Learning Outcome(s)
Graduates of the program will be proficient engineering problem solvers capable of identifying, formulating, and solving engineering problems by applying their knowledge of mathematics, science, and engineering. This year's focus is ABET 3a, 3e, & 3k.

Aligns with University Learning Outcome(s):
Learn and Integrate

Assessment Tools and Procedures

Direct Measure
During this year student skills in equation formulation for dynamic system modeling, and use of MatLAB in system simulation were queried based on a specific assignment in our ME 313 course.

Indirect Measure
As part of their senior exit survey, students are asked about the confidence and competence in engineering problem solving.

Face-to-Face Measures

Direct Benchmarks
A 70% for the class average on this assignment was set as a minimum target.

Indirect Benchmarks
We expect a majority of students to have well-founded self-confidence in their engineering analysis and problem solving skills.

Benchmarks

Direct Findings
The class average on the ABET modeling assignment was 89.7% which exceeded the target.

Indirect Findings
Of the 20 exiting seniors interviewed, none had concerns about their skills in the ABET 3a and 3e areas. Several expressed a desire for more explicit instruction in programming best practices lower in the curriculum.

Findings

Curricular and Co-Curricular Changes to be Made
We need to continue to monitor the sequence of MatLAB assignments in our curriculum as well as the development of foundational MatLAB/programming skills that will help students further exceed in this area.
### Learning Outcome(s)
Graduates of the program will be effective mechanical engineers capable of analyzing, modeling, designing, and experimentally verifying mechanical engineering systems, components, or processes to meet specified engineering requirements while considering real-world constraints and the impact their solution may have on society. This year's focus is ABET 3c.

### Aligns with University Learning Outcome(s):
Think and Create

### Assessment Tools and Procedures

#### Direct Measure
The venue for exploring outcomes in this area will again be the annual Engineering Expo where each design team is required to present a poster, prepare a booth exhibit, and answer questions from visitors and Expo judges. Judges are typically industry practitioners and at least three judges score every design team on their display and accompanying explanation. The scoring rubric uses a five point scale with written anchors for levels 1, 3, and 5 ranging from cursory to detailed discussion of different design features.

#### Indirect Measure
As part of senior exit interviews, students are asked about their

### Benchmarks

#### Direct Benchmarks
Average class-wide performance in each rubric category is expected to be at or above 3.0 Similarly, the overall average of performance for each team is expected to be at or above 3.0 for more than two-thirds of the design teams.

#### Indirect Benchmarks
We expect students to display well-founded self-confidence in at least one of these design areas, and ability to perform design work in the other area with appropriate prompting.

### Findings

#### Direct Findings
There were 19 senior design project teams judged at their 2016 Design Expo booths. Teams contained a mixture of ME, ECE, CS, and BE members. The average score in the four design categories queried were above 3.9/5.0. No individual team had an overall average less than 3.4/5.0. Both of these exceeded our benchmark.

#### Indirect Findings
All students felt very competent and confidence in at least one of the design areas and most felt very solid in both areas.

### Face-to-Face Findings

### Curricular and Co-Curricular Changes to be Made
Reinforce Design Expo judging categories in Snapshot Days throughout the senior design sequence. Continue to collect information from alumni and industry representatives on project-related performance criteria to ensure that we are emphasizing the most important elements of design in the modern workplace.
skills and confidence in designing mechanical systems as well as designing thermal systems.

**Face-to-Face Measures**
Graduates of the program will be effective verbal and written communicators, and be team members capable of clearly developing and explaining their engineering solutions to diverse groups using appropriate tools and technology. This year's focus is ABET 3g.

### Aligns with University Learning Outcome(s):

**Communicate**

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**Assessment Tools and Procedures**

**Direct Measure**
The venue for exploring outcomes in this area were technical presentations at the Design Expo. These were judged by alumni and representatives from regional industry. The scoring rubric uses a five point scale with written anchors for levels 1, 3, and 5.

**Indirect Measure**
As part of the senior exit interview, students are asked about their self-confidence and competence in effectively communicating technical ideas to broad and diverse audiences.

**Face-to-Face Measures**

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**Benchmarks**

**Direct Benchmarks**
Average class-wide performance in each rubric category is expected to be at or above 3.0. Similarly, the overall average of performance for each team is expected to be at or above 3.0 for more than two-thirds of the design teams.

**Indirect Benchmarks**
A major of graduating seniors should display well-founded confidence in giving a formal presentation about technical work to a diverse audience.

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**Findings**

**Direct Findings**
There were 10 senior design teams with ME students judged in technical sessions at the 2016 Design Expo. Five areas of performance were investigated and the average in each area exceeded 3.8/5.0. The lowest team average across these areas was 3.5/5.0 which exceeded our benchmark.

**Indirect Findings**
Students had varying levels of personal confidence in their communication skills, but all felt that they could successfully share technical information with diverse audiences. Some expressed a desire for more opportunities to give formal presentations throughout the curriculum.

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**Curricular and Co-Curricular Changes to be Made**

Continue to expand technical presentation opportunities in design courses throughout the curriculum, with the expectation that each team member plays a lead role in at least one formal presentation associated with each project course.
## Learning Outcome(s)

Graduates of the program will practice mechanical engineering in a professional and ethical manner while remaining current in their field. This year's focus is ABET 3f & 3i.

**Aligns with University Learning Outcome(s):**
- Clarify Purpose and Perspective

## Assessment Tools and Procedures

<table>
<thead>
<tr>
<th>Direct Measure</th>
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<tbody>
<tr>
<td>Student growth and development in these ABET areas is queried through project logbooks in our capstone design class that are reviewed 2-3 times each semester. The logbook assessment form was updated this year based on input from the faculty involved with the capstone design course. We also challenge students to identify personal, team, and project strengths as well as improvements through their logbook activity.</td>
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<thead>
<tr>
<th>Indirect Measure</th>
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<tr>
<td>Each semester we conduct senior exit interviews with a subset of our graduates. Questions explore post-graduation professional development, reflections about UI</td>
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## Benchmarks

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<tr>
<td>Over and extended engineering project such as the capstone design sequence, average logbook scores in team meeting activities, design development, and project reflection should grow to levels above 3 out of 4 by the end of the course. We expect students to supply rationale for the strengths and areas for improvement that they identify in their logbook activity.</td>
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<th>Indirect Benchmarks</th>
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<td>We expect a majority of our students to be open to becoming licensed professional engineers and open to maintaining membership in a professional organization.</td>
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## Findings

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<tr>
<th>Direct Findings</th>
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<tbody>
<tr>
<td>Based on a pilot with 20 capstone students across 6 different teams, averages in all four performance areas were above the 3.0 target by the final logbook collection, with decreasing variation across the three performance areas as the course progressed. All logbooks which reviewed included periodic entries focused on strengths and areas for improvement in logbook usage.</td>
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<th>Indirect Findings</th>
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<tr>
<td>A majority of students involved in our senior exit interviews communicated a desire to pursue further education and/or obtain their professional engineering license.</td>
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## Curricular and Co-Curricular Changes to be Made

The methodology for reviewing, scoring, and providing feedback on logbooks will be more broadly disseminated to capstone faculty, including calibration training, over the course of the next academic year. Efforts will be continued to align logbook practices and assessment between sophomore level and senior level design courses, building on the 2016 ASEE paper by Mike Maughan & Joel Perry.
learning experiences, and recommendations for program improvement.

**Face-to-Face Measures**
<table>
<thead>
<tr>
<th>Learning Outcome(s)</th>
<th>Assessment Tools and Procedures</th>
<th>Benchmarks</th>
<th>Findings</th>
<th>Curricular and Co-Curricular Changes to be Made</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduates of the program will add value to their organizations, communities and society at large through involvement in professional societies, public presentations, civic engagement, and/or outreach. This year's focus is ABET 3d &amp; 3h.</td>
<td><strong>Direct Measure</strong> During this academic year we used our team member citizenship rubric at the midpoint of the senior design course and also during the final project in our sophomore CAD course. Four key areas of teamwork performance were rated as below expectations, meets expectations, and exceeds expectations. These areas were joint contributions, individual contributions, team climate, and work products.</td>
<td><strong>Direct Benchmarks</strong> It is expected that average classwide performance should be 3.0 or higher in all areas covered by the team member citizenship rubric. A majority of students should meet expectations in all four areas, especially in the capstone design course. It is expected that members of design teams can correctly identify at least one strength and at least one area for improvement in each other's performance.</td>
<td><strong>Direct Findings</strong> Classwide averages in all four performance areas are above the 3.0 target, with somewhat higher averages in the individual contribution and work product areas.</td>
<td>This year's assessment effort was a pilot among three capstone instructors. A methodology for logging class-wide team member citizenship data is now in place and that will be disseminated to other capstone instructors during the 2016-17 academic year. We will continue to explore ways to make ABET 3h outcomes explicit in our program and to measure these directly in future assessment cycles.</td>
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<tr>
<td><strong>Aligns with University Learning Outcome(s):</strong> Practice Citizenship</td>
<td><strong>Indirect Measure</strong> This year we began harvesting data from the online senior survey that is completed by our BS graduates. Several questions were selected dealing with the relationship between humans and</td>
<td><strong>Indirect Benchmarks</strong> We expect that 50% or more of our students would respond that skills associated with selected would be perceived as moderately or greatly improved through their UI experience.</td>
<td><strong>Indirect Findings</strong> The threshold of 50% was met for two out of the three questions selected in this area.</td>
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**Face-to-Face Findings**
their environment. Results are compared between the UI, College of Engineering, and ME Dept.

**Face-to-Face Measures**

Close the Loop Questions

Discuss your progress on the actions identified in your Assessment plan for 2014-15.

ABET data collection, interpretation, and action planning is progressing according to a schedule that insures three or more assessments for each of the ABET student outcome areas for the current accreditation cycle. New indirect measures were incorporated using results from the online senior survey and face to face senior exit survey. Preliminary benchmarks for these were proposed and used, but these should be reviewed/validated in subsequent assessments.

In what ways were the changes you made in 2014-15 effective in improving your program?

The recent ABET committee feedback provided by Sara Mahuron was very welcome and helpful. Many of our previous submissions have been pretty much a one-way communication. Based on Sara’s guidance we will strive to infuse a specific context/artifact in our outcome definitions rather than embedding this in the assessment tool discussion. We will also select a smaller subset of our ABET assessment activities for UI reporting, attempting to highlight those areas where the most widespread curriculum/pedagogical revision is anticipated or ongoing. We will also make a point of uploading minutes from faculty planning and deliberations surrounding our program assessment activities. The minutes from our Sept 2016 meeting are attached to this report.

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