ABET Compliance Tracking System (ACTS)

Electrical and Computer Engineering Department at Binghamton University

Stephen Zahorian
Douglas H. Summerville
Scott Craver
Michael Elmore

BINGHAMTON UNIVERSITY
STATE UNIVERSITY OF NEW YORK
Thomas J. Watson School of Engineering and Applied Science

Outline

- **Introduction**
- **ABET Compliance Tracking System**
  - Development
  - Features
  - Implementation
- **Outcome Assessment**
  - Assessment Process
  - Analysis of Qualitative/Quantitative Data
  - Assessment Improvements
- **Conclusion**

INTRODUCTION

Introduction

- Accreditation Board for Engineering and Technology (ABET) Engineering Criteria 2000 (EC2000)
- Documentation of Program Outcomes[1] a – k under Criteria 3
- Organization and technology to reduce time needed for self-assessment process
- WEB hosted database – ABET Compliance Tracking System (ACTS)

[1]Program Outcomes are Student Outcomes starting with the 2011-2012 Accreditation Cycle.

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ABET Compliance Tracking Tool
Development

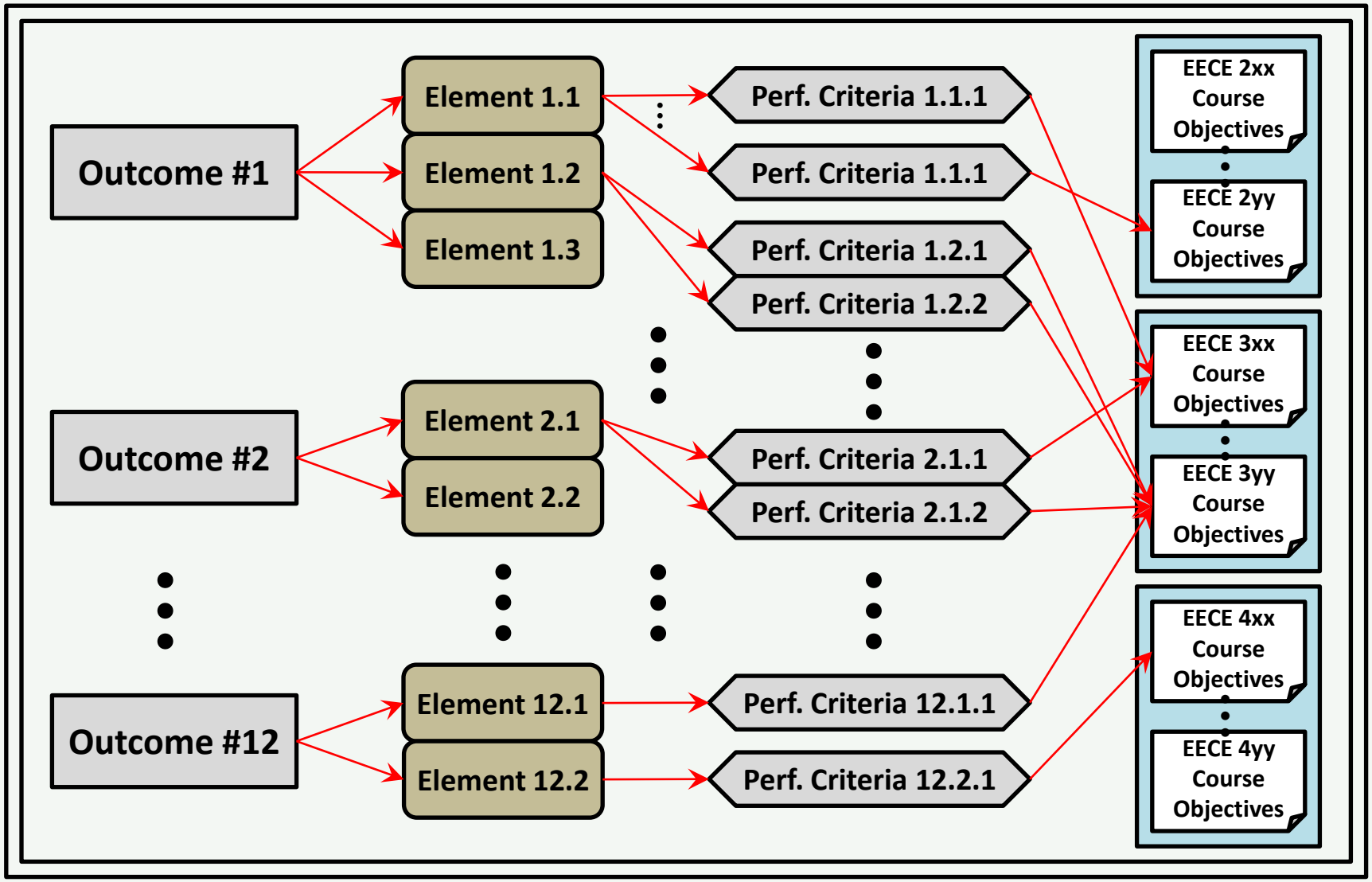
- Steps in development of ACTS
  1. Define Program Outcomes
     - Outcomes account for each a – k outcome
     - Plus additional selected outcomes
  2. Assign "Meaning" and define essential "Elements" for each Program Outcome
  3. Decompose each "Element" into "Performance Criteria"
     - Performance Criteria correspond to specific course objectives in the curriculum

ABET Compliance Tracking Tool
Features

outcome	**CoE-11** The ability to use techniques, skills, and modern tools necessary for computer engineering practice.
Meaning and Elements	Techniques are methodologies used to accomplish engineering tasks. Skills are actions used to accomplish engineering tasks. Tools are hardware and software used to accomplish engineering tasks. Attributes: **CoE-11-1** the application of techniques used in the practice of computer engineering **CoE-11-2** the application of skills used in computer engineering **CoE-11-3** the application of modern tools (which includes software packages and laboratory equipment) required for the practice of computer engineering
Performance Criteria	**CoE-11-1-1 (EECE301)** Use Fourier series to determine the response of a continuous-time, linear time-invariant system to a periodic input. **CoE-11-1-2 (EECE351)** Use an IEEE standard hardware description language (HDL) to describe combinational and sequential circuits. **CoE-11-2-1 (EECE352)** Convert real numbers to/from the IEEE 754 standard format, determine the result of basic arithmetic operations on floating point numbers, and describe the reason for errors resulting from side-effects of fixed precision. **CoE-11-2-2 (EECE351)** Use the algorithmic state machine model to specify a complex sequential circuit. **CoE-11-3-1 (EECE315)** Use circuit simulation software to obtain dc- and transient response of electronic circuits as a part of circuit analysis and design verification **CoE-11-3-2 (EECE351)** Implement a synchronous sequential circuit using a programmable logic device (PLD) and industry standard CAD tools.

- Sample Program Outcome, its Meaning and Elements, and Performance Criteria

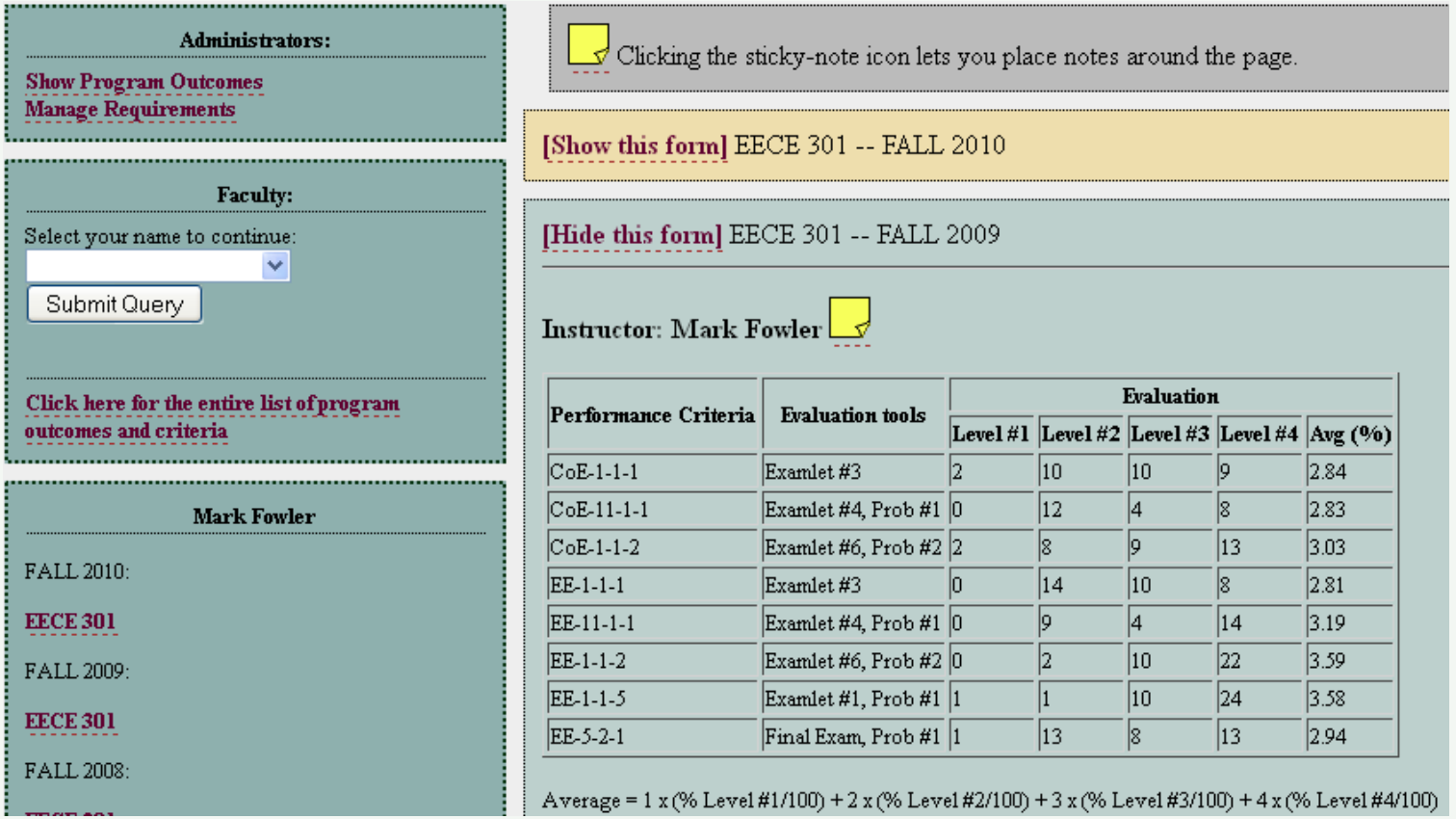
ABET Compliance Tracking Tool
Development



ABET Compliance Tracking Tool
Features

- Quantitative Assessments
  - Instructor evaluation of student performance via exams, quizzes, project reports, and presentations
    - Work samples collected to support assessment
  - Entry of "Levels" of performance into ACTS
    - Level 1 – Unacceptable performance (~D or ~F)
    - Level 2 – Minimal performance (~C)
    - Level 3 – Good performance (~B)
    - Level 4 – Mastery performance (~A)

ABET Compliance Tracking Tool
Features



Administrators:

Show Program Outcomes
Manage Requirements

Faculty:

Select your name to continue:

Submit Query

Click here for the entire list of program outcomes and criteria

Mark Fowler

FALL 2010:

EECE 301

FALL 2009:

EECE 301

FALL 2008:

Clicking the sticky-note icon lets you place notes around the page.

[Show this form] EECE 301 -- FALL 2010

[Hide this form] EECE 301 -- FALL 2009

Instructor: Mark Fowler

Performance Criteria	Evaluation tools	Evaluation				
		Level #1	Level #2	Level #3	Level #4	Avg (%)
CoE-1-1-1	Examlet #3	2	10	10	9	2.84
CoE-11-1-1	Examlet #4, Prob #1	0	12	4	8	2.83
CoE-1-1-2	Examlet #6, Prob #2	2	8	9	13	3.03
EE-1-1-1	Examlet #3	0	14	10	8	2.81
EE-11-1-1	Examlet #4, Prob #1	0	9	4	14	3.19
EE-1-1-2	Examlet #6, Prob #2	0	2	10	22	3.59
EE-1-1-5	Examlet #1, Prob #1	1	1	10	24	3.58
EE-5-2-1	Final Exam, Prob #1	1	13	8	13	2.94

Average = 1 x (% Level #1/100) + 2 x (% Level #2/100) + 3 x (% Level #3/100) + 4 x (% Level #4/100)

- Screenshot taken from ACTS showing quantitative performance data entered by an instructor

ABET Compliance Tracking Tool
Features

- Qualitative Assessments
  - Instructor evaluation of student preparedness
    - Includes changes observed from previous semesters
  - Instructor evaluation of student achievement and suggestions for improvements
  - Undergraduate Studies Committee feedback to instructor

ABET Compliance Tracking Tool
Features

Comments on student preparedness:

The students seemed very well compared to previous years. They were very comfortable working with basic logic principles and took to the more advanced topics with ease. No prerequisite knowledge was missing. Specific improvements over previous years included ability to work with k-maps and working with VHDL. I have no recommendations for the USC for improvements.

Comments and recommendations for the course:

I thought the course objectives were all met adequately. The objective "CoE-11-2-2 Use the algorithmic state machine model to specify a complex sequential circuit." was not covered exactly as it was in the past. Instead of the ASM model, I used a newer model that merges the FSM graph of a controller with the datapath RTL assignments labeled on each state. This model is closer to the final hardware configuration snd is close to what the students extract from the ASm model. I recommend the course objective be changed to "CoE-11-2-2: Use advanced sequential circuit models and representations to specify a complex sequential circuit". The other objective that was not met as well as the others was the first part of "CoE-2-1-1: Select test vectors and verify the operation of a digital circuit design using 1) an industry standard simulation tool; and 2) bench tools." The software used in the lab was upgraded and the new version dropped the simulator we have used in the past. The students did select test vectors and use bench tools, but performed manual testing of the circuits and did not do much simulation. This was communicated to the downstream course (EECE359) and the students are using ModelSim in that course to simulate their circuits. The robotic car platform was used for the first time in this course. The students really seemed to enjoy working with the platform, despite that the cars were rarely taken off the Lab benches. Next year I hope to build a course on which the robots can operate. The student's course projects were much more advanced than in the past. Most of the students wanted to implement video games instead of working with the robot (only one project used the robot).

Comments from USC:

The USC agrees with the suggested change to the wording of course objective COE-11-2-2 and has made the change.

- Screenshot taken from ACTS showing qualitative data entered by an instructor

ABET Compliance Tracking Tool
Implementation

- MySQL database backend, fronted by server-side PHP scripts
  - Database normalized to 3rd normal form (3NF)
    - Tables to describe instructors, courses, course sections, Program Outcomes, Meanings, Elements, Performance Criteria, & course performance data
- Human Factors
  - No additional training required
  - Minimization of mouse clicks
  - Ease of updates with backward compatibility

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OUTCOME ASSESSMENT

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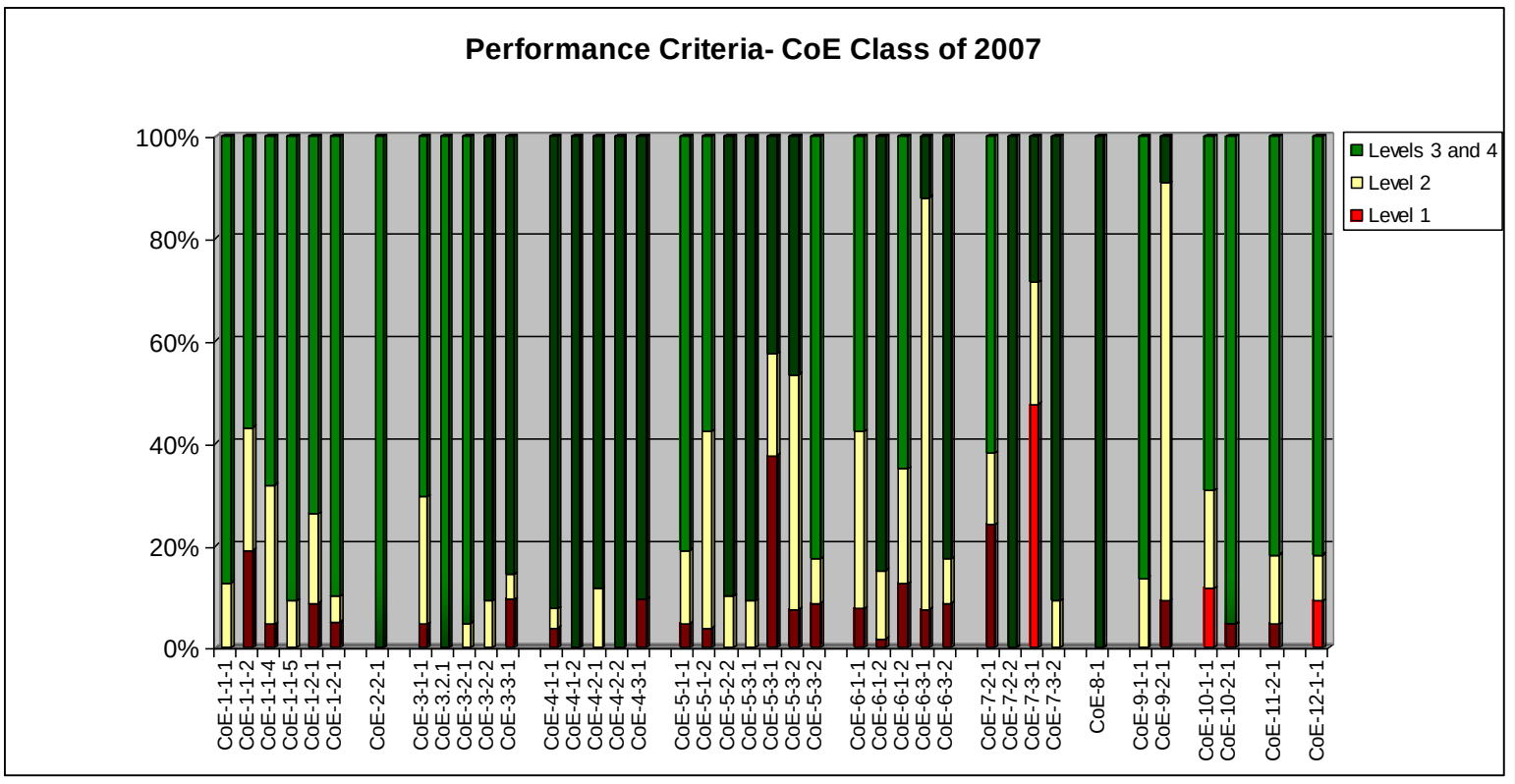
Outcome Assessment
Process

- 4 step assessment process
  1. Start of semester
     - Instructors directed to ACTS site to find Performance Criteria and assessment directions
  2. During semester
     - Instructors document Performance Criteria
  3. End of Semester
     - Instructors complete quant. /qual. assessments
  4. Beginning of next semester
     - Undergraduate Studies Committee reviews assessments and makes recommendations



- Sample of Summarized assessment data from Fall 2005 for the CoE Class of 2007.

Outcome Assessment
Improvement

- Assessment process improvements are made easily
- As result of last ABET visit collection of assessment data was made more efficient, uniform, and effective
  - Enabling instructors to directly contribute to assessment of Program Outcomes
  - Ensuring sufficient assessment of all Program Outcomes
  - Changes made in fewer than 8 hours

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CONCLUSION

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Conclusion

- Motivation for the ABET Compliance Tracking System (ACTS)
- Description of the development, features, and implementation of ACTS
- Description of Program Outcome assessment process, analysis, and improvements

- ACTS contact – Scott Craver
  scraver@binghamton.edu

Thank you

Any questions?