Department: BCME
Program: Materials Engineering Masters Degree
College: Engineering
Website: https://bcme.sjsu.edu/content/ms-materials-engineering-mate

_X Check here if your website addresses the University Learning Goals. Shown on the department web page

Program Accreditation (if any): none
Contact Person and Email: Melanie McNeil Melanie.mcneil@sjsu.edu (for assessment report completion only)
Date of Report: March 23, 2017

Part A
All of the student outcomes are assessed in a combination of the Project Course (MatE 281) when they defend their research proposal and subsequently when they defend their thesis or project, which is the culminating experience of their program.

Below is shown the list of outcomes and the specific performance criterion is listed as a bullet below the numbered outcome. The assessment process involves the project committee answering the bullet question according to the rubric (in parenthesis) at the time of their proposal and project defense presentations.

The 281 course is taken when the students have completed most of the coursework for the program, as such, they have taken the courses to expose and challenge them to learn the courses at a more rigorous and in-depth level than at the BS course level. The final defense must happen when they have completed all of the remaining courses.

1. **List of Program Learning Outcomes (PLOs)**
   * Are able to solve complex engineering problems and tasks, and use engineering, science and statistics principles to justify recommendations

   - (PC 4) The student was able to defend his/her experimental results based on established and accepted engineering, science and statistical principles. (1 = student did not or was not able to adequately justify the majority of their experimental results (no verification runs etc.), 3 = student did adequately justify most aspects of their experimental results, 5 = excellent justification of all aspects of their experimental results
2. Are able to evaluate the impact of their work on society, including ethical, economic, global and environmental aspects.

- (PC 5) The student was aware of the global impact of their work on society including the ethical and/or environmental and/or economic impact of his/her work. (Note: 1 = neither the oral nor written presentation had a separate section on the global impact of the proposed work, 3 = both the oral and written presentation had an adequate section on the global impact of the proposed work, 5 = both the oral and written presentation had an excellent section on the global impact of the proposed work).

3. Can deliver effective presentations of engineering results in written and oral formats.

- (PC 1) The student delivered a professional written report. (Note: 1 = insufficient technical content and/or major formatting, and/or lack of adequate referencing, and/or major grammatical/spelling errors, 3 = acceptable technical content, formatting, referencing and grammar/spelling, 5 = excellent report in all aspects) A level of 4 or above also implies that the report demonstrates a level of writing quality and technical analysis suitable for publication whether or not the focus is original enough to be published.

- (PC 2) The student delivered a professional oral presentation. (Note: 1 = insufficient technical content and/or major errors in grammar/spelling and/or insufficient use of presentation software and/or in major errors in deliverance of a practiced presentation including response to questions, 3 = acceptable technical content, grammar/spelling, use of presentation software and deliverance of a practiced presentation including response to questions, 5 = excellent presentation in all aspects)

4. Have life-long learning skills and are able to apply their engineering knowledge to critically evaluate relevant literature and new technologies or systems.

- (PC 3) The student was able to show how his/her project relates to work reported in the literature. (Note: 1 = incomplete or irrelevant literature cited and/or inadequate literature discussion, 3 = adequate amount and discussion of relevant literature, 5 = excellent discussion of relevant literature)

5. Are effective leaders, capable of working in diverse environments.

- This outcome is not assessed in the program

6. Are able to apply their engineering education to a variety of career paths.
- This outcome is not assessed in the program

2. **Map of PLOs to University Learning Goals (ULGs)**

<table>
<thead>
<tr>
<th>PLO</th>
<th>Specialized Knowledge</th>
<th>Broad Integrative Knowledge</th>
<th>Intellectual Skills</th>
<th>Applied Knowledge</th>
<th>Social and Global Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Are able to solve complex engineering problems and tasks, and use engineering, science and statistics principles to justify recommendations</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Are able to evaluate the impact of their work on society, including ethical, economic, global and environmental aspects.</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Can deliver effective presentations of engineering results in written and oral formats.</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Have life-long learning skills and are able to apply their engineering knowledge to critically evaluate relevant literature and new technologies or systems.</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Are effective leaders, capable of working in diverse environments.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6. Are able to apply their engineering education to a variety of career paths.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

3. **Alignment – Matrix of PLOs to Courses**
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MatE 205</td>
<td>Advanced Theory of Solids</td>
</tr>
<tr>
<td>MatE 210</td>
<td>Exp. Methods in MatE</td>
</tr>
<tr>
<td>MatE 215</td>
<td>Solid State Materials Engr.</td>
</tr>
<tr>
<td>MatE 241</td>
<td>Structures, X-ray Diffraction and Imaging Techniques</td>
</tr>
<tr>
<td>MatE 251</td>
<td>Thermodynamics &amp; Kinetics of Phase Changes</td>
</tr>
<tr>
<td>MatE 281</td>
<td>Thesis Prep Seminar</td>
</tr>
<tr>
<td>MatE 281</td>
<td>M.S. Project/Thesis</td>
</tr>
<tr>
<td>MatE 298/299</td>
<td>M.S. Project/Thesis</td>
</tr>
</tbody>
</table>

1. Are able to solve complex engineering problems and tasks, and use engineering, science and statistics principles to justify recommendations
   - X
   - X
   - X
   - X
   - X
   - X
   - X

2. Are able to evaluate the impact of their work on society, including ethical, economic, global and environmental aspects.
   - X
   - X
   - X

3. Can deliver effective presentations of engineering results in written and oral formats.
   - X
   - X

4. Have life-long learning skills and are able to apply their engineering knowledge to critically evaluate relevant literature and new technologies or systems.
   - X
   - X

5. Are effective leaders, capable of working in diverse environments.
   - X
   - X

6. Are able to apply their engineering education to a variety of career paths.
   - X
   - X

10. Planning – Assessment Schedule

The grad program assessment schedule is as follows (also described in (1) above). All of the student outcomes are assessed in a combination of the Project Course (MatE 281) when they defend their research proposal and subsequently when they defend their thesis or project, which is the culminating experience of their program. The data is reviewed periodically by the graduate advisors and appropriate recommendations are made, as necessary.
5. Student Experience
The students are initially made aware of the assessment process and student outcomes during their MS student orientation meeting, and then again the students are made aware of the outcomes and assessment process in the 281 class, primarily as this is where they are assessed. They see their scores because they are on the backside of the sheet that they need to get signed by their advisor/committee stating that they have completed all the requirements for the degree program.

10. Closing the Loop/Recommended Actions
The most recent changes since the last MatE Graduate Program Report is that we now require the students to attend one semester of MatE 298 and, for thesis students, MatE 299, so that they can give progress reports on their research project. We hope by this method we can eliminate any bottlenecks individual students may have (broken equipment, loss of focus, etc.) in the most timely manner. In addition they now must register for UNST 290 or MatE 1290R each semester after they have finished all coursework except for RP grades in MatE 298 or MatE 299. This course is a special sessions course with reduced fees of about $260. Graduate Studies will not process their graduation if they are not registered in a course, including this one, the semester they want to graduate. This helps encourage the students to complete their project in a timely fashion.

11. Assessment Data
Below is shown data for Spring 2016 students. The students are scored at their proposal defense and later when they are finishing their research, again at their project/thesis defense. When we have both scores the difference between the scores shows improvement although some students start and end at a high level so absolute values are important to consider for those cases.

<table>
<thead>
<tr>
<th>Student</th>
<th>PC1 281</th>
<th>PC2 281</th>
<th>PC3 281</th>
<th>PC4 281</th>
<th>PC5 281</th>
<th>PC2 298/299</th>
<th>PC3 298/299</th>
<th>PC4 298/299</th>
<th>PC5 298/299</th>
</tr>
</thead>
<tbody>
<tr>
<td>JSA</td>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
<td>5.0</td>
<td>5.0</td>
<td>4.0</td>
<td>4.0</td>
<td>5.0</td>
<td>4.0</td>
</tr>
<tr>
<td>KBD</td>
<td>4.5</td>
<td>4.0</td>
<td>3.5</td>
<td>4.0</td>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MJF</td>
<td>4.0</td>
<td>4.0</td>
<td>4.5</td>
<td>3.5</td>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPJ</td>
<td>3.5</td>
<td>3.5</td>
<td>4.5</td>
<td>4.5</td>
<td>4.0</td>
<td>4.0</td>
<td>5.0</td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>MJK</td>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
<td>3.0</td>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM</td>
<td>3.5</td>
<td>3.5</td>
<td>4.5</td>
<td>4.5</td>
<td>4.0</td>
<td>4.0</td>
<td>3.0</td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>FT</td>
<td>3.0</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
<td>3.0</td>
<td>3.0</td>
<td>5.0</td>
<td>4.0</td>
<td></td>
</tr>
</tbody>
</table>

Analysis: A score of 3 means the student is required to make specific improvements required by their research committee in order to pass the course. We do not have Spring 2017 data due to the early
assessment report due date (March 1) in Spring 2017. However, as shown students are doing well in general.

The values shown above are typical for the students. Generally there is a slight improvement from the proposal to the final defense. This is not always the case, which can be due to various factors of the students.

12. **Proposed changes and goals (if any)**
This year we are not proposing any changes in the assessment process or in the program, as we feel our students are able to meet the outcomes and the degree of Master’s in Materials Engineering is valuable to help the students achieve their career development goals.