### Table 1. Project grading rubric. Each BS BIOE graduate will conduct a research project that shows his/her ability to...

<table>
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<tr>
<th>ABET Outcome</th>
<th>Capability</th>
<th>4 Exemplary</th>
<th>3 Proficient</th>
<th>2 Apprentice</th>
<th>1 Novice</th>
<th>Score</th>
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<td>b</td>
<td>Design and conduct experiments as well as analyze and interpret data: Utilize BioE skills to test experimental hypotheses developed in BIOEN 401; correctly analyze results; compile/interpret results in a permanent record such as lab notebook or written reports. Conduct experiments consistent with relevant standards.</td>
<td>Appropriate analytical methods were selected and correctly implemented. Quality laboratory conduct was followed, including experimentation consistent with all relevant standards, and compilation of results in a professional manner in a lab notebook or written reports.</td>
<td>Analytical methods were appropriate and correctly implemented. Basic laboratory conduct was followed including adherence to relevant experimental standards and maintenance of a lab notebook, detailed notes or written reports.</td>
<td>Analytical methods were appropriate, but implementation may be questionable. Basic laboratory conduct was followed including lab notebook or detailed notes and reports. Student may need reminding to consider and follow experimental guidelines and standards.</td>
<td>Analytical tools applied were inappropriate and/or not implemented correctly. Basic laboratory conduct was only partially followed (including neglecting experimental standards, infrequent reports or inadequate details in lab notebook).</td>
<td>Score</td>
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<td>e</td>
<td>Identify, formulate, and solve BioE problems: Recognize need in medical or bioscience community; evaluate its relative and absolute importance; cast need as engineering research challenge; perform experiments that address the need.</td>
<td>Medical or scientific need is clearly understood; current costs (health, economic, social, etc.) were used to justify project. Project provides the desired knowledge or discovery.</td>
<td>Medical or scientific need is understood; current costs (health, economic, social, etc.) were considered; problem was cast as engineering challenge. Research meets experimental goals.</td>
<td>Medical or scientific need is understood; current costs were considered; research design may be inappropriate for challenge.</td>
<td>Student did not show understanding of need for project, the project did not satisfy the stated needs.</td>
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<td>Communicate effectively: Maintain active, effective communication with lab members and advisors. Scheduling and form of communication depends on the lab group and agreements with the advisor.</td>
<td>Student maintained frequent, productive communication with lab members and advisor. Provided high-quality written reports or group presentations. Could be counted on to communicate professionally with outside collaborators.</td>
<td>Student maintained adequate, communication with lab members and advisor. Provided written reports on time and was prepared for group meetings. Could be counted on to communicate effectively with outside collaborators.</td>
<td>Student maintained intermittent, communication when required. Written reports were submitted eventually, and participation in group meetings was minimal. Advisor needs to oversee communication with collaborators.</td>
<td>Student seldom responds to email. Attendance at group meetings was minimal. Advisor reluctant to let student communicate with collaborators.</td>
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<td>l</td>
<td>Recognize the need for, and have the ability to engage in, life-long learning: Shows an ability to keep up with continuous progress in the field during project. See note (1) below.</td>
<td>Current literature is monitored. Key advances relevant to the project were identified and considered as motivation for changes in the project. Student welcomes opportunities to attend conferences, if available.</td>
<td>Literature is monitored, and key advances relevant to the project were identified but impact on project was not recognized.</td>
<td>Student reads relevant current literature when its existence is pointed out. Student is not interested in interpersonal communication as means to advance knowledge.</td>
<td>Either ability or motivation to engage with current literature is lacking.</td>
<td>Score</td>
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(1) Assessing recognition of the need for life-long learning is similar to assessing students’ understanding of scientific and technological progress and potential. Students should be able to relate: A brief history of their technical field, starting from a point that predates their advisors’ entry into the field; Recent and ongoing advances in the field, especially those that change the goals, methods, and analysis of their projects; A set of new skills or knowledge that must be learned before the next major step in this project or research can be taken; How the education of others outside this institution might change after the results of their project (or the advisor’s larger research effort) are publicized.

Suggested criteria for assessing a student’s ability to engage in life-long learning are: An ability to gain access to available academic resources – including texts, specialized periodicals, and technical databases – after the student has graduated; An ability to seek out and communicate with persons who possess knowledge that cannot be learned effectively from impersonal means; An ability to assimilate newly acquired knowledge into one’s existing understanding of technology; An ability to assess which endeavors are worthy of pursuit, in order to apply time and energy effectively.