Expected Outcome 1: Analytical, Computational and Experimental Practices

Be able to integrate systems using appropriate analytical, computational and experimental practices.

Assessment Method 1: EBI Survey

Assessment Method Description

Each spring semester, all of our graduating seniors for May, August, and December are given a nationally administered EBI Engineering Student Survey. Students use a scale of 1-7 (7 is best) to rate their accomplishments of each of our program outcomes. Some of the outcomes are covered by multiple questions. For this first-time detailed analysis of the EBI survey from May 2012, we simply compare the percentage of our students that scored 5-7 compared to the percentage for all AU engineering students that answered these questions.

Findings

The EBI survey used three separate questions that assess this outcome: OQ2: How well were you able to apply your knowledge of probability and statistics in your engineering classes and design project(s)? OQ4: How well were you able to apply your knowledge of computer programming in your engineering classes and design project(s)? OQ5: How well were you able to apply your knowledge of computer-based engineering tools (spreadsheet, simulation, CAD, MATLAB, etc.) in your engineering classes and design project? The findings are below:

OQ2: 95.7% of our 23 students scored 5 or 7 compared to 61.0%
OQ4: 81.6% of our 23 students scored 5 to 7 compared to 79.2%
OQ5: 92.1% of our 23 students scored 5 to 7 compared to 86.7%

for the approximately 450 total engineering students that answered these three questions.
How did you use findings for improvement?

We are satisfied with the results from OQ2 and OQ5. However, OQ4 needs to be addressed. These results from the survey are not a surprise since faculty teaching our upper level courses where programming assignments are given believe that our students are not properly prepared with programming expertise. In 2008 a new programming class was developed with Computer Science specifically for ISE students. However, our results still indicate a problem. To that end, two of our faculty members developed a set of “course modules” that involved domain-specific programming assignments, solutions, and teaching materials that were integrated into our curriculum. Modules were developed for 8 key IE courses in our curriculum (3020, 3400, 3410, 3420, 3600, 3700, 4330, and 4700) and these modules were included in the courses for a minimum of 2 years.

Additional Comments

This outcome will not be used any longer as we are synchronizing the outcomes in this report with our ABET outcomes.

Expected Outcome 2: Apply Math, Science and Engineering

An ability to apply knowledge of mathematics, science, and engineering

Assessment Method 1: EBI Survey

Assessment Method Description

Each spring semester, all of our graduating seniors for May, August, and December are given a nationally administered EBI Engineering Student Survey. Students use a scale of 1-7 (7 is best) to rate their accomplishments of each of our program outcomes. Some of the outcomes are covered by multiple questions. For this first-time detailed analysis of the EBI survey from May 2012, we simply record our score vs. the mean score for all AU engineering students that answered these questions.

Findings

The EBI survey used three separate questions to assess this outcome, one question each for the ability to apply math, science, and engineering. Our 23 students that answered the survey scored 6.34, 5.18, 6.45 compared to 6.03, 5.77, 6.25 respectively for the approximately 450 total engineering students that answered these questions.

How did you use findings for improvement?

We want to evaluate one more year’s data before making any recommendations or changes.

Additional Comments

None.
**Expected Outcome 3: Communicate Effectively**

An ability to communicate effectively

**Assessment Method 1: EBI Survey**

**Assessment Method Description**

Each spring semester, all of our graduating seniors for May, August, and December are given a nationally administered EBI Engineering Student Survey. Students use a scale of 1-7 (7 is best) to rate their accomplishments of each of our program outcomes. Some of the outcomes are covered by multiple questions. For this first-time detailed analysis of the EBI survey from May 2012, we simply record our score vs. the mean score for all AU engineering students that answered these questions.

**Findings**

The EBI survey used two separate questions to assess this outcome, one question for oral communication and one question for written communication. Our 23 students that answered this survey scored 5.84 and 6.11 compared to 5.63 and 5.84 respectively for the approximately 450 total engineering students that answered these questions.

**How did you use findings for improvement?**

Our students scored higher on average than the other engineering students at AU. No actions are planned at this time.

**Additional Comments**

None

**Assessment Method 2: Grades for Oral Presentation in INSY 4330**

**Assessment Method Description**

Student teams of senior level students are required to give an oral presentation in INSY 4330 Quality Control in Fall 2012. The rubric consists of format (1/5), communication skills (1.5/5), content presented (2/5), and storyboard and time requirements (0.5/5). All students on the team are required to give part of the presentation and each student receives a separate grade. Here is a copy of the actual rubric:

**Presentation:**

Format: (Proper/descriptive slide titles, correct template use, good organization/flow of content)
SCORE __________ OUT OF 20

Communication Skills: (good eye contact, engaged with the audience, sound response to Q&A, all members participate/knowledgeable in Q&A session)

SCORE __________ OUT OF 30

Content Presented: (brief introduction/ highlight major findings/ thorough explanation of methods and analysis)

SCORE __________ OUT OF 40

Other: (Submitted storyboard, met time requirements: 12 minutes (9 minutes talk, 3 minutes Q&A))

SCORE __________ OUT OF 10

Total Presentation Score: __________ OUT OF 100 (5% of course grade)

Very Important:

1. All groups must participate (speak) in the presentation

1. (-2% of the course grade if you do not attend any presentation without being excused)

2. No cheat sheets/note cards should be used during the presentation

3. Format: must use provided PowerPoint template or Prezi

4. Must submit a storyboard by Nov 16th

1. Brief outline that will summarize the presentation

5. Must submit FINAL presentation by midnight Nov 26th (your presentation order is based on a random number generator)

6. Your presentation will be recorded and each time will receive a copy for their reference.
Findings

All of the grades are out of 5 points. Two (2) students received 0, 6 students received 3, 6 students received 4.4, 1 student received 4.5 and 50 students received 5.

How did you use findings for improvement?

76% of the students received 5/5 points. We want to evaluate one more year’s data before making any recommendations or changes.

Additional Comments

None.

Assessment Method 3: Grades for Oral Presentation in INSY 4800

Assessment Method Description

Student teams of senior level students are required to give an oral presentation in INSY 4800 Senior Design. The students are graded on a 100 point scale. Every student on the team must present, but the team receives an aggregate grade.

Findings

There were 12 teams in Spring 2013; the 12 teams received the following grades: 83, 84, 85 (2), 86, 89 (2), 90 (2), 91, 94, 95 with an average of 88.4.

How did you use the findings for improvement?

We want to evaluate one more year’s data before making any recommendations or changes.

Additional Comments

None.

Expected Outcome 4: Contemporary Issues

A knowledge of contemporary issues.

Assessment Method 1: EBI Survey

Assessment Method Description

Each spring semester, all of our graduating seniors for May, August, and December are given a nationally administered EBI Engineering Student Survey. Students use a scale of 1-7 (7 is best) to rate their accomplishments of each of our program outcomes. Some of the outcomes are covered by multiple questions. For this first time detailed analysis of the EBI survey from May
2012, we simply record our score vs. the mean score for all AU engineering students that answered the question.

Findings

Our 23 students that answered the survey scored 5.26 compared to 5.35 for the approximately 450 total engineering students that answered this question.

How did you use findings for improvement?

We want to evaluate one more year’s data before making any recommendations or changes.

Additional Comments

None.

Expected Outcome 5: Design Experiments

An ability to design and conduct experiments, as well as to analyze and interpret data

Assessment Method 1: EBI Survey

Assessment Method Description

Each spring semester, all of our graduating seniors for May, August, and December are given a nationally administered EBI Engineering Student Survey. Students use a scale of 1-7 (7 is best) to rate their accomplishments of each of our program outcomes. Some of the outcomes are covered by multiple questions. For this first-time detailed analysis of the EBI survey from May 2012, we simply record our score vs. the mean score for all AU engineering students that answered the question.

Findings

The EBI survey used three separate questions to assess this outcome, one question for designing experiments, one question for conducting experiments, and one question for analyzing and interpreting data. Our 23 students that answered the survey scored 5.82, 5.79, 6.61 compared to 5.75, 5.74, 6.08 respectively for the approximately 450 total engineering students that answered these questions.

How did you use findings for improvement?

We want to evaluate one more year’s data before making any recommendations or changes.

Additional Comments

None.

Assessment Method 2: Grades on a Work Sampling Study Assignment in INSY 3021
Assessment Method Description

This assignment was given in the class INSY 3021; it involves designing a personal work sampling experiment. The assignment was worth 100 points: 30 points for the generation of random observation times, 50 points for presentation of the results and 20 points for formatting/appearance of the report. Here is the assignment:

INSY 3021 Homework 2

Self-Observation using Work Sampling

This is an individual homework assignment worth that will be graded on a 100 point scale. You will conduct a personal work sampling study to determine how much time you spend on various activities over a three week period (21 days) covering 24 hours per day. You may start any time from now as long as you finish and turn in your report by April 21 at 11:00 p.m. That means the latest you can start to record observations is March 30.

You may use the model contained in section 14.8 of your text for the university professor as a guide. You should choose your own activities (minimum of 8), have an average of 2 observations per hour, and include sleeping as one of your activities. You don't need to observe yourself sleeping. If you were sleeping when your observation time(s) occurred, simply record that as “sleeping” at your next opportunity. You may use the form similar to Figure 14.13 on p. 578, but you must submit it electronically (pdf or Excel) to Canvas. You should show your actual observation times and which activity you observed for each observation for each day. Make sure you generate your observation times using random numbers. Describe your method for generating your observation times somewhere on the sheet/form that you submit. Also, from your study, show your percent results and your 95 percent confidence interval for each of your activities.

Findings

The average grade was 99.2% for the students that submitted the assignment.

How did you use findings for improvement?

The students did very well on this assignment. Their feedback was that they enjoyed the assignment and it told them a lot about how they spend their time. This assignment will be repeated in future classes as it clearly helps teach the students how to conduct a work sampling experiment.

Additional Comments
Assessment Method 3: Design a Simulation Experiment

Assessment Method Description

A homework assignment is given to measure the ability of the student to design a computer simulation model of a queuing system using a spreadsheet such as Excel.

Findings

This assessment wasn't audited during 2012-13.

How did you use the findings for improvement?

Additional Comments

Expected Outcome 6: Design system, component or process

An ability to design a system, component, or process to meet desired needs.

Assessment Method 1: EBI Survey

Assessment Method Description

Each spring semester, all of our graduating seniors for May, August, and December are given a nationally administered EBI Engineering Student Survey. Students use a scale of 1-7 (7 is best) to rate their accomplishments of each of our program outcomes. Some of the outcomes are covered by multiple questions. For this first-time detailed analysis of the EBI survey from May 2012, we simply record our score vs. the mean score for all AU engineering students that answered the question.

Findings

Our 23 students that answered the survey scored 6.16 compared to 5.88 for the approximately 450 total engineering students that answered this question.

How did you use findings for improvement?

We are satisfied with this score; we want to evaluate one more year’s data before making any recommendations or changes based on this assessment.

Additional Comments

None.

Assessment Method 2: Grades in Senior Design

Assessment Method Description
Each spring semester, our seniors are formed into teams of 4-6 students and assigned a culminating capstone project at a partner or company. The students must design an improvement for a system, component, or process to meet the desired needs of the customer. The course is rigorous and is basically equivalent to a project that a new engineer might be assigned in the first 1-3 years of employment with a company. The student work is graded by two faculty members as well as the company.

Findings

There were 43 As, 20 Bs, and 1 C in the Spring 2012 offering of this class

How did you use findings for improvement?

Even though our students performed very well, we continue to improve the course offering. For example, in the last several years, we have added a poster presentation session to the faculty and alumni council as part of the requirements of the course. We use faculty and company input each year to improve the course.

Additional Comments

None.

Assessment Method 3: Design a process in INSY 3021

Assessment Method Description

The students are given an assignment to develop a method and a labor standard for donning and doffing an article of clothing. The assignment is worth 100 points: 50 points for the method, 30 points for the time study, and 20 points for presentation. This is the assignment:

INSY 3021 Lab 1 (100 points)

Don and Doff an Article of Clothing

This lab is an individual lab assignment. You must do all of your own work except that your partner may take photographs and time you.

7. Individual: Choose an article of clothing such as a jacket, vest, etc. If you don’t have a jacket or vest, ask your instructor or TA for approval to substitute another article. Partners may not use the same article of clothing.

8. Individual: Design the method you will use to don and doff the clothing and document it in writing on a piece of paper. Ask your TA to sign off on your method and for a partner.

9. Individual: Practice the method at least 5 times (5 dons and 5 doffs) or until you can perform the operation smoothly without error.
10. With a partner: You perform 30 trials (30 dons and 30 doffs) and your partner records the times for each.

11. Individual: Calculate the mean and standard deviation of the dons and doffs.

12. Individual: Submit your finished document to Canvas by the deadline. It should look something like the example below (notice formatting is professional). This example shows the doffing process only but your assignment is to show donning and doffing.

Rubric: Method (50 points), Time Study (30 points), Presentation (20 points).

Findings

The average grade for this assignment was 94.5.

How did you use the findings for improvement?

This is the first lab assignment given to this class (the first sophomore major class in our program). The grades show that the students understand the assignment and are able to perform the design.

Additional Comments

Expected Outcome 7: Function on Teams

An ability to function on multi-disciplinary teams

Assessment Method 1: EBI Survey

Assessment Method Description

Each spring semester, all of our graduating seniors for May, August, and December are given a administered EBI Engineering Student Survey. Students use a scale of 1-7 (7 is best) to rate their accomplishments of each of our program outcomes. Some of the outcomes are covered by multiple questions. For this first-time detailed analysis of the EBI survey from May 2012, we simply record our score vs. the mean score for all AU engineering students that answered the question.

Findings

Our 23 students that answered this question scored 5.76 compared to 5.51 for the approximately 450 total engineering students that answered this question.

How did you use findings for improvement?

We are satisfied with this rating. We want to evaluate one more year’s data before making any recommendations or changes based on this assessment.
Additional Comments

None.

Assessment Method 2: Team project in ENGR 1110

Assessment Method Description

Students work within a team of 4-5 students to design a production model paper airplane that meets statistical quality control performance goals. The team must optimize the manufacturing floor to minimize variable and fixed costs in the production of the project using the basic skills provided in the introductory survey classes and laboratories. The project includes preliminary reports, a live performance trial performed by the students, final reports and a team PowerPoint presentation to the class. Each of these elements is worth 100 points and has its own rubric. For example, the rubric for the PowerPoint presentation is shown here:

ENGR 1110 Design Presentation Grading
Industrial & Systems Engineering

Date: ________________

Section:

Team & Team Members:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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</thead>
<tbody>
<tr>
<td>Beginning:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establish main purpose, preview major points, provide definitions</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Middle:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well organized, cues for change of topic or focus, provides all important/relevant information</td>
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<tr>
<td>Close:</td>
<td></td>
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<tr>
<td>Summarize key points</td>
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<tr>
<td>Design of visuals:</td>
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<tr>
<td>Effective choice, easy to read, supports the presentation, simplicity and clarity</td>
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<tr>
<td>Pace of presentation:</td>
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<tr>
<td>Minutes:</td>
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<td></td>
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<tr>
<td>All team members participate.</td>
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<td></td>
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<tr>
<td>Body language:</td>
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<td></td>
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<tr>
<td>Posture, eye contact, voice, gestures</td>
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<tr>
<td>Relation to audience:</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Courteous, informative, interesting</td>
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</tbody>
</table>


Score (Total Points Max = 28):

A >=25.2; 22.4<=B<=25.1; 19.6<=C<=22.3; 16.8<=D<=19.5; F<=16.7

Comments:

Findings

The average grade on the final PowerPoint presentations for Fall 2012 was 89.2.

How did you use findings for improvement?

The TAs for the class have been spending more time with the students teaching them some tricks with PowerPoint as well as teaching them more about how the presentation should go.

Additional Comments

Expected Outcome 8: Impact of Engineering Solutions

The broad education necessary to understand the impact of engineering solutions in a global and societal context

Assessment Method 1: EBI Survey

Assessment Method Description

Each spring semester, all of our graduating seniors for May, August, and December are given a nationally administered EBI Engineering Student Survey. Students use a scale of 1-7 (7 is best) to rate their accomplishments of each of our program outcomes. Some of the outcomes are covered by multiple questions. For this first-time detailed analysis of the EBI survey from May 2012, we simply record our score vs. the mean score for all AU engineering students that answered these questions.

Findings

The EBI survey used 11 separate questions to assess this outcome, three questions pertaining to students’ engineering education and eight questions pertaining to the students’ senior design experience. The 1st category of three questions was regarding global/societal, economic, and environmental impacts in their entire engineering education. Our 23 students that answered this question scored 5.46, 5.70, 5.25 compared to 5.13, 5.23, 5.07 respectively for the approximately 450 total engineering students that answered these questions. The 2nd category of eight questions was regarding economic, environmental, social, political, ethical, health/safety, manufacturability, and sustainability impacts in their senior design project. Our students scored 5.03, 4.31, 4.62, 3.95, 4.76, 6.00, 6.43, 5.56 compared to 5.10, 4.80, 4.58, 4.09, 4.84, 5.29, 5.42, 5.24 respectively for the approximately 450 total engineering students that answered these questions.
How did you use findings for improvement?

We want to evaluate one more year’s data before making any recommendations or changes.

Additional Comments

None.

Expected Outcome 9: Integrate Systems

Be able to design, develop, implement and improve integrated systems that include people, materials, information, equipment and energy.

Assessment Method 1: EBI Survey

Assessment Method Description

Each spring semester, all of our graduating seniors for May, August, and December are given a nationally administered EBI Engineering Student Survey. Students use a scale of 1-7 (7 is best) to rate their accomplishments of each of our program outcomes. Some of the outcomes are covered by multiple questions. For this first-time detailed analysis of the EBI survey from May 2012, we simply compare the percentage of our students that scored 5-7 compared to the percentage for all AU engineering students that answered these questions.

Findings

The EBI survey used two separate questions that assess this outcome: OQ6: How well were you able to apply your knowledge of environmental and safety issues in your engineering classes and design project? OQ10: How well do you feel your engineering education prepared you to perform a job in your chosen field of engineering? The findings are below:

OQ6: 63.2% of our students scored 5 or 7 compared to 58.5%

OQ10: 92.1% of our students scored 5 to 7 compared to 92.1%

for the approximately 450 total engineering students that answered these two questions.

How did you use findings for improvement?

We want to evaluate one more year’s data before making any recommendations or changes.

Additional Comments

None.
**Expected Outcome 10: Life-Long Learning**

A recognition of the need for, and an ability to engage in life-long learning.

**Assessment Method 1: EBI Survey**

**Assessment Method Description**

Each spring semester, all of our graduating seniors for May, August, and December are given a nationally administered EBI Engineering Student Survey. Students use a scale of 1-7 (7 is best) to rate their accomplishments of each of our program outcomes. Some of the outcomes are covered by multiple questions. For this first-time detailed analysis of the EBI survey from May 2012, we simply record our score vs. the mean score for all AU engineering students that answered the question.

**Findings**

Our students scored 5.95 compared to 5.75 for the approximately 450 total engineering students that answered this question.

**How did you use findings for improvement?**

We are satisfied with this rating. We want to evaluate one more year’s data before making any recommendations or changes based on this assessment.

**Additional Comments**

None.

**Assessment Method 2: Extra Credit Assignment in ENGR 1110**

**Assessment Method Description**

Students are encouraged to join professional organizations and attend cross-disciplinary meetings. Students must supply proof of joining a professional society. Students must submit a one-page description of the meeting they attended and submit it to Canvas.

**Findings**

For Fall 2012, 57/122 (46.7%) students joined a professional society and received extra credit in the class. For this same class 33/122 (27%) students attended a professional meeting and submitted a one-page report about the meeting.

**How did you use findings for improvement?**

Every student that participates in a professional society or seminar is a benefit. We would like to see these numbers be higher. Cost probably prohibits the first number from going any higher. A lack of knowledge about what seminars are available prohibits the second number.
The instructor is going to put a link on Canvas to AU Daily where most seminars are announced in the future class offering.

**Expected Outcome 10: Modern Engineering Tools**

An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Assessment Method 1: EBI Surveys**

**Assessment Method Description**

Each spring semester, all of our graduating seniors for May, August, and December are given a nationally administered EBI Engineering Student Survey. Students use a scale of 1-7 (7 is best) to rate their accomplishments of each of our program outcomes. Some of the outcomes are covered by multiple questions. For this first-time detailed analysis of the EBI survey from May 2012, we simply record our score vs. the mean score for all AU engineering students that answered the question.

**Findings**

Our 23 students that answered this question scored 5.89 compared to 5.73 for the approximately 450 total engineering students that answered this question.

**How did you use findings for improvement?**

We want to evaluate one more year’s data before making any recommendations or changes.

**Additional Comments**

None.

**Assessment Method 2: Annual Faculty Review of Curriculum and Student Performance**

**Assessment Method Description**

Our faculty discuss curriculum issues and student performance as a regular faculty agenda item throughout the year.

**Findings**

Most of our students do not work in processes industries anymore (based on our exit survey data and involvement of faculty with industry) and we have a new "Lego Lab" that would facilitate more modern manufacturing techniques being taught.

**How did you use findings for improvement?**
In the 2012-13 academic year, INSY 3600 and INSY 3800 were switched in the model curriculum and in practice. The faculty teaching INSY 3800 and INSY 4700 reorganized the two courses and linked them more closely, requiring that INSY 3800 become a pre-requisite for INSY 4700 and rearranging the curriculum schedule to have 3800 taught in the semester just prior to 4700.

Multiple labs and lectures that were previously spent teaching processes are now spent teaching cell manufacturing, one-piece flow, etc.

Additional Comments

Expected Outcome 10: Professional and Ethical Responsibility

An understanding of professional and ethical responsibility

Assessment Method 1: EBI Survey

Assessment Method Description

Each spring semester, all of our graduating seniors for May, August, and December are given a nationally administered EBI Engineering Student Survey. Students use a scale of 1-7 (7 is best) to rate their accomplishments of each of our program outcomes. Some of the outcomes are covered by multiple questions. For this first-time detailed analysis of the EBI survey from May 2012, we simply record our score vs. the mean score for all AU engineering students that answered these questions.

Findings

The EBI survey used two separate questions to assess this outcome, one question for professional responsibility and one question for ethical responsibility. Our 23 students that answered this question scored 5.76 and 5.62 compared to 5.69 and 5.45 respectively for the approximately 450 total engineering students that answered these questions.

How did you use findings for improvement?

We want to evaluate one more year’s data before making any recommendations or changes.

Additional Comments

None.
**Expected Outcome 10: Solve Engineering Problems**

An ability to identify, formulate, and solve engineering problems.

**Assessment Method 1: EBI Survey**

**Assessment Method Description**

Each spring semester, all of our graduating seniors for May, August, and December are given a nationally administered EBI Engineering Student Survey. Students use a scale of 1-7 (7 is best) to rate their accomplishments of each of our program outcomes. Some of the outcomes are covered by multiple questions. For this first-time detailed analysis of the EBI survey from May 2012, we simply record our score vs. the mean score for all AU engineering students that answered these questions.

**Findings**

The EBI survey used three separate questions to assess this outcome, one question for identifying problems, one question for formulating problems, and one question for solving engineering problems. Our 23 students that answered this question scored 6.24, 5.82, 6.16 compared to 5.99, 5.78, 6.07 respectively for the approximately 450 total engineering students that answered these questions.

**How did you use findings for improvement?**

We want to evaluate one more year’s data before making any recommendations or changes.

**Additional Comments**

None.