

## University of Dayton Annual Assessment and Continuous Improvement (ACI) Report For The Electrical and Computer Engineering Programs AY2005-2006

### 1. Introduction

This report details the program outcome assessment data and analysis of the Electrical Engineering (ELE) and Computer Engineering (CPE) programs at the University of Dayton for AY2005-06. During the Fall and Winter semesters, course assessment reports<sup>1</sup> for all focused-outcome courses were prepared by faculty and include direct and indirect measures of student achievement. Additionally, the 2006 Exit Survey of Graduating seniors<sup>2</sup> was conducted with Dec. 2005 and May 2006 graduates of both programs. During the Fall semester of AY2006-07, the ELE and CPE program committees reviewed the course assessment and survey results. The recommendations of these committees are detailed in section 4 of this report.

### 2. Review of Previous Recommendations

The last review of both the Electrical Engineering and the Computer Engineering program was prepared for the previous ABET accreditation of both degree programs in 2004. The current assessment plan involving program outcome assessment using course-based direct and indirect measures was developed in response to evaluator comments and was first implemented in AY2005-06. As a result, no longitudinal data for the specified program outcomes is yet available. The review and assessment of the program outcome data reported here indicates areas of concern for future assessment and analysis, and focuses primarily on the validity or utility of the assessment plan.

### 3. Analysis of Program Outcome Data for AY2005-06.

The following color code is used for clarity and ease of interpretation of the direct and indirect measures for program outcomes in both the Electrical and Computer Engineering programs.

- ❖ The yellow highlight indicates that the success criterion was NOT met.
- ❖ The green highlight indicates that the course assessment data (direct and/or indirect measures) was not available for analysis.
- ❖ The blue highlight indicates that the course instructor has provided comments or recommendations that require attention by the ELE and CPE program committees.

## Program Outcome, Success Criteria – Direct and Indirect Measures

**3.1 Program Outcome (a):** An ability to apply knowledge of mathematics, science and engineering.

**3.1.1. Measure 1:** 90% of students who pass ECE 302/334\* must score a minimum of 80% on an assignment which requires the application of math, science and engineering.

**FA05:** In ECE-302, 73% of students scored 80% or higher on a homework assignment covering the design and analysis of electronic circuits.

**FA05:** For ECE-334, no course assessment report is available for this semester.

**WI06:** In ECE-302, 70% of students scored 80% or higher on a homework assignment covering the design and analysis of electronic circuits.

**WI06:** In ECE-334, 100% of students scored 80% or better in an assignment involving the use of discrete transforms to design digital filters.

<sup>1</sup> The course assessment forms are available in electronic form on the ECE Assessment Quick Place site.

<sup>2</sup> The Exit Survey of Graduating Seniors is conducted by Educational Benchmarking Inc. (EBI)

**3.1.2. Measure 2:** An exit survey score of 4.0 on criterion (a) questions.

The results of the Exit Survey of Graduating Seniors are provided in Attachments 1 (ELE Program) and 2 (CPE Program).

**3.1.3. Measure 3:** An end of course survey score of 4.0 on criterion (a) questions in each of the above classes.

**FA05:** In ECE-302, a survey score of approximately 3.0 was achieved on questions relating to this program outcome.

**FA05:** For ECE-334, no course survey data is available for this semester.

**WI06:** In ECE-302, a survey score less than 2.0 was achieved on questions relating to this program outcome.

**WI06:** No end-of-course survey was conducted in ECE-334.

**3.1.4. Analysis of outcome (a).** Monitor ECE302 and ECE334 in 06-07. **Update syllabus and implement assessment in ECE 302 and ECE 334 for direct and indirect measures addressing the outcome in AY 06-07.**

**3.2. Program Outcome (b):** An ability to design and conduct experiments, as well as to analyze and interpret data.

**3.2.1. Measure 1:** 90% of students who pass 215L/401L/444/446/447/449\* will score at least 80% overall on an assignment requiring the design and conduct of an experiment and the analysis and interpretation of the data.

**FA05:** ECE-215L, ECE-447 and ECE-449 were not taught this semester.

**FA05:** In ECE-401L, 100% of students scored 80% or better on a laboratory assignment involving Non-coherent Detection of Frequency-Shift Keying.

**FA05:** For ECE-444, 70% of students scored 80% or better a test question involving ALU design on FPGAs.

**FA05:** In ECE-446, 82% of students scored 80% or higher on Design Assignment #1.

**WI06:** ECE-444, ECE-447 and ECE-446 were not taught this semester.

**WI06:** For ECE-215L, no "design of experiments" assignment was conducted this semester. 100% of students who passed this course scored 90% or better on an experiment involving the analysis and interpretation of experimental data.

**WI06:** For ECE-449, no course assessment report is available for this semester.

**3.2.2. Measures 2:** An exit survey score of 4.0 on criterion (b) questions.

The results of the Exit Survey of Graduating Seniors are provided in Attachments 1 (ELE Program) and 2 (CPE Program).

**3.2.3. Measure 3:** An end of course survey score of 4.0 on criterion (b) questions in each of the above classes.

**FA05:** ECE-215L, ECE-447 and ECE-449 were not taught this semester.

**FA05:** For ECE-401L, a survey score of 4.56/5.0 was obtained on questions relating to the students improved ability to design, analyze and interpret experimental results.

**FA05:** For ECE-444, no course survey results are available for this semester.

**FA05:** In ECE-446, 100% of students agreed or strongly agreed that the course improved their ability to design, analyze and interpret experimental results.

**WI06:** ECE-444, ECE-447 and ECE-446 were not taught this semester.

**WI06:** For ECE-215L, no course survey results are available for this semester.

**WI06:** For ECE-449, no course survey results are available for this semester.

**3.2.4. Analysis of outcome (b).** Remove ECE 446, ECE 449, and CPS 444 for ELE students. Add ECE202L as a direct measure. **Update syllabus and implement assessment in ECE 202L, ECE 215L, ECE 401L and ECE 444 for direct and indirect measures addressing the outcome in AY06-07.**

**3.3. Program Outcome (c):** An ability to design a system, component or process to meet desired needs.

**3.3.1. Measure 1:** 90% of students who pass ECE 401L/444/446/447/449/CPS 444\* must score 80% on a design project.

**FA05:** ECE-447 and ECE-449 were not taught this semester.

**FA05:** For ECE-401L, 75% of students scored 80% or better on a laboratory involving the design of a Crystal Oscillator and Frequency Multiplier.

**FA05:** For ECE-444, 85% of student scored 80% or better on assignments involving ALU design, memory design and digital control unit design.

**FA05:** For ECE-446, 82% of students scored 80% or better on Design #1.

**FA05:** For CPS-444, no course assessment report is available for this semester.

**3.3.2. Measure 2:** An exit survey score of 4.0 on criterion (c) questions.

The results of the Exit Survey of Graduating Seniors are provided in Attachments 1 (ELE Program) and 2 (CPE Program).

**3.3.3. Measure 3:** An end of course survey score of 4.0 on criterion (c) questions for each of the above classes.

**FA05:** ECE-447 and ECE-449 were not taught this semester.

**FA05:** For ECE-401L, an average score of 4.22/5.0 was obtained on questions related to the student's ability to design a component or system to meet desired specifications.

**FA05:** For ECE-444, no course assessment report is available for this semester.

**FA05:** For ECE-446, 90% of students agreed or strongly agreed that the course improved their ability to design CMOS circuits to meet design specifications.

**FA05:** For CPS-444, no course assessment report is available for this semester.

**3.3.4. Analysis of outcome (c).** Remove ECE 446, ECE 449, and CPS 444 for ELE students. Add ECE 302L, and ECE 415 on an experimental basis. Update syllabus and implement assessment in ECE 302L, ECE 401L, ECE 415, and ECE 444 for direct and indirect measures addressing the outcome in AY06-07.

**3.4. Program Outcome (d):** An ability to function on multi-disciplinary teams.

**3.4.1. Measure 1:** 100% of ECE 431L students must work on multidisciplinary teams (project reports must describe multidisciplinary team experience).

**FA05:** All ECE students registered for this course worked on multidisciplinary designs teams whose project reports appropriately document this experience.

**WI05:** All ECE students registered for this course worked on multidisciplinary designs teams whose project reports appropriately document this experience.

**3.4.2. Measure 2:** 100% of ECE 432L students must work on multidisciplinary teams (project reports must describe multidisciplinary team experience).

**3.4.3 Measures 3:** An exit survey score of 4.0 on criterion (d) questions.

The results of the Exit Survey of Graduating Seniors are provided in Attachments 1 (ELE Program) and 2 (CPE Program).

**3.4.3. Measure 4:** An end of course survey score of 4.0 on criterion (d) questions in each of the above courses.

**FA05:** For ECE-431L, 87% of students agreed or strongly agreed that the course improved their ability to function on engineering teams. [Q12. aggregate score of 4.0/5.0].

**WI06:** For ECE-431L, 84% (13 of 19) students believe they are better able to function on multidisciplinary teams. [Q13. aggregate score of 4.0/5.0].

**3.4.4. Analysis of outcome (d).** This program is outcome is satisfied and there are no recommendations for changes to the outcome measures.

**3.5. Program Outcome (e):** An ability to identify, formulate and solve engineering problems.

**3.5.1. Measures 1:** 90% of students who pass ECE 302/314\* must achieve an average grade of 80% on the laboratory/class projects.

**FA05:** For ECE-302, data reported on the course assessment form are not consistent with the approved direct measure for this program outcome.

**WI06:** For ECE-302, data reported on the course assessment form are not consistent with the approved direct measure for this program outcome.

**FA05:** For ECE-314, 90% of students scored 80% or better on course assignments requiring them to identify, formulate and solve engineering problems.

**WI06:** For ECE-314, no course assessment report is available for this semester.

**3.5.2. Measure 2:** An exit survey score of 4.0 on criterion (e) questions.

The results of the Exit Survey of Graduating Seniors are provided in Attachments 1 (ELE Program) and 2 (CPE Program).

**3.5.3. Measure 3:** An end of course survey score of 4.0 on criterion (e) questions in each of the courses above.

**FA05:** For ECE-302, data reported on the course assessment form are not consistent with the approved indirect measure for this program outcome.

**WI06:** For ECE-302, data reported on the course assessment form are not consistent with the approved indirect measure for this program outcome.

**FA05:** For ECE-314, an average survey score of 4.5/5.0 was achieved on questions relating to this outcome.

**WI06:** For ECE-314, no course assessment report is available for this semester.

**3.5.4. Analysis of outcome (e). Update syllabus and implement assessment in ECE 302 and ECE 314 for direct and indirect measures addressing the outcome in AY06-07.**

**3.6. Program Outcome (f):** An understanding of professional and ethical responsibility.

**3.6.1. Measure 1:** 85% of students who pass PHL 316 or 319 must achieve an average grade of C.

**FA05:** For PHL-316, 6 of 7 (86%) of students who completed PHL-316 passed this course with grades of C or better.

**WI06:** For PHL-316, no ECE or CPE students were register for this semester.

**FA05:** For PHL-319, 7 of 8 (88%) of students who completed PHL-316 passed this course with grades of C or better.

**WI06:** PHL-319 was not offered this semester.

**3.6.2. Measure 2:** 85% of students in PHL 316 or 319 must achieve a score of 80% or more on an assignment/exam dealing with professional and ethical responsibility.

**FA05/WI06:** For PHL-316 and PHL-319, no course assessment report is available for these semesters.

**3.6.3. Measure 3:** 90% of students who pass ECE 431L must score 80% or more on an assignment dealing with ethics in design.

**FA05:** For ECE-431L, all students complete a design decision analysis involving design criteria such as safety and other ethical issues. There is no separately graded course assignment dealing with the topic of "ethics in design."

**WI06:** For ECE-431L, all students complete a design decision analysis involving design criteria such as safety and other ethical issues. There is no separately graded course assignment dealing with the topic of "ethics in design."

**3.6.4. Measure 4:** 100% of the projects in ECE 432L/CPS 418\* must demonstrate ethical considerations in the project report.

**FA05:** For ECE-432L and CPS-418, there are no course assessment reports available for this semester.

**WI06:** For ECE-432L, there is no specific project reporting requirement addressing ethical considerations in design.

**WI06:** CPS-418 was not taught this semester.

**3.6.5. Measure 5:** An exit survey score of 4.0 on criterion (f) questions.

The results of the Exit Survey of Graduating Seniors are provided in Attachments 1 (ELE Program) and 2 (CPE Program).

**3.6.6. Measure 6:** An end of course survey score of 4.0 on criterion (f) questions in each of the courses above.

**FA05:** For ECE-431L, 39% (9 of 23) students believe they have a better appreciation for ethical issues in design. [Q15 aggregate score of 2.7/5.0].

**FA05:** For ECE-432L and CPS-418, there are no course survey results available for this semester.

**WI06:** For ECE-431L, 53% (10 of 19) students believe they have a better appreciation for ethical issues in design. [Q16 aggregate score of 3.5/5.0].

**WI06:** For ECE-432L, there are no survey results available for this course.

**WI06:** CPS-418 was not taught this semester.

**3.6.7. Analysis of outcome (f).** Change direct measure 1 to 90% of students passing of the PHL 316/319 with a grade of C or better. Remove direct measure 2, related to an assignment in PHL 316/319. Remove direct measure 3, related to an assignment in ECE 431L. For direct measure 4, add a relevant assignment in ECE 432L, on ethical ramifications of the decision analysis performed by each team, reviewing the code of conduct established by the IEEE. Add a new direct measure, 5, an assignment in ECE 101 related to ethics. Add direct measure 6, an assignment in ECE 401. **Update syllabus, and implement assessment in ECE 101, ECE 401, and ECE 432L for direct and indirect measures addressing the outcome in AY06-07.**

**3.7. Program Outcome (g):** An ability to communicate effectively.

**3.7.1. Measures 1:** 90 % of our students must receive a grade of 80 % on ECE 301L/302L laboratory presentation and the corresponding formal report.

**FA05:** For ECE-301L, 70% of students scored 90% or better on written laboratory reports.

**FA05:** For ECE-302L, 100% of students achieved scores of 100% on the laboratory report requirement. No formal presentation was required in this course this semester.

**WI06:** For ECE-301L, 100% of students scored 80% or better on written laboratory reports (BJT Amplifier) including a formal presentation.

**WI06:** For ECE-302L, 80% of students achieved scores of 90% or better on the laboratory report requirement. No formal presentation was required in this course this semester.

**3.7.2. Measure 2:** 90 % of our students must receive a grade of 80 % on ECE 401L/444/446/447/449/CPS 444\* design project presentations and the corresponding formal report.

**FA05:** ECE-447 and ECE-449 were not taught this semester.

**FA05:** For CPS-444, there is no course assessment report for this semester.

**FA05:** For ECE-444, 100% of students scored 80% or better on interim and final project presentations.

**FA05:** For ECE-401L, no results for formal presentations are included in the course assessment report.

**FA05:** For ECE-446, 75% of students scored at 80% or better in a design project presentation.

**WI06:** ECE-401L, ECE-444, ECE-446, ECE-447 and CPS-444 were not taught this semester.

**WI06:** For ECE-449, there is no course assessment report for this semester.

**3.7.3. Measure 3:** An exit survey score of 4.0 on criterion (g) questions.

The results of the Exit Survey of Graduating Seniors are provided in Attachments 1 (ELE Program) and 2 (CPE Program).

**3.7.4. Measure 4:** An end of course survey score of 4.0 on criterion (g) questions in each of the above courses.

**FA05:** ECE-447 and ECE-449 were not taught this semester.

**FA05:** For ECE-444 and CPS-444, there are no course assessments reports for this semester.

**FA05:** For ECE-401L, no results for formal presentations are included in the course assessment report.

**FA05:** For ECE-446, 100% of students agreed or strongly agreed that this course improved their ability to communicate effectively through formal reports and presentations.

**WI06:** ECE-401L, ECE-444, ECE-446, ECE-447 and CPS-444 were not taught this semester.

**WI06:** For ECE-449, there is no course assessment report for this semester.

**3.7.5. Analysis of outcome (g).** Remove ECE 446, ECE 447, ECE 449, and CPS 444 for ELE students. **Update syllabus, and implement assessment in ECE 301L, ECE 302L, ECE 401L, and ECE 444 for direct and indirect measures addressing the outcome in AY06-07.**

**3.8. Program Outcome (h):** The broad education necessary to understand the impact of engineering solutions in global, societal context.

**3.8.1. Measure 1:** Continued accreditation of the University College of Arts and Sciences.

The university is scheduled for re-accreditation by the Higher Learning Commission of the North Central Association of Colleges and Schools in 2007.

**3.8.2. Measure 2:** 100% of ECE 431L and 432L projects must consider impact on society in design.

**FA05:** ECE-432L, there are no course assessment report for this semester.

**FA05/WI06:** For ECE-431L, there are no specific course components dealing with the topic "impact on society" in the design process.

**WI06:** For ECE-432L, 100% of students completed a design decision analysis with consideration to the impact on society of their conceptual designs.

**3.8.3. Measure 3:** An exit survey score of 4.0 on criterion (h) questions.

The results of the Exit Survey of Graduating Seniors are provided in Attachments 1 (ELE Program) and 2 (CPE Program).

**3.8.4. Measure 4:** An end of course survey score of 4.0 on criterion (h) questions in 431L/432L.

**FA05:** ECE-432L, there are no course survey results available for this semester.

**FA05/WI06:** For ECE-431L, there are no specific course components dealing with the topic "impact on society" in the design process.

**WI06:** For ECE-432L, there are no survey results available for this course.

**3.8.5. Measure 5:** Project evaluator survey score of 4.0 in ECE 432L on criterion (h) questions.

**FA05:** For ECE-432L, there are no survey results available for this course.

**WI06:** For ECE-432L, there are no survey results available for this course.

**3.8.6. Analysis of outcome (h).** Remove ECE 431L project as a direct measure. Add a relevant assignment in ECE 101 and ECE 401. **Update syllabus, and implement assessment in ECE 101, ECE 401, and ECE 432L for direct and indirect measures addressing the outcome in AY06-07.**

**3.9. Program Outcome (i):** A recognition of the need for and the ability to engage in lifelong learning.

**3.9.1. Measures 1:** 90% of ECE 444/446/447/449\* students achieve a grade of 80% on project requiring use of independent learning.

**FA05:** ECE-447 and ECE-449 were not taught this semester.

**FA05:** For ECE-444, 100% of students scored 80% or better on final projects.

**FA05:** For ECE-446, 82% of students (Design #1) and 75% of students (Design #2) scores 80% or better in a project requiring independent learning.

**WI06:** ECE-444, ECE-446 and ECE-447 were not taught this semester.

**WI06:** For ECE-449, there is no course assessment report for this semester.

**3.9.2. Measure 2:** An exit survey score of 4.0 on criterion (i) questions.

The results of the Exit Survey of Graduating Seniors are provided in Attachments 1 (ELE Program) and 2 (CPE Program).

**3.9.3. Measure 3:** An end of course survey score of 4.0 on criterion (i) questions.

**FA05:** ECE-447 and ECE-449 were not taught this semester.

**FA05:** For ECE-444, there is no course survey data for this semester.

**FA05:** For ECE-446, 90% of students agreed or strongly agreed that the course improved their skills for independent learning or to explore emerging areas.

**WI06:** ECE-444, ECE-446 and ECE-447 were not taught this semester.

**WI06:** For ECE-449, there are no course survey results for this semester.

**3.9.4. Analysis of outcome (i).** Remove ECE 446, ECE 447, and ECE 449 for ELE students. **Update syllabus, and implement assessment in ECE 444, and ECE 432L for direct and indirect measures addressing the outcome in AY06-07.**

**3.10. Program Outcome (j):** A knowledge of contemporary issues.

**3.10.1. Measure 1:** 100% of students pass contemporary issues project in ECE 101.

**FA05:** For ECE-101, 100% of students satisfactorily completed a contemporary issues project.

**3.10.2. Measure 2:** 90% of students in ECE 431L achieve a grade of 80% in contemporary issues report.

**FA05/WI06:** For ECE-431L, there are no specific course components dealing with "contemporary issues" in relation to design.

**3.10.3. Measures 3:** 100% of project reports in ECE 432L contain discussions of contemporary issues.

**FA05:** For ECE-432L, there is no course assessment report for this semester.

**WI06:** For ECE-432L, there are no specific course components dealing with "contemporary issues" in relation to design.

**3.10.4 Measure 4:** An exit survey score of 4.0 on criterion (j) questions.

The results of the Exit Survey of Graduating Seniors are provided in Attachments 1 (ELE Program) and 2 (CPE Program).

**3.10.5. Analysis of outcome (j).** **Update syllabus, and implement assessment in ECE 101, and ECE 432L for direct and indirect measures addressing the outcome in AY06-07.**

**3.11. Program Outcome (k):** An ability to use techniques, skills, and modern engineering tools necessary for engineering practice.

**3.11.1. Measure 1:** 90% of ECE 444/445/446/449/CPS 444\* students achieve a grade of 80% on projects requiring use of modern design tools.

**FA05:** ECE-449 was not taught this semester.

**FA05:** For ECE-444, all students satisfactorily demonstrated in the skills in digital filter design, the use of VHDL and the Altera Quartus Tool Set.

**FA05:** For ECE-445, 100% of students scored 80% or better on a final design project involving the use of modern engineering tools.

**FA05:** For ECE-446, 82% of students (Design #1) and 75% of students (Design #2) scored at least 80% on design projects requiring the use of modern engineering tools.

**FA05:** For CPS-444, there is no course assessment report for this semester.

**WI06:** ECE-444, ECE-445, ECE-446 and CPS-444 were not taught this semester.

**WI06:** For ECE-449, there is no course assessment report available for this semester.



**3.11.2. Measure 2:** An exit survey score of 4.0 on criterion (k) questions.

The results of the Exit Survey of Graduating Seniors are provided in Attachments 1 (ELE Program) and 2 (CPE Program).

**3.11.3. Measure 3:** An end of course survey score of 4.0 on criterion (k) questions in each of the above courses.

**FA05:** ECE-449 was not taught this semester.

**FA05:** For ECE-444, there are no course survey results available for this semester.

**FA05:** For ECE-445, there are no course survey results available for this semester.

**FA05:** For ECE-446, 90% of students agreed or strongly agreed that the course improved their ability to use and apply modern engineering tools and software.

**FA05:** For CPS-444, there is no course assessment report for this semester.

**WI06:** ECE-444, ECE-445, ECE-446 and CPS-444 were not taught this semester.

**WI06:** For ECE-449, there are no course survey results available for this semester.

**3.11.4. Analysis of outcome (k).** Remove ECE 446, ECE 449, and CPS 444 for ELE students. **Update syllabus, and implement assessment in ECE 444, and ECE 445 for direct and indirect measures addressing the outcome in AY06-07.**

**3.12. Program Outcome (I):** An understanding of probability and statistics and the ability to apply probability and statistics to engineering problems.

**3.12.1. Measure 1:** 100% of students must pass ECE 340.

This is a graduation requirement. All graduating seniors passed this course or its former equivalent, ECE-211, -315 and -316.

**3.12.2. Measure 2:** 90% of students must achieve a score of 80% on P&S application in ECE 301/302L/314\*.

**FA05:** For ECE-301L, there are no course assessment results for this program outcome in the course assessment report.

**FA05:** For ECE-302L, there are no course assessment results for this program outcome in the course assessment report.

**FA05:** For ECE-314, there are no course assessment results for this program outcome in the course assessment report.

**WI06:** For ECE-301L, there are no course assessment results for this program outcome in the course assessment report.

**WI06:** For ECE-302L, there are no course assessment results for this program outcome in the course assessment report.

**WI06:** For ECE-314, there is no course assessment report available for this semester.

**3.12.3. Measure 3:** An exit survey score of 4.0 on criterion (I) questions.

The Exit Survey of Graduating Seniors does not directly address this program outcome.

**3.12.4. Measure 4:** An end of course survey score of 4.0 on criterion (I) questions in each of the above courses.

**FA05:** For ECE-301L, there are no course survey results for this program outcome in the course assessment report.

**FA05:** For ECE-302L, there are no course survey results for this program outcome in the course assessment report.

**FA05:** For ECE-314, there are no course survey results for this program outcome in the course assessment report.

**WI06:** For ECE-301L, there are no course survey results for this program outcome in the course assessment report.

**WI06:** For ECE-302L, there are no course survey results for this program outcome in the course assessment report.

**WI06:** For ECE-314, there is no course assessment report available for this semester.

**3.12.5. Analysis of outcome (I).** Remove ECE 301L, ECE 302L, ECE314 for ELE students. Add a direct measure, an assignment in ECE 401. **Update syllabus, and implement assessment in ECE 340, and ECE 401 for direct and indirect measures addressing the outcome in AY06-07.**

**3.13. Program Outcome (m):** A knowledge of discrete mathematics including formal proofs, Boolean algebra, and discrete signal representations and transforms.

**3.13.1. Measure 1: Formal proofs** - ECE 340: 90% of students score 80% on HW or exam containing formal proofs in probability; MTH 343: 90% of students must score 80% in at least 2 HWs.

**FA05:** For ECE-340, 85% of students scored 80% or better on test questions involving formal proofs.

**FA05:** For MTH-343, this course was not taught this semester.

**WI06:** For ECE-340, 85% of students scored 80% or better on test questions involving formal proofs.

**WI06:** For MTH-343, no course assessment report is available for this semester.

**3.13.2. Measure 2: Boolean algebra** - ECE 215: 90% of student in HW on Boolean Algebra and its applications must receive 80 %.

**FA05:** ECE-215 was not taught this semester.

**WI06:** For ECE-215, over 90% of students scored greater than 80% on problems and test questions involving Boolean algebra.

**3.13.3. Measure 3: Discrete signals and transforms** - MTH 343: 90% of students must score 80% in the projects; ECE 334: 90% of the students achieve a score of 80% on homework assignments, projects or at least one exam and/or final.

**FA05:** MTH-343 was not taught this semester.

**FA05:** For ECE-334, there is no course assessment form available for this semester.

**WI06:** For MTH-343, there is no course assessment report available for this semester.

**WI06:** For ECE-334, 78% of students scored 80% or better on assignments involving the use of discrete signal representations and also on the formal proof of z-transform properties. 100% of students scored 80% or better on homework problems on the use of discrete Fourier transforms to solve engineering problems.

**3.13.4. Measure 4: Complex Variables** – MTH 343: 90% of students must score 80% on homework or exam involving complex variables.

**FA05:** MTH-343 was not taught this semester.

**WI06:** For MTH-343, there is no course assessment report available for this semester.

**3.13.5. Measure 5:** An end of course survey score of 4.0 on criterion (m) questions in ECE 211/340/334/MTH 343\*.

**FA05:** MTH-343 was not taught this semester.

**FA05:** For ECE-211/340, 100% of students agreed or strongly agreed that they learned the axioms of probability and could use these axioms to derive more elaborate probability relationships.

**FA05:** For ECE-334, there is no course assessment report available for this semester.

**WI06:** For MTH-343, there is no course assessment report available for this semester.

**WI06:** For ECE-211/340, 94% of students agreed or strongly agreed that they learned the axioms of probability, and 88% agreed or strongly agreed that they could use these axioms to derive more elaborate probability relationships.

**WI06:** For ECE-334, there are no course survey results available for this semester.

**3.13.6. Analysis of outcome (m).** Change the direct measures for MTH343 to 90% of students passing MTH343 with a C or better grade. For continuous and discrete transforms, use an assignment in ECE 202, and one from ECE 334. **Update syllabus, and implement assessment in ECE 202, ECE 215, ECE 334 and ECE 340 for direct and indirect measures addressing the outcome in AY06-07.**

**3.14. Program Outcome (n):** A major design experience.

**3.14.1. Measure 1:** 100% of the students must participate in a major design project in the ECE 431L/432L multidisciplinary design sequence.

**FA05/WI06:** This is satisfied by course design. All students in ECE-431L/432L work on a major design project managed through the University of Dayton, Design and Manufacturing Clinic. These projects are all documented in formal reports and presentations.

**3.14.2. Measure 2:** 100% of the students must participate in a major design project in ECE 444/446/447/449/CPS 444\*.

**FA05:** ECE-447 and ECE-449 were not taught this semester.

**FA05:** For ECE-444, 100% of students completed a major design project with a score of 80% or higher.

**FA05:** For ECE-446, 100% of students were required to participate in a major design project.

**FA05:** For CPS-444, no course assessment report is available for this semester.

**WI06:** ECE-444, ECE-446, ECE-447 and CPS-449 were not taught this semester.

**FA05:** For ECE-444, all students successfully completed a major design project with a score of 80% or better.

**FA05:** For ECE-446, 100% of students were required to participate in a major design project.

**FA05:** For CPS-444, no course assessment report is available for this semester.

**3.14.3. Measure 3:** These measures are not currently included in the focused course outcome assessment plan.

**FA05:** For ECE-431L:

- (i) 78% (18 of 23) of students agreed or strongly agreed that they have a very good understanding of the product realization process as a result of this course. [Q3 aggregate score of 3.8/5.0].
- (ii) 78% (18 of 23) of students agreed or strongly agreed that they learned a great deal about design and the design process as a result of this course. [Q5 aggregate score of 3.7/5.0].
- (iii) 83% (19 of 23) of students agreed or strongly agreed that the course enhanced their ability to design components and/or processes to meet customer needs. [Q9 aggregate score of 3.7/5.0].
- (iv) 78% (18 of 23) of students agreed or strongly agreed that are better able to solve engineering problems as a result of this course. [Q10 aggregate score of 3.7/4.0].
- (v) 83% (19 of 23) of students agreed or strongly agreed that are better able to develop creative and innovative solutions to engineering problems as a result of this course. [Q11 aggregate score of 3/7/5.0].

**WI06:** For ECE-431L:

- (i) 81% (17 of 21) of student believe they have a better understanding of the product realization process. [Q4 aggregate score of 3.8/5.0].
- (ii) 85% (17 of 20) of students believe they learned a great deal about the design process. [Q6 aggregate scores of 4.1/5.0].
- (iii) 90% (18 of 20) of students believe they are better able to design components or processes to meet customer needs. [Q10 aggregate score of 4.1/5.0].
- (iv) 85% (17 of 20) of students believe they are better able to solve engineering problems through the development of design specifications. [Q11 aggregate score of 4.1/5.0].
- (v) 89% (17 of 19) students feel they are better able to develop creative and innovative solutions as a results of the project and the PRP. [Q12 aggregate score of 3.9/4.0].

**3.14.4. Analysis of outcome (n).** This program outcome is satisfied and no recommendations for changes to the outcome measures.

**3.15. Program Outcome (o):** (CPE only) An understanding of the hardware/software integration process and an ability to conduct hardware/software integration.

**3.15.1. Measure 1:** 90% of students achieve score of 80% in ECE 444/449/CPS 444\* projects demonstrating hardware/software integration.

**FA05:** ECE-449 was not offered this semester

**FA05:** For ECE-444, there are no direct or indirect measures for this program outcome reported in the course assessment report.

**FA05:** For CPS-444, no course assessment is available for this semester.

**FA05:** ECE-444 and CPS-444 were not offered this semester

**FA05:** For ECE-449, no course assessment is available for this semester.

**3.15.2. Analysis of outcome (o).** There is not program outcome assessment data for this outcome. Direct and indirect measures for this outcome should be implemented in AY 06-07.

\* Quantitative measures in at least one of the listed courses must be monitored and assessed.

#### 4. Summary Assessment and Recommendations for Action

Based on the review of courses assessment reports for the AY2005-06, the main recommendations from the ELE program committee are as follows. These recommendations refer to changes in the Program Outcome measures used in the focused-outcome assessment process. In certain cases, these recommendations add new program outcome requirements to specific courses namely, ECE\_101, ECE-202 and ECE-401.

- 4.1. Outcome a:** Monitor ECE302 and ECE334 in 06-07. **Update syllabus and implement assessment in ECE 302 and ECE 334 for direct and indirect measures addressing the outcome in AY 06-07.**
- 4.2. Outcome b:** Remove ECE 446, ECE 449, and CPS 444 for ELE students. Add ECE202L as a direct measure. **Update syllabus and implement assessment in ECE 202L, ECE 215L, ECE 401L and ECE 444 for direct and indirect measures addressing the outcome in AY06-07.**
- 4.3. Outcome c:** Remove ECE 446, ECE 449, and CPS 444 for ELE students. Add ECE 302L, and ECE 415 on an experimental basis. **Update syllabus and implement assessment in ECE 302L, ECE 401L, ECE 415, and ECE 444 for direct and indirect measures addressing the outcome in AY06-07.**
- 4.4. Outcome e:** **Update syllabus and implement assessment in ECE 302 and ECE 314 for direct and indirect measures addressing the outcome in AY06-07.**
- 4.5. Outcome f:** Change direct measure 1 to 90% of students passing PHL 316, PHL 319 or REL 369 with a grade of C or better. Remove direct measure 2, related to an assignment in PHL 316/319. Remove direct measure 3, related to an assignment in ECE 431L. For direct measure 4, add a relevant assignment in ECE 432L, on ethical ramifications of the decision analysis performed by each team, reviewing the code of conduct established by the IEEE. Add a new direct measure, 5, an assignment in ECE 101 related to ethics. Add direct measure 6, an assignment in ECE 401. **Update syllabus, and implement assessment in ECE 101, ECE 401, and ECE 432L for direct and indirect measures addressing the outcome in AY06-07.**
- 4.6. Outcome g:** Remove ECE 446, ECE 447, ECE 449, and CPS 444 for ELE students. Add a direct measure relating to CMM-111/112. A direct measure will also be added to outcome (d) relating to CMM-110. **Update syllabus, and implement assessment in ECE 301L, ECE 302L, ECE 401L, and ECE 444 for direct and indirect measures addressing the outcome in AY06-07.**
- 4.7. Outcome h:** Remove ECE 431L project as a direct measure. Add a relevant assignment in ECE 101 and ECE 401. **Update syllabus, and implement assessment in ECE 101, ECE 401, and ECE 432L for direct and indirect measures addressing the outcome in AY06-07.**
- 4.8. Outcome i:** Remove ECE 446, ECE 447, and ECE 449 for ELE students. Add a direct measure from ECE 432L. **Update syllabus, and implement assessment in ECE 444, and ECE 432L for direct and indirect measures addressing the outcome in AY06-07.**
- 4.9. Outcome j:** **Update syllabus, and implement assessment in ECE 101, and ECE 432L for direct and indirect measures addressing the outcome in AY06-07.**
- 4.10. Outcome k:** Remove ECE 446, ECE 449, and CPS 444 for ELE students. Add a direct measure from ECE 203. **Update syllabus, and implement assessment in ECE 444, and ECE 445 for direct and indirect measures addressing the outcome in AY06-07.**
- 4.11. Outcome l:** Remove ECE 301L and ECE 302L for ELE students. Add a direct measure, an assignment in ECE 401. **Update syllabus, and implement assessment in ECE 340, and ECE 401 for direct and indirect measures addressing the outcome in AY06-07.**
- 4.12. Outcome m:** Change the direct measures for MTH 343 to 90% of students passing MTH 343 with a C or better grade. For continuous and discrete transforms, use an assignment in ECE 202, and one from ECE 334. **Update syllabus, and implement assessment in ECE 202, ECE 215, ECE 334 and ECE 340 for direct and indirect measures addressing the outcome in AY06-07.**

Following faculty review, the following additional recommendations are made:

**4.13. Exit Survey of Graduating Seniors:** The success measures detailed in the program assessment plan regarding the Exit Survey of Graduating Seniors (EBI Survey) should be modified to reflect the survey scale of 1.0 - 7.0. This will align the ABET Longitudinal Factor Analysis with the program assessment plan. A target score of 5.0/7.0 is recommended for all ABET Criterion factor analyses.

**4.14. Concurrence of CPE Program Committee:** The faculty request concurrence from the CPE Program committee regarding the assessment plan changes outlined above.

**4.15. Implementation Issues:** The faculty recognize that there is some lack consistency between the direct and indirect program measures listed in the program assessment plans, and those reported on the course assessment forms. Faculty are strongly encouraged to pay due diligence to the course assessment reporting requirements.

**4.16. Assessment Timeline:** Since the Exit Survey of Graduating Seniors is not available until early in the Fall semester, the faculty recommend that all due diligence be taken by the ELE and CPE program committees to complete the annual program assessment review early in the Fall semester.

Based on the recommendations of the ELE program committee and with concurrence from the CPE program committee, the recommended changes to the course outcome mapping for the ELE and CPE programs and the associated program outcome assessment plan were approved on 1-24-07. The revisions to the ELE and CPE Course Outcome Program mappings are included in Attachment 6 and are recommended for implementation in the winter semester of AY 2006-07.

**Document Status:**

First draft: 8/24/06

Revision 1: 9/18/06

Revision 2: 1/9/07

Recommendations Approved (ECE faculty): 4.1 thru. 4.12 approved. 1/10/07

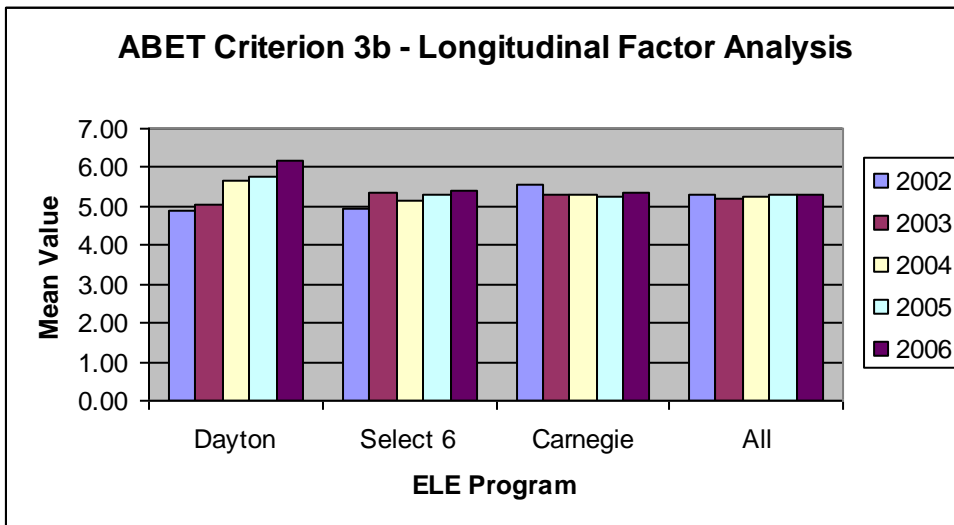
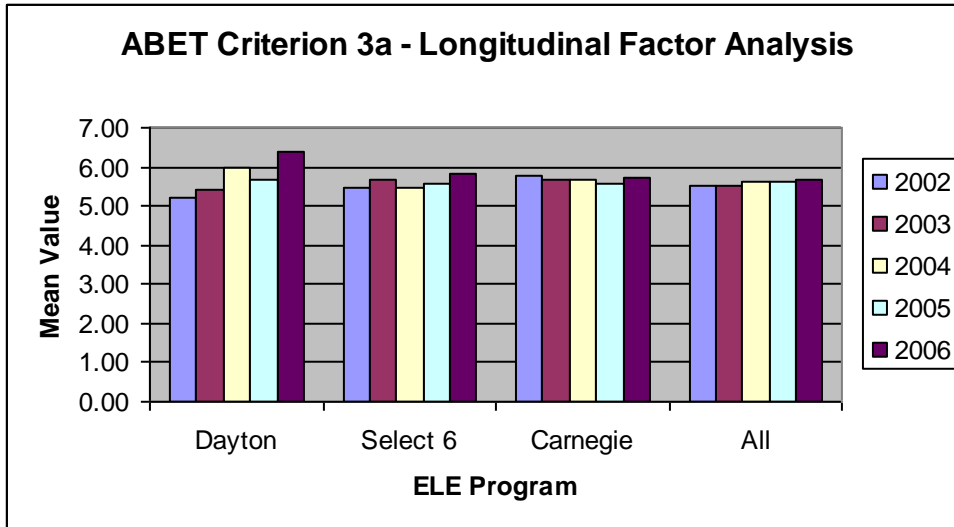
Recommendations Approved (ECE faculty): 4.13 thru. 4.16 approved 1/24/07

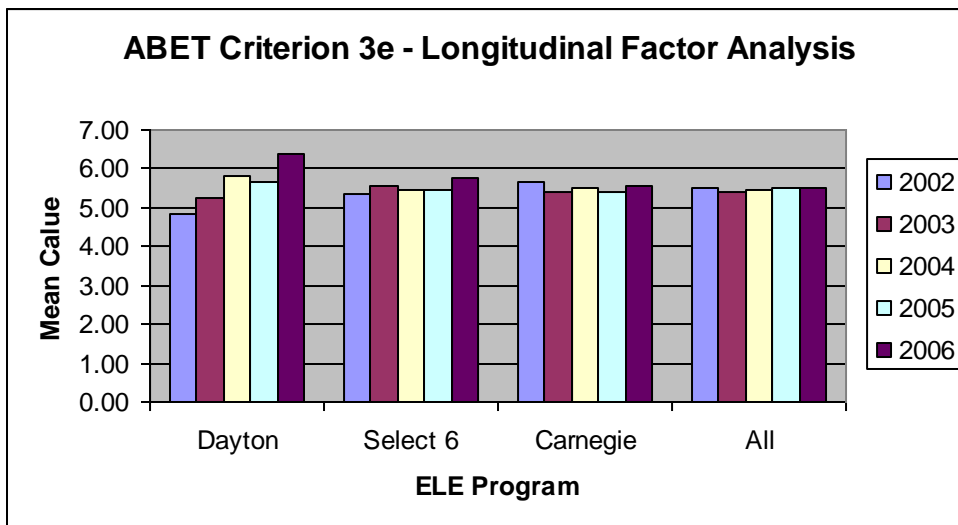
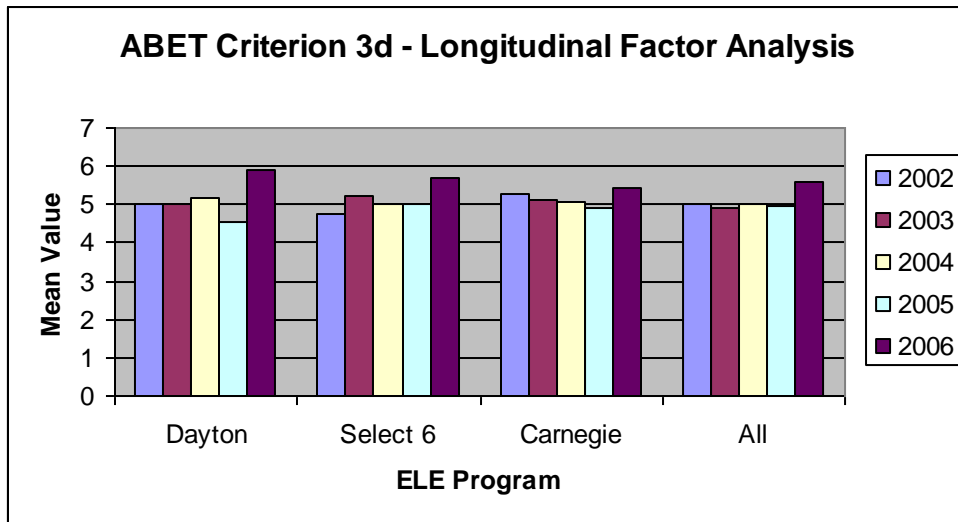
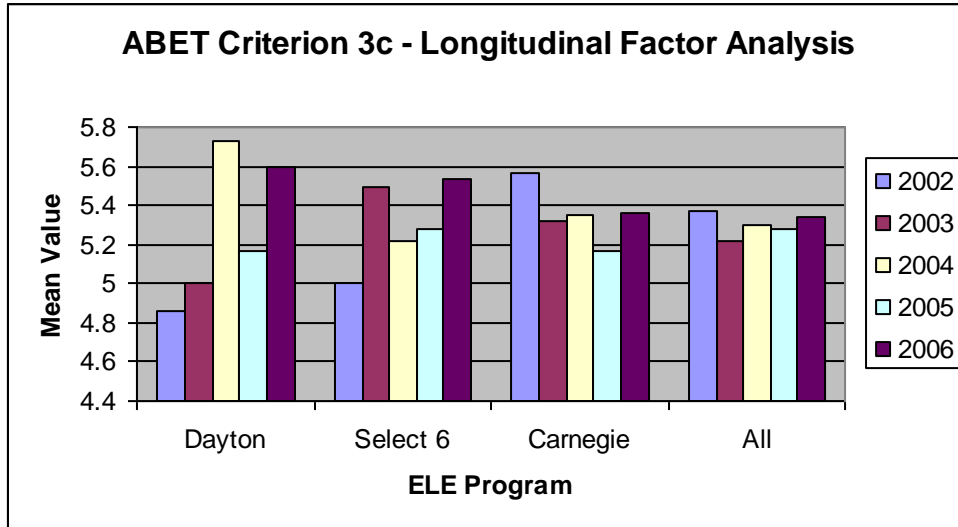
Recommendations Approved (CPE Program Committee): 4.1 thru. 4.16 approved 1/17/07

SoE ACI Committee Review:

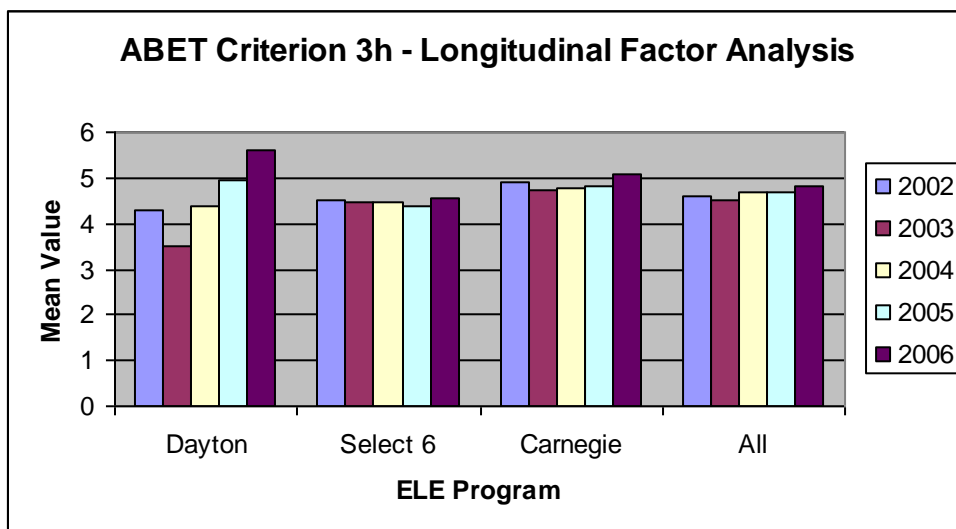
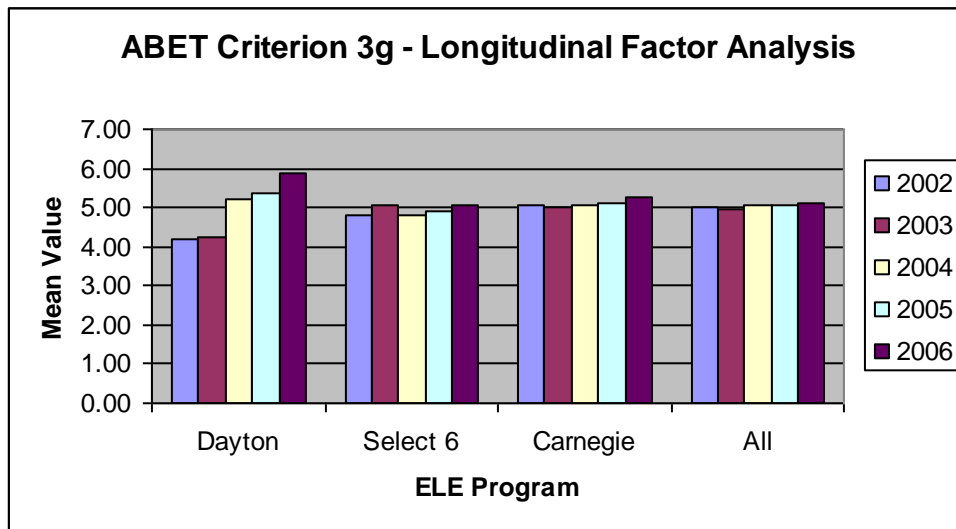
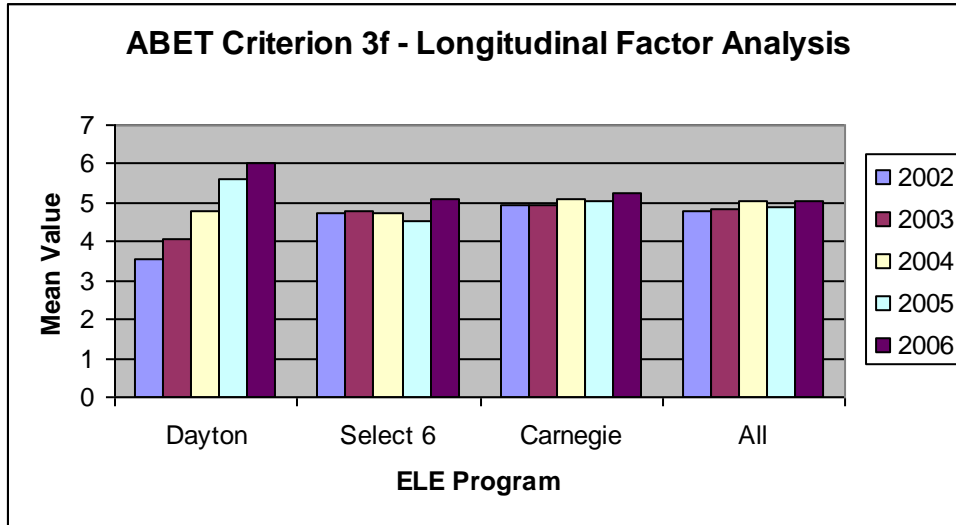
**Attachment 1: EBI Exit Survey Results - AY2005-06 - ABET Factor Analysis**

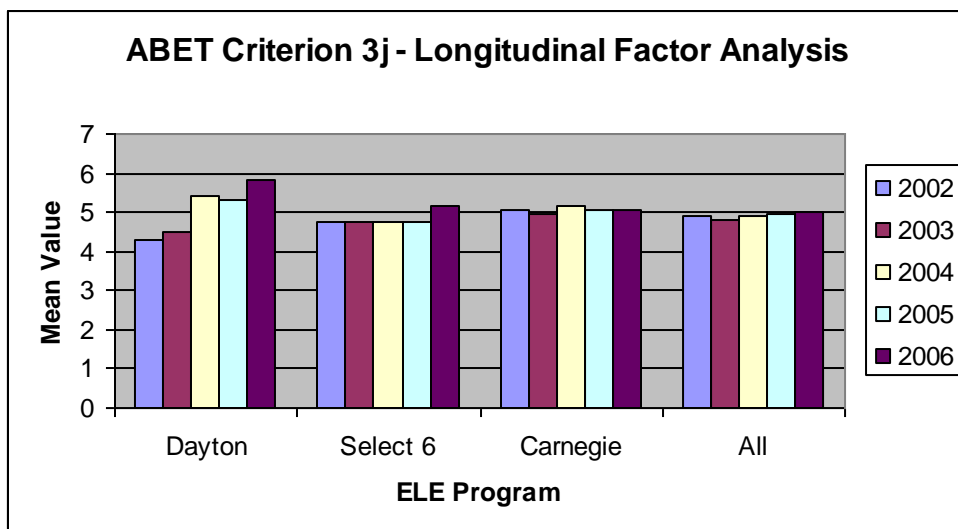
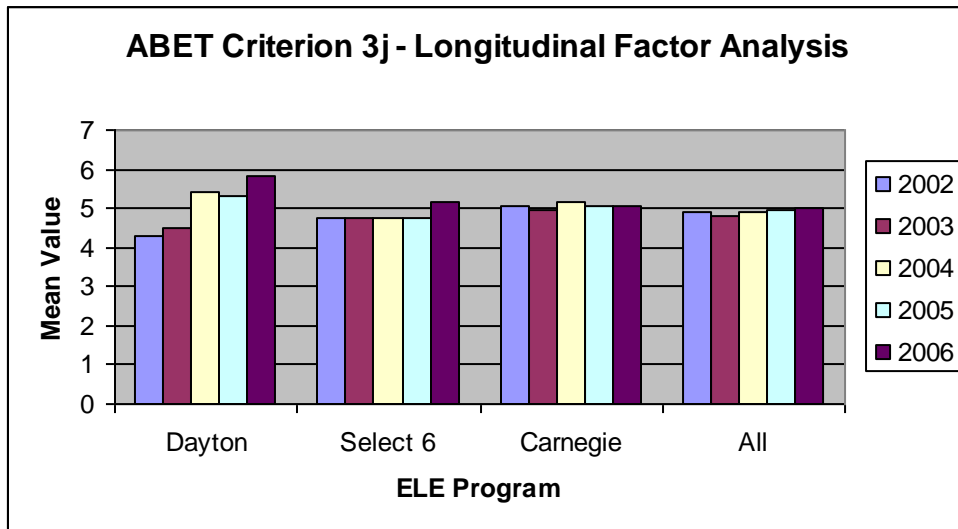
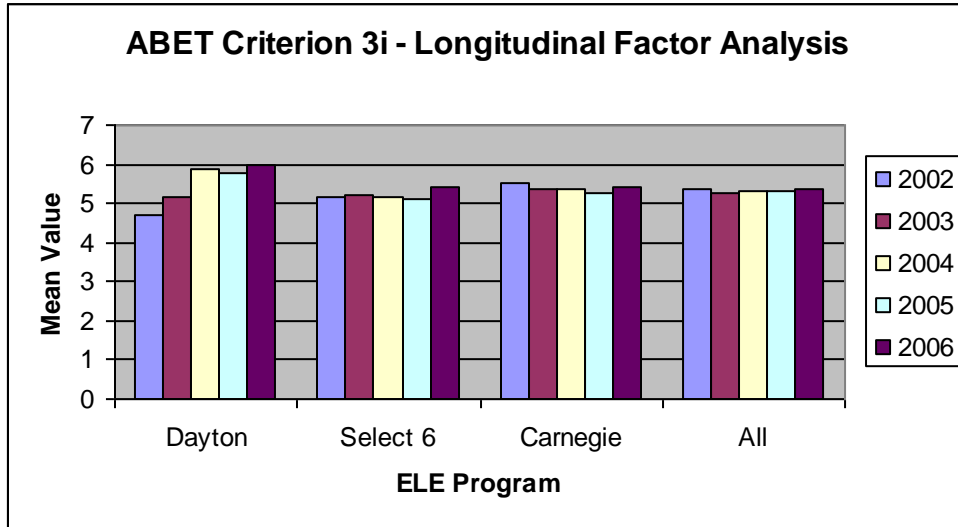
**Electrical Engineering Program**





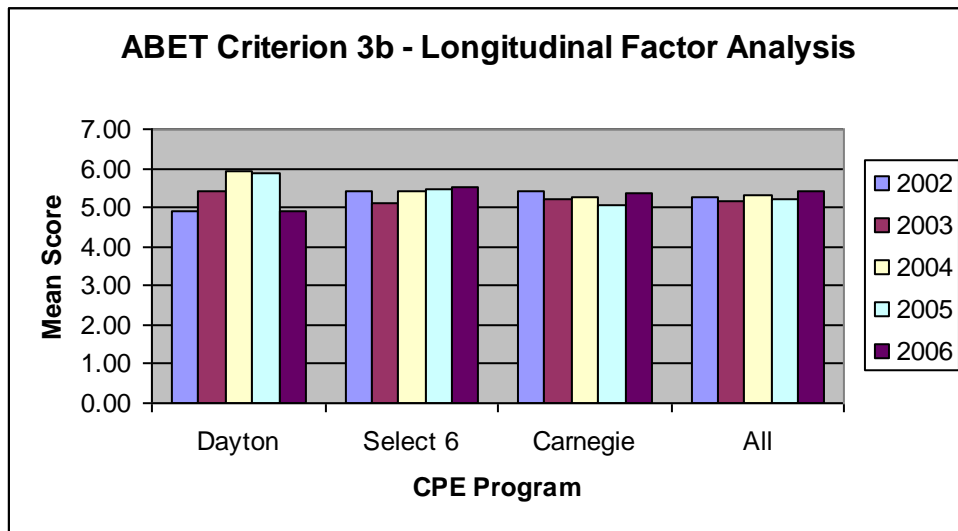
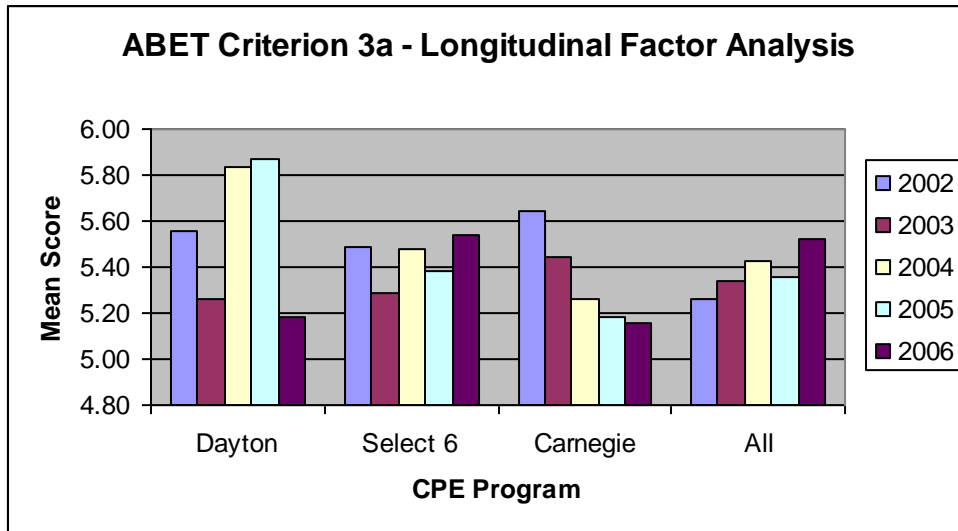


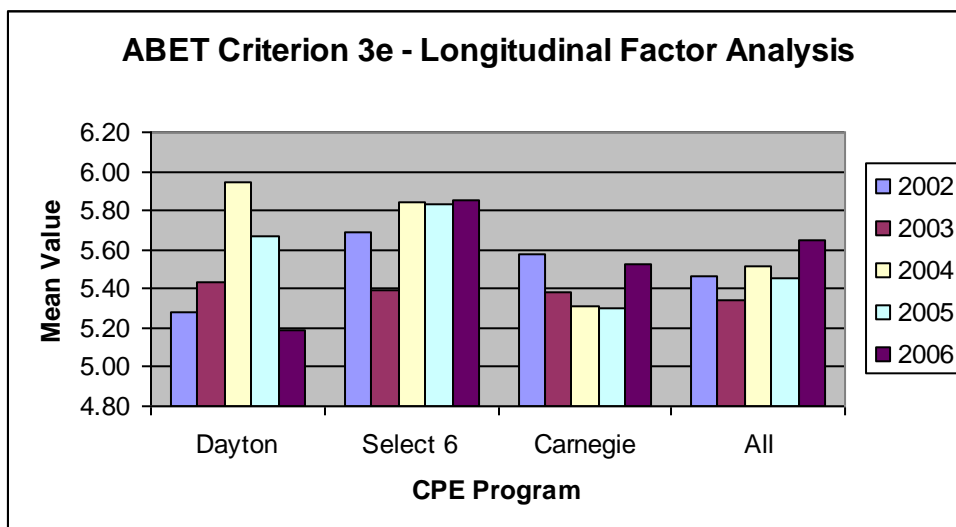
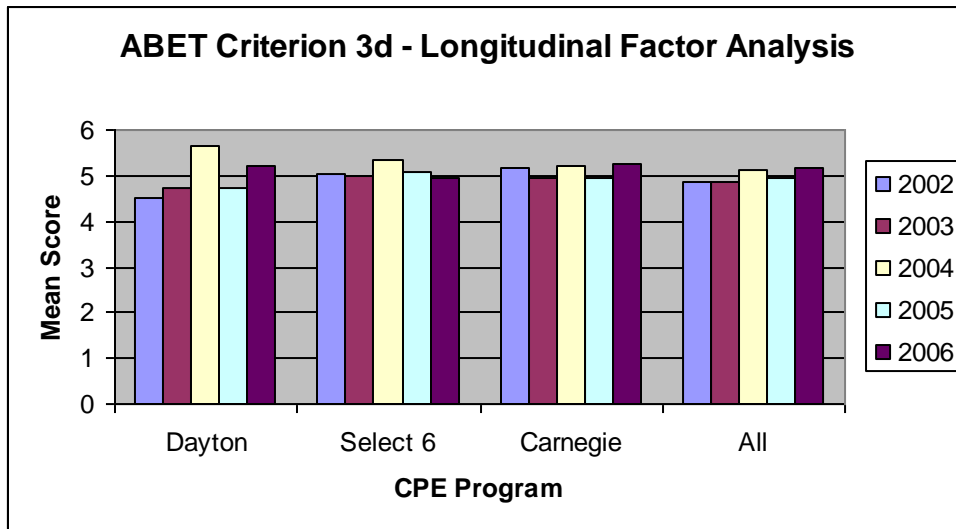
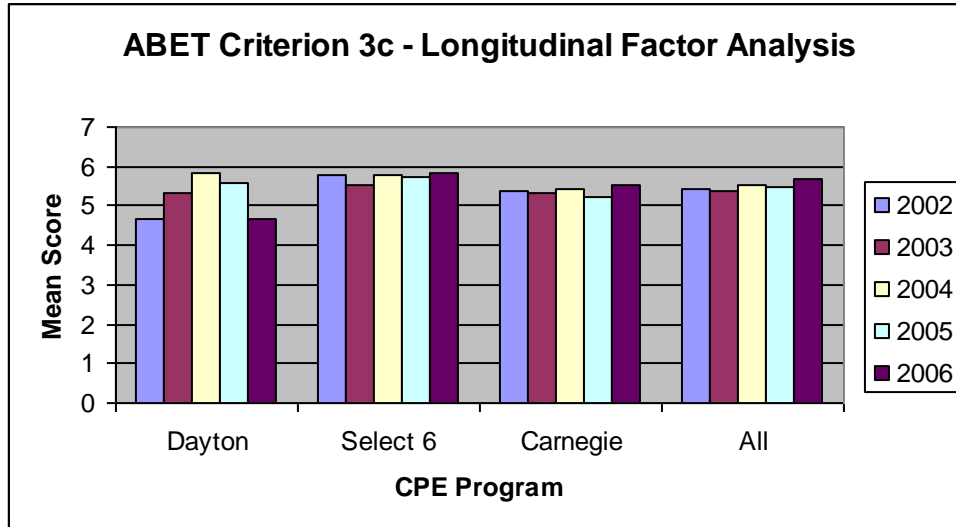


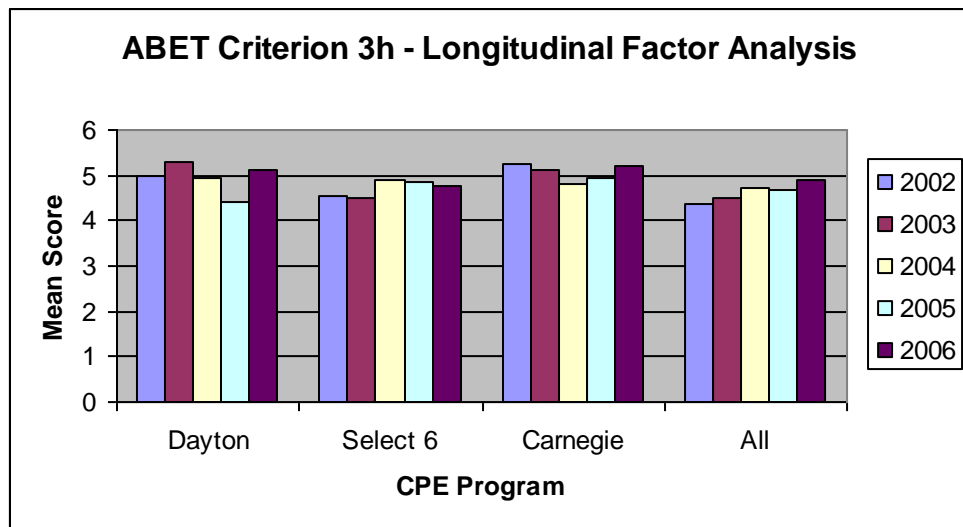
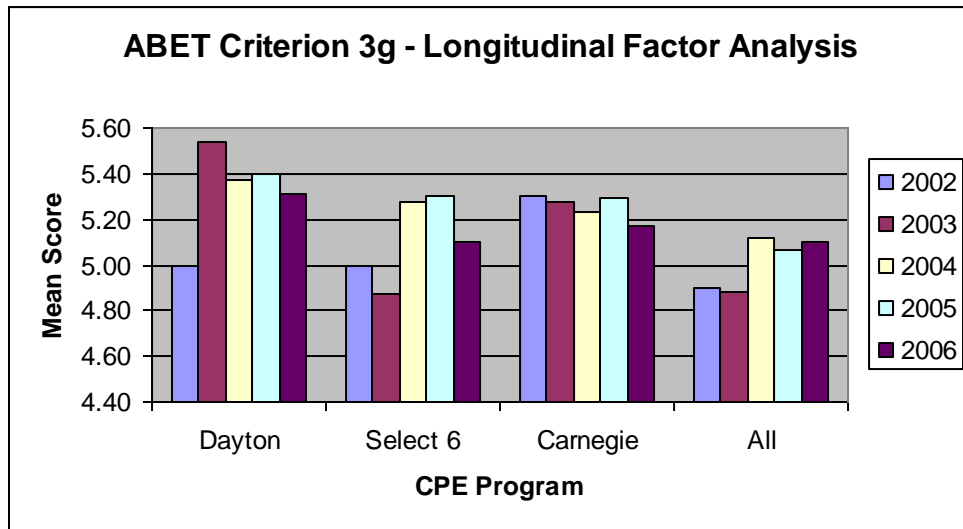
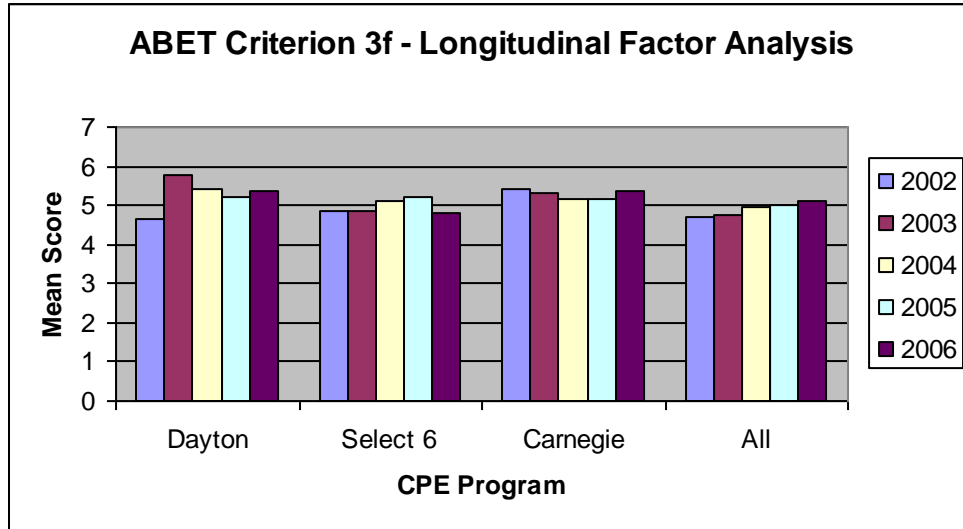


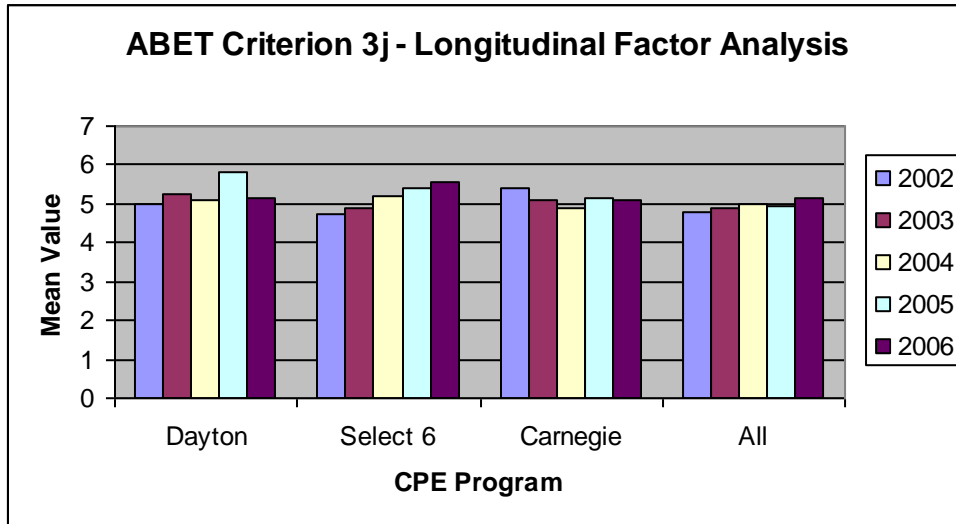
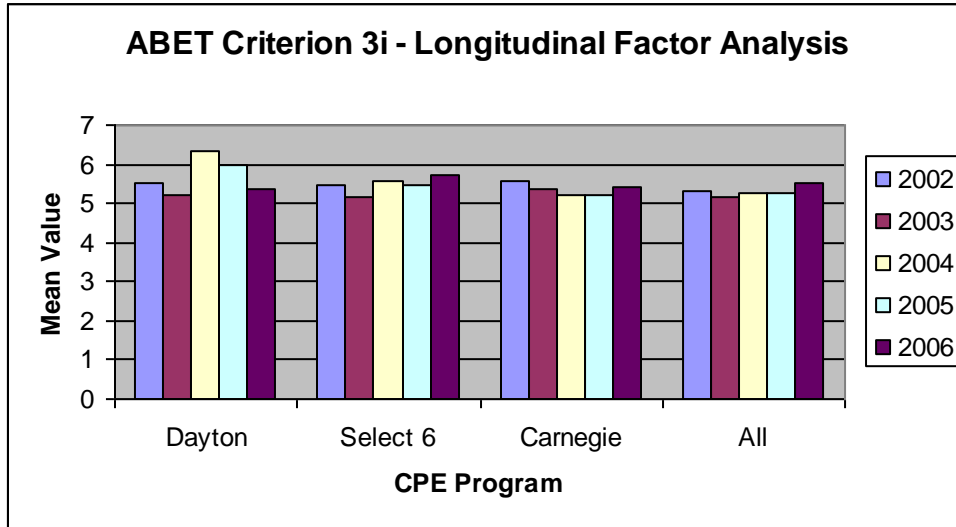
**Attachment 2: EBI Exit Survey Results - AY2005-06 - ABET Factor Analysis**

**Computer Engineering Program**









### Attachment 3: Instructor Comments and Recommendations

#### ECE-215: Introduction to Digital Design

- ❖ Students seemed prepared for the course.
- ❖ All prescribed material was covered.
- ❖ Outcome/measures are appropriate for the course.
- ❖ Classroom facilities were adequate.

#### ECE-215L: Digital Systems Laboratory

- ❖ Students seemed prepared for the course.
- ❖ All prescribed material was covered.
- ❖ Outcome/measures are appropriate for the course.
- ❖ Classroom facilities were adequate.
- ❖ We need to continue to upgrade this course.

#### ECE-301: Electronic Devices

- ❖ Revisit of the course assessment criteria is highly recommended. Please see the attached draft of proposed ECE 301 assessment. (FA05)
- ❖ Outcome/measures appropriate for class: Need to add questions to assess if the students have a better understanding of their ability to apply probability and statistics to engineering problems. (WI06)
- ❖ In design problems, add functional block diagrams, flow charts to show the design procedures, and power budgeting. (WI06)

#### ECE-301L: Electronic Devices Laboratory

- ❖ Assess prerequisite: Sometimes labs are not in sync with lectures, and students are poorly prepared because this course introduces electronics, and students are very new to it. (FA05)
- ❖ Course coverage of planned material: This lab instructor (MRC) has not taught the lecture portion of this course (ECE 301). Since Dr. Guliants was teaching the lecture class, the pace of in-class coverage conflicted often with lab experiments. Combining ECE 301 and 301L under the same instructor will alleviate this problem. (FA05)
- ❖ Combine lecture and lab under same instructor. (FA05)
- ❖ Give an adequate number of PSPICE and Matlab assignments with each lab. (FA05)
- ❖ A group presentation at the end is desirable. (FA05)
- ❖ Need to add questions to assess if the students improved their ability to communicate effectively through formal reports and presentations. (WI06)

#### ECE-302: Electronic Systems

- ❖ Assess prerequisite skills: Skills with complex numbers insufficient. (FA05)
- ❖ Course coverage of planned material: I believe I achieved about 75% - 80% of the target topics. Active filters were left out. (FA05)
- ❖ Outcome/measures appropriate for class: I believe the 2 mid-terms + 1 final + HW + project (not assigned during 1st offering, in Fall 2005) are adequate to measure the criteria sought. (FA05)

- ❖ Assess prerequisite skills (Where student is lacking): Skills with complex numbers insufficient. (WI06)
- ❖ Course coverage of planned material: I believe I achieved about 75% - 80 % of the target topics. Active filters were left out. (WI06)
- ❖ Outcome/measures appropriate for class: I believe the 2 mid-terms + 1 final + HW + project (not assigned during 1st offering, in Fall 2005) are adequate to measure the criteria sought. (WI06)
- ❖ The class response was below expectation this semester. Since I began with frequency response analysis before covering amplifiers and circuit analysis, it may be that the students did not develop the overall feel for where frequency response fits into device behavior. In any case, it appears that the labs and the course material may not have synchronized well enough, leading to negative student reaction. Also- I used some material from Horenstein instead of Sedra/Smith- this may have caused some change of flavor that students may not have reacted well to. (WI06)
- ❖ Recommendations: Better graphics skills are needed. Better skills with complex numbers. Ability to handle electronics problems beyond textbook. Stay close to the textbook. (WI06)

### ECE-302L: Electronic Systems Laboratory

- ❖ Assess prerequisite skills (Where student is lacking): Proficiency with complex numbers. (FA05)
- ❖ Course coverage of planned material: I believe the current range of lab experiments is reasonable in breadth. Small adjustments may be made here and there. (FA05)
- ❖ Recommendations: Combine lecture and lab under same instructor. Keep lab group sizes small . Give an adequate number of PSPICE and Matlab assignments with each lab. A group presentation at the end is desirable. Add a noise-analysis component in ECE 302 and/or ECE 302L. (FA05)
- ❖ Assess prerequisite skills (Where student is lacking): Proficiency with complex numbers. (WI06)
- ❖ Course coverage of planned material: I believe the current range of lab experiments is reasonable in breadth. Small adjustments may be made here and there (WI06)
- ❖ Lab response was much more positive than the course component. The main lesson is that a course that stays close to the textbook at this level will likely create better student response. (WI06)
- ❖ Recommendations: Combine lecture and lab under same instructor. Keep lab group sizes small. Give an adequate number of PSPICE and Matlab assignments with each lab. A group presentation at the end is desirable. Add a noise-analysis component in ECE 302 and/or ECE 302L. (WI06)

### ECE-314: Fundamentals of Computer Architecture

- ❖ Outcome (l) is not appropriate to this course. (FA05)

### ECE-334: Discrete Signals and Systems

- ❖ Assess prerequisite skills (Where student is lacking): Many of the students lack the necessary background knowledge on complex variable functions, complex number calculations and Fourier transforms. From the feedback I got in the class, many of them said that either they have never had this background knowledge or they haven't practiced for very long time. However, this may only apply to this particular group of students, since this was the "off-semester" group. (WI06)
- ❖ Outcome/measures appropriate for class: This is a relatively small class. There are always one or two students that did not do well in any of the homework sets. If I drop the 80% to 75%, then this group of class would have met the targets for measurements m(i) and m(ii). (WI06)
- ❖ Facilities adequate: A tablet computer may be helpful for examples and derivations during class. (WI06)



- ❖ **Recommendations:** It would be helpful to set aside at least one lecture at the beginning of the semester to review the mathematics on sequence manipulations, complex number and variables, and Fourier transform. (WI06)

#### **ECE-340: Engineering Probability and Statistics**

- ❖ I completely revised the ECE-211/315/316 sequence to create ECE-340 this term. I'm not sure the course went as smoothly as it could have been. Assessment results seemed to be down from when the courses were separated. In particular, I introduced new material in the areas of linear and polynomial regression, and Monte Carlo simulation. My end of term course assessment indicated that students weren't fully comfortable with this material, though homework problems indicated otherwise. Students also didn't seem too comfortable with the concepts of bivariate pdf's. I hope to smooth out the bugs during the next offering (FA05)
- ❖ All indicators are that the course went much more smoothly this term. I am still zeroing in on the material I need to cover, and the appropriate depth to which I should cover a few topics. For example I did not get to Wiener filter design this term, and I only covered thermal noise, noise figure and noise equivalent bandwidth on the last day. However, I have ideas on redundant material I can probably eliminate, and some discussions which I might shorten. The good news is that my presentations on Monte Carlo simulations seem to have gone very well this term. Getting that right was a central focus for me this term. (WI06)
- ❖ **Recommendations:** I need to further refine the course content, eliminate a few redundancies, and shorten some discussions. Otherwise all looks very good. (WI06)

#### **ECE-401L: Communication Systems Laboratory**

- ❖ **Circuit debugging skills could use improvement. Given that this is their final lab, I would expect lab groups to be able to debug their circuits independently. Many groups relied on instructor (and TA) to help. (FA05)**
- ❖ **Outcome/measures appropriate for class: Yes. I would like to increase the amount of open-ended design, but it is difficult since certain fundamentals also need to be reinforced. 7 out of 28 students scored less than 80% on Lab 4, primarily due to late or un-submitted reports. Since this is only a 1 credit hour course, students are more likely to submit late reports. I will try to establish a clear late policy to discourage late assignments. (FA05)**
- ❖ **Facilities adequate: OK. We could benefit from digital communications experimenter stations. Signal generators are cumbersome and spectrum analyzers are getting out-dated. (FA05)**

#### **ECE-431L: Multidisciplinary Design I**

- ❖ **The course in its present structure does not require students to complete focused assignments on any of the following topics; ethics in design, social impact of design, and contemporary issues related to design. Whilst these issues are an integral component of the decision analysis process used to evaluate and assess conceptual designs, they are included only when deemed appropriate by the design teams and/or the project sponsors. (FA05)**
- ❖ **Likewise the course survey does not directly address issues of the social impact of design, and contemporary issues related to design. (FA05)**
- ❖ **The survey data, although a self-reported competency, provides some rich data on the value of the course to students. This information is not currently used in the focused course outcome assessment plan.**
- ❖ **Recommendations: A review of the utility of the direct measures is necessary. If they are considered as essential components of the ELE and/or CPE program assessment plans, changes to the course requirements are necessary and should be negotiated with the MEE department. (FA05)**
- ❖ **The course in its present structure does not require students to complete focused assignments on any of the following topics; ethics in design, social impact of design, and contemporary issues related to design. Whilst these issues are an integral component of the decision analysis process used to evaluate and assess conceptual**

designs, they are included only when deemed appropriate by the design teams and/or the project sponsors. (WI06)

- ❖ Recommendations: A review of the utility of the direct measures is necessary. If they are considered as essential components of the ELE and/or CPE program assessment plans, changes to the course requirements are necessary and should be negotiated with the MEE department. (WI06)

#### **ECE-432L: Multidisciplinary Design II**

- ❖ Access prerequisite skills (Where student is lacking): Skills in developing flow charts, functional block diagrams, and prototype development (WI06)

#### **ECE-444: Advanced Digital Design**

- ❖ Covered all planned material. Will need to emphasize the instrumentation portions in the future to correct what seems to be a marginal capability to conduct measurements.
- ❖ Outcome (o) is not appropriate for this class. Move to ECE-449.
- ❖ Moving to the DE-2 board will increase our capabilities in this class.

#### **ECE-445: Signal Processing**

- ❖ Access prerequisite skills: Students who did not take ECE-203 were at a major disadvantage. I would have expected student's in ECE334 Discrete Signals and Systems to have done some practical applications of DSP. (FA05)
- ❖ Be sure to conduct ABET survey. There may be an error regarding the outcomes for ECE-445 in the ECE graduation competencies document (or inconsistencies). (FA05)

#### **ECE-446: Microelectronics Systems Design**

- ❖ Facilities adequate: Lack of DRC checker in AWR Suite was a problem. Hopefully this will be rectified by the Analog Office

#### **ECE-449: Computer Systems Engineering**

- ❖ No course assessment form is available for this course.

#### **CPS-418: Software Engineering**

- ❖ No course assessment form is available for this course.

#### **CPS-444: Systems Programming I**

- ❖ No course assessment form is available for this course.

#### **MTH-343: Engineering Mathematics**

- ❖ No course assessment form is available for this course.

#### **PHL-316: Engineering Ethics**

- ❖ No course assessment form is available for this course.

**PHL- 319: Information Ethics**

- ❖ No course assessment form is available for this course.

## Attachment 4: Process Activity Summary

### School of Engineering, Assessment and Continuous Improvement Committee:

#### Department Representatives:

Malcolm W. Daniels (ELE)

John Loomis (CPE)

#### Meeting Schedule and Minutes:

<http://quickplace.udayton.edu/QuickPlace/aci/Main.nsf>

#### Summary of Accomplishments:

#### Summary of Accomplishments:

- ❖ **Uniform Assessment Processes and Schedule:** The committee spent some time reviewing the assessment plans and processes of each undergraduate department outlined in the documents defining the respective program *Graduation Competencies – Definition and Assessment*, submitted to the Competencies Subcommittee of the Academic Senate in the winter semester of 2005. The committee consensus was that there was sufficient uniformity between departments and no changes were necessary at this time. The processes will be reviewed by the committee at a later date following completion of an annual assessment cycle(s). [Minutes of 11-22-06]
- ❖ **Uniform Course Assessment Form:** The draft version of the Uniform Course Assessment Form was used to collect program outcome assessment data for the Fall 2005 and Winter 2006 semesters in departments using course-based, direct outcome measures. For the ELE and CPE programs, course assessment forms were prepared for focused-outcome courses as required by the ELE and CPE assessment plans. These forms are available at: <http://quickplace.udayton.edu/QuickPlace/ece2004/main.nsf>
- ❖ **Annual Report Requirements:** Draft outcome assessment reports will be prepared for review by the committee. The CME Annual Assessment Report was reviewed although no specific structure was adopted for these draft reports.
- ❖ **Review and Discussion of Institutional Assessment Issues:** The committee reviewed data from the National Survey of Student Engagement (NSSE) study. Additionally, the committee reviewed and discussed the preparations for the forthcoming NCA assessment review. The ABET 2004 Self-Study documents and reports are included in the NCA assessment materials.
- ❖ **Review and Discussion of Assessment Data Sources:** The committee reviewed and discussed data sources used for program outcome assessment and objective evaluation. This academic year we will conduct the following EBI surveys; Exit Survey of Graduating Seniors, Alumni Survey and the Alumni Employer Survey.
- ❖ **Review of Graduate Program Assessment:** Following a review of March 2003 Graduate Program Review, the committee began work on plans for a periodic review of MS and PhD programs.



**Attachment 6: Proposed Revisions based of ACI report for AY2005-06.**

**[Changes to the ECE Program Outcome Course Mappings are highlighted in red.]**

**ECE Program Outcome Course Mapping – AY2006-07**

The following program outcomes are defined and published in accordance with our ABET Assessment Plan. These outcomes are directly measurable, are demonstrated by our students at or before graduation, and guarantee achievement of our program educational objectives. Outcomes l, m, n, and o correspond to ABET Criterion 8 to support the ABET professional criteria requirements.

<b>Program Outcome</b>	
a	Our graduates will have the ability to apply knowledge of mathematics, science and engineering. [QRC]
b	Our graduates will have the ability to design and conduct experiments, as well as to analyze and interpret data. [QRC]
c	Our graduates will have the ability to design a system, component, or process to meet desired needs. [QRC]
d	Our graduates will have the ability to function on multi-disciplinary teams. [RWC, CC]
e	Our graduates will have the ability to identify, formulate, and solve engineering problems. [QRC]
f	Our graduates will have an understanding of professional and ethical responsibility.
g	Our graduates will have an ability to communicate effectively. [CC, RWC]
h	Our graduates will have the broad education necessary to understand the impact of engineering solutions in a global and societal context.
i	Our graduates will have a recognition of the need for, and an ability to engage in life-long learning. [ILC]
j	Our graduates will have knowledge of contemporary issues. [ILC]
k	Our graduates will have an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. [QRC, ILC]
l	Our graduates will have an understanding of probability and statistics and the ability to apply probability and statistics to engineering problems. [QRC]
m	Our graduates will have knowledge of discrete mathematics including formal proofs, Boolean algebra, and discrete signal representations and transforms. [QRC]
n	Our graduates will have participated in a major design activity.
o	(CPE only) Our graduates will have an understanding of the hardware/software integration process and an ability to conduct hardware/software integration.

**Mapping of CPE Curriculum to Program Outcomes.**

Course No.	Course Title		ECE Program Outcomes															
			a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	
EGR 101	Introduction to Engineering Design	Semesters 1 and 2						x		x	x	x						
ECE 101	Introduction to ECE							X	x	X	x	X						
PHL 103	Introduction to Philosophy									x								
HST 101/102/198	History of Western Civilization										x							
CHM 123	General Chemistry			x														
MTH 168-9	Calculus I, II			x														
ENG 101-2/114/198	English Composition I, II									x								
REL 103	Introduction to Religion										x							
CPS 150	Algorithms and Programming I			x		x		x										
PHY 206	General Physics			x														
PHY 210L	General Physics Laboratory I			x														
ECE 201	Circuit Analysis		Semester 3	x				x				x		x				
ECE 201L	Circuit Analysis Laboratory				x	x		x	x		x		x		x			
MTH 218	Calculus III																	
CPS-151	Algorithms and Programming II			x	x	x		x						x				
CMM 110	Group Decision Making						X	x		x								
ECE 202	Signals & Systems	Semester 4	x		x		x		x		x		x		X			
ECE 202L	Signals & Systems Laboratory			x	X	x	x	x	x	x		x		x				
ECE 203	Introduction to Matlab Programming			x	x	x		x						X				
ECE 215	Introduction to Digital Systems			x		x		x		x		x		x		X		
ECE 215L	Digital Systems Laboratory			x	X	x	x	x		x		x		x				
PHY 232	Wave Phenomena for Engineers			x														
MTH 219	Applied Differential Equations			x														
ECE 340	Engineering Probability and Statistics	Semester 5	x				x				x		x	X	X			

Course No.	Course Title		ECE Program Outcomes														
			a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
PHL 319	Information Ethics																
ECE 301	Electronic Devices		x		x		x				x		x	X			
ECE 301L	Electronic Devices Laboratory		x	x	x	x	x		X		x		X				
ECE 334	Discrete Signals		X		x		x				x		x			X	
CPS 350	Data Structures		x	x	x		x						x				
CMM 111 or 112	Informative/Persuasive Pub. Speaking	Semester 6								X							
ECE 302	Electronic Systems		X		x		X				x		x				
ECE 302L	Electronic Systems Laboratory		x	x	X	x	x		X		x		X	x			
CPS 346	Operating Systems		x	x	x		x		x		x		x				x
ECE 314	Fund. of Computer Architecture		x				X				x		x		X		
CMM 113	Interviewing										x						
MTH 343	Engineering Mathematics		x				x				x		x			X	
ECE 431L	Multidisciplinary Engr. Design I		Semester 7	x	x	x	X	x	x	x	x	x	X	x			
EGM 213	Statics and Mechanics																
ECE 444	Advanced Digital Design	x		X	X		x	X	x		X		X				X X
CPS 418	Software Engineering	x		x	x	x	x	X	x				x				x
CPS 444	Systems Programming	x		x	x	x	x		X				X				X X
ECE 432L	Multidisciplinary Engr. Design II	Semester 8	x	x	x	X	x	X	X	X	X	X	x				X
ECE 449	Computer Systems Engineering		x	X	X		x	x	X		X		X	x			X X

x – Indicates that this program outcome is directly addressed in this course.  
**X** – Indicates that this program/course outcome measurement is used for annual program outcome assessment purposes.



**Mapping of the ELE Curriculum to Program Outcomes.**

Course No.	Course Title		ECE Program Outcomes														
			a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
EGR 101	Introduction to Engineering Design	Semesters 1 and 2						x		x	x	x					
ECE 101	Introduction to ECE							X	x	X	x	X					
PHL 103	Introduction to Philosophy									x							
HST 101/102/198	History of Western Civilization										x						
CHM 123	General Chemistry		x														
MTH 168-9	Calculus I, II		x														
ENG 101-2/114/198	English Composition I, II									x							
REL 103	Introduction to Religion										x						
CPS 132	Comp. Prog. For Engr. and Science		x		x		x										
PHY 206	General Physics		x														
PHY 210L	General Physics Laboratory I	x															
ECE 201	Circuit Analysis	Semester 3	x				x			x		x					
ECE 201L	Circuit Analysis Laboratory		x	x		x	x		x		x		x				
MTH 218	Calculus III																
CMM 110	Group Decision Making					X	x		x								
ECE 202	Signals & Systems	Semester 4	x		x		x		x		x		x		X		
ECE 202L	Signals & Systems Laboratory		x	X	x	x	x	x	x		x		x				
ECE 203	Introduction to Matlab Programming		x	x	x		x						X				
ECE 215	Introduction to Digital Systems		x		x		x		x		x		x		X		
ECE 215L	Digital Systems Laboratory		x	X	x	x	x		x		x		x				
PHY 232	Wave Phenomena for Engineers		x														
MTH 219	Applied Differential Equations		x														
ECE 340	Engineering Probability and Statistics		x				x				x		x	X	X		
PHL 319	Information Ethics	Semester 5															
ECE 301	Electronic Devices		x		x		x				x		x	X			

Course No.	Course Title		ECE Program Outcomes														
			a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
ECE 301L	Electronic Devices Laboratory		x	x	x	x	x		X		x		X				
ECE 334	Discrete Signals		X		x		x				x		x		X		
ECE 332	Electromagnetics		x		x		x					x	x				
CMM 111 or 112	Informative/Persuasive Pub. Speaking								X								
ECE 302	Electronic Systems	Semester 6	X		x		X				x		x				
ECE 302L	Electronic Systems Laboratory		x	x	X	x	x		X		X		X	x			
ECE 333	Appl. Electromagnetics		x		x		x		X		x		x				
ECE 314	Fund. of Computer Architecture		x				X				x		x	X			
CMM 113	Interviewing								X								
MTH 343	Engineering Mathematics		x				x				x		x		X		
ECE 431L	Multidisciplinary Engr. Design I	Semester 7	x	x	x	X	x	x	X	x	x	X	x			X	
ECE 415	Control Systems		x		X		x				x		x	x			
ECE 401	Communication Systems		x		x		x	x		X	x	x	x	X			
ECE 401L	Comm. Sys. Lab		x	X	X		x		X		x	x	x				
ECE 444	Advanced Digital Design		x	X	X		x	X	x		X		X			X	X
ECE 432L	Multidisciplinary Engr. Design II	Semester 8	x	x	x	X	x	X	X	X	X	X	x			X	
ECE 446	Microelectronics Design				x	x					x		x			x	
ECE 445	Signal Processing		X	x	x		X				x	x	X				

x – Indicates that this program outcome is directly addressed in this course.

X – Indicates that this program/course outcome measurement is used for annual program outcome assessment purposes.