good
Alumni Survey				
Industrial Advisory Committee				
Overall Average			**82**	**Very good**

Conclusions and Actions Taken/Recommended:

The overall average score is "very good" suggesting that this outcome has been met. 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 computer engineering practice

This outcome is to be realized by all EEC courses.

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Results of Outcome (k):

Scores / Assessment Strategy	Fall 2008	Spring 2009	Average of the year	Designation
Course Evaluation	84	82	83	Very good
Senior Exit Survey		87	87	Very good
Senior Design Instructor Survey	90	90	90	Excellent
Alumni Survey				
Industrial 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. 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 fall 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).

Objectives	Industrial Advisory Committee Report 08-09	Fall 08 Course Evaluation	Spring 09 Course Evaluation	Overall Average Score (%) 2008-2009	Designation	Overall Average Score (%) 2007-2008
1) Practice computer engineering in one or more of the following areas: communications, computers, controls, power electronics, and power systems		87	94	**91**	**Excellent**	86
2) Define and diagnose problems, and provide and implement computer engineering solutions in industry, business, and government		90	73	**82**	**Very good**	81
3) Observe engineering ethics in the practice of computer engineering		100		**100**	**Excellent**	100
4) Communicate effectively with technically diverse audiences		67	67	**67**	**Satisfactory**	82
5) Collaborate with others as a member or as a leader in an engineering team		72	80	**76**	**Good**	85
6) Develop their knowledge beyond the undergraduate level and to keep current with advancements in computer engineering		75	100	**88**	**Very good**	85

IV. Conclusions and Further Actions

From above assessment results and analyses, we can conclude that our Program of Bachelor of Computer 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. Overall, eight out of the eleven Outcomes currently have the "Very good" rating, with the rest having high "Good" ratings.

From the objectives result summary table, we see that the scores for Objectives (2), (3) and (6) remained relatively steady, Objective (1) improved from "Very good" to "Excellent," Objectives (5) declined from "Very Good" to "Good," and Objective (4) declined significantly from "Very good" to "Satisfactory." 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. 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 computer engineering curriculum have been approved during the 2008-2009 academic year in support of Vision 2010 and in line with the joint IEEE Computer Society/ACM Task Force recommendations on "Model Curricula for Computing":

- EEC 480 Modern Digital Design and EEC 481 Digital Systems Laboratory II have been replaced by better designed and updated substitutes, EEC 487 Advanced Digital Systems and EEC 488 Advanced Digital Laboratory.
- EEC 483 Computer Organization and EEC 484 Computer Networks have been revised to include laboratory components as part of the "hands on" initiative. As a result, EEC 482 Computer Engineering Laboratory and EEC 485 High Performance Architectures have been eliminated. All EEC Computer Engineering courses now have integrated laboratory components.
- EEC 421 Software Engineering has been made a required course in fall semester of the third year.
- As part of the "early on" initiative, CIS 260 Introduction to Programming and EEC 382 Digital Systems and Laboratory have been moved up in the curriculum to spring semester of the first year and spring semester of the second year, respectively.

- 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.
- An Engineering Science Elective, an EEC technical elective and CIS 334 Fundamentals of Microcomputer architecture have been eliminated to make the curriculum more aligned with current trends.
- 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 (%)
Computer Engineering Courses														
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 316	***Electronic Devices Lab***	1	93	95	87		89		95				95	92.3
EEC 382	***Digital Systems and Lab***	4	85	72	79		66		93				79	79.0
EEC 480/481	***Modern Digital Design/Lab***	6	80	89	85		89						85	85.6
EEC 482	***Computer Engineering Lab***	2												*Not offered*
EEC 483	***Computer Organization***	4												*Not offered*
EEC 484	***Computer Networks CE***	4	91		90		97				90		100	93.6
EEC 485	***High Perf. Comp. Arch. CE***	4	85		82		83				90		93	86.6
EEC 490	***Senior Design***	4	95	95	95	95	95		85		85		95	92.5
Computer Engineering EEC Electives														
EEC 417	***Embedded Systems***	4												*Not offered*
EEC 421	***Software Engineering***	4												*No undergrads*
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 447	***Applications of PLCs***	4	82		85									83.5
EEC 450	***Communications***	4	46		70		65						70	62.8
Other Courses														
ESC 120	***Introduction to Eng. Design***	2												*Not collected*
PHL 215	***Engineering Ethics***	3												*Not collected*
ESC 282	***Engineering Economy***	3												*Not collected*
	Average Score (%)		**77.5**	**88.6**	**81.2**	**95.0**	**83.6**		**91.0**		**88.0**	**87.0**	**84.0**	***86.2***

Appendix 2 Course Evaluation Results for Objectives, Fall 2008

Course No.	Course Description	Cr.	1	2	3	4	5	6	Average (%)
Computer Engineering Courses									
EEC 310	***Electric Circuits I***	4	3	3					100.0
EEC 311	***Electric Circuits II***	4	2	3					83.3
EEC 313	***Electronics I***	4	3	3					100.0
EEC 316	***Electronic Devices Lab***	1	2	2			3		77.8
EEC 382	***Digital Systems/Lab***	4	3	3			0		66.7
EEC 480/481	***Modern Digital Design/Lab***	6	2	3			3		88.9
EEC 482	***Computer Engineering Lab***	2							*Not offered*
EEC 483	***Computer Organization***	4							*Not offered*
EEC 484	***Computer Networks CE***	4	3	3	3		3	2	93.3
EEC 485	***High Perf. Comp. Arch. CE***	4	3	2				3	88.9
EEC 490	***Senior Design***	4	3	3		2	3		91.7
Computer Engineering EEC Electives									
EEC 417	***Embedded Systems***	4							*Not offered*
EEC 421	***Software Engineering***	4							*No undergrads*
EEC 430	***Digital Signal Processing***	4	2	2					66.7
EEC 440	***Controls***	4	3	3			1	2	75.0
EEC 447	***Applications of PLCs***	4	2	2				2	66.7
EEC 450	***Communications***	4	3	3					100.0
Other Courses									
ESC 120	***Introduction to Eng. Design***	2							*Not collected*
PHL 215	***Engineering Ethics***	3							*Not collected*
ESC 282	***Engineering Economy***	3							*Not collected*
	Average Score (%)		**87.2**	**89.7**	**100.0**	**66.7**	**72.2**	**75.0**	**81.8**

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 (%)
Computer Engineering Courses														
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 316	***Electronic Devices Lab***	1	94	77	87				85				87	86.0
EEC 382	***Digital Systems and Lab***	4												*Not offered*
EEC 414	***Writing in Elec. & Comp. Eng.***	2												*Not Submitted*
EEC 480/481	***Modern Digital Design/Lab***	6												*Not offered*
EEC 482	***Computer Engineering Lab***	2												#DIV/0!
EEC 483	***Computer Organization***	4	78		80		80						80	79.5
EEC 484	***Computer Networks CE***	4	92	90	92		94		90				92	*Not Submitted*
EEC 485	***High Perf. Comp. Arch. CE***	4												*Not offered*
EEC 490	***Senior Design (1)***	4	88	85	88	90	88		80				88	86.7
Computer Engineering EEC Electives														
EEC 417	***Embedded Systems***	4	77	79	79				77		80		78	78.3
EEC 421	***Software Engineering***	4												*Not offered*
EEC 430	***Digital Signal Processing***	4												*Not offered*
EEC 440	***Controls***	4	88		82		91						93	88.5
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*
Other Courses														
ESC 120	***Introduction to Eng. Design***	2												*Not collected*
PHL 215	***Engineering Ethics***	3												*Not collected*
ESC 282	***Engineering Economy***	3												*Not collected*
	Average Score (%)		**79.7**	**82.8**	**80.4**	**90.0**	**86.6**		**83.0**		**86.0**	**90.0**	**82.4**	***84.5***

Appendix 4 Course Evaluation Results for Objectives, Spring 2009

Course No.	Course Description	Cr.	1	2	3	4	5	6	Average (%)
Computer Engineering Courses									
EEC 310	***Electric Circuits I***	4	3	3					100.0
EEC 311	***Electric Circuits II***	4	3	3					100.0
EEC 313	***Electronics I***	4	3	3					100.0
EEC 316	***Electronic Devices Lab***	1	2	2			3		77.8
EEC 382	***Digital Systems and Lab***	4							*Not offered*
EEC 414	***Writing in Elec. & Comp. Eng.***	2							*Not Submitted*
EEC 480/481	***Modern Digital Design/Lab***	6							*Not offered*
EEC 482	***Computer Engineering Lab***	2	3	2					83.3
EEC 483	***Computer Organization***	4	3	2			2		77.8
EEC 484	***Computer Networks CE***	4							*Not Submitted*
EEC 485	***High Perf. Comp. Arch. CE***	4							*Not offered*
EEC 490	***Senior Design (1)***	4	3	2		2	3		83.3
Computer Engineering EEC Electives									
EEC 417	***Embedded Systems***	4	3	2			2		77.8
EEC 421	***Software Engineering***	4							*Not offered*
EEC 430	***Digital Signal Processing***	4							*Not offered*
EEC 440	***Controls***	4	3	2			2		77.8
EEC 442	***Art & Sci. of Feedback Control***	4	3	2				3	88.9
EEC 447	***Applications of PLCs***	4	2	1					50.0
EEC 450	***Communications***	4							*Not offered*
Other Courses									
ESC 120	***Introduction to Eng. Design***	2							*Not collected*
PHL 215	***Engineering Ethics***	3							*Not collected*
ESC 282	***Engineering Economy***	3							*Not collected*
	Average Score (%)		**93.9**	**72.7**		**66.7**	**80.0**	**100.0**	**82.7**

Appendix 5 Senior Exit Survey Results for Outcomes, Spring 2009

		Relative Score							
		5	***4***	***3***	***2***	***1***	***N/A***		
Outcome	***Survey Question Number***	**Frequency**						***Question Score***	***Outcome Score***
(a)	4	1	3	1	1			73%	**78%**
	5	1	3	1	1			73%	
	6	3	2	1				87%	
(b)	7	1	3	1	1			73%	**73%**
(c)	8	2	3	1				83%	**83%**
(d)	9		2	3	1			63%	**63%**
(e)	10	1	3	1	1			73%	**73%**
(f)	11	2	2	1	1			77%	**77%**
(g)	12	1	1	4				70%	**70%**
	13		3	3				70%	
(h)	14	1	5					83%	**83%**
(i)	15	3	2	1				87%	**87%**
(j)	16	1	3	2				77%	**77%**
(k)	17	3	3					90%	**87%**
	18	2	3	1				83%	
AVERAGE								78%	**77%**

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

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

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

		Relative Score							
		5	***4***	***3***	***2***	***1***	***N/A***		
Outcome	***Survey Question Number***	**Frequency**						***Question Score***	***Outcome Score***
(a)	1		1					80%	**87%**
	2		1					80%	
	3	1						100%	
(b)	4		1					80%	**70%**
	5			1				60%	
(c)	6	1						100%	**100%**
(d)	7		1					80%	**80%**
(e)	8		1					80%	**80%**
(f)	9		1					80%	**80%**
(g)	10		1					80%	**70%**
	11			1				60%	
(h)	12		1					80%	**80%**
(i)	13		1					80%	**80%**
(j)	14		1					80%	**80%**
(k)	15	1						100%	**90%**
	16		1					80%	
AVERAGE								81%	**82%**

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 484 Computer Networks.

EEC 484 Computer Networks Fall 2006

Quantitative Measure of Students Success in Mastering Outcomes

Program Outcome	Student Learning Outcome	Method of Assessment Assignment/Problem	Average Score (%)	Program Outcome Score (%)
(a) Knowledge of mathematics, science, and engineering	**Outcome 1**: An ability to understand protocol design principles and computer networks reference models	Quiz 1: Problems 1,2.1-2.6, 2.9-2.15	85.2	87.8
	Outcome 2: An ability to understand error detection and correction code	Quiz 2: Problem 2.1, 2.2, 2.3, Problem 5 (M W session)	93.6	
	Outcome 3: An ability to understand medium access control methods	Quiz 2: Problem 2.4-2.8, 2.13, 2.14, Problem 5 (T Th session)	64.0	
	Outcome 4: An ability to understand the role of standards in computer networks	Quiz 1: Problem 2.7, 2.8	92.5	
	Outcome 5: An ability to understand routing protocols	Quiz 3: Problems 2, 3, 4	93.1	
	Outcome 6: An ability to understand flow control and congestion control methods	Quiz 4 Problems 1, 4	98.1	
(c) Ability to design a system, component, or proc.	**Outcome 7**: An ability to design simple reliable communication protocols	Project	100	100
(e) Ability to identify, formulate, and solve computer engineering problems	**Outcome 8**: An ability to estimate the benefit of applying the proxy technology to increase the network throughput and reduce latency	Quiz 1 Problem 3	87.9	84.3
	Outcome 9: An ability to calculate the maximum data rate in a physical medium	Quiz 1 Problem 4	56.4	
	Outcome 10: An ability to determine IP address block allocation according to CIDR and IP fragmentation	Quiz 3 Problem 5 (MW session)	98.0	
	Outcome 11: An ability to calculate how to fragment an IP packet at a router	Quiz 3 Problem 5 (TTh session)	94.8	
(i) Recognition of the need for, and an ability to engage in life-long learning	**Outcome 12:** An ability to research topics not fully covered in class and to learn programming skills necessary to complete course project	Course Project	100	100
(k) Ability to use the techniques, skills, and modern engineering tools	**Outcome 13**: An ability to use tools (i.e., Ethereal, Web browser, DOS utilities) to perform traffic analysis for the following protocols: HTTP, DNS, TCP, IP, ICMP, Ethernet, DHCP, ARP	Labs 1-5	100	100

Appendix 9 Course Evaluation Form for Objectives

ABET Course Evaluation for Computer 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 computer 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 computer 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 computer engineering	☐	☐	☐	☐
	Total Number of Points				
	Percentage of the Maximum Total Number of Points				

on to spport your evaluation given above.

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

Department of Electrical and Computer Engineering

Senior Exit Survey for Computer 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 Computer 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 Computer Engineering program.

Comments on how the Computer 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 Computer 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 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
☐ Computers
☐ Controls
☐ Networks
☐ Power Electronics
☐ Power Systems
☐ Software
☐ Other _____

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

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

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

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

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

☐ Yes ☐ No

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

☐ Yes ☐ No

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

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

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

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

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

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

29. Overall, the education that you received at Cleveland State was of:(k78/t:t□□T. vJ8/238.ev7,zk3:3t:t□□T. vu8□Tk,z,82-tJk2(,-k8t

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