## Student Learning Outcomes with Performance Indicators

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>Performance Indicators</th>
</tr>
</thead>
</table>
| 1. an ability to identify, formulate, and solve engineering problems             | - Problem statement shows understanding of the problem  
- Solution procedure and methods are defined  
- Problem solution is appropriate and within reasonable constraints  |
| 2. an ability to apply knowledge of mathematics, science, and engineering         | - Chooses a mathematical model of a system or process appropriate for required accuracy  
- Applies mathematical principles to achieve analytical or numerical solution to model equations  
- Examines approaches to solving an engineering problem in order to choose the more effective approach |
| 3. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. | - Selects appropriate techniques and tools for a specific engineering task and compares results with results from alternative tools or techniques  
- Uses computer-based and other resources effectively in assignments and projects |
| 4. an ability to design and conduct experiments, as well as to analyze and interpret data | - Observes good lab practice and operates instrumentation with ease  
- Determines data that are appropriate to collect and selects appropriate equipment, protocols, etc. for measuring the appropriate variables to get required data  
- Uses appropriate tools to analyze data and verifies and validates experimental results including the use of statistics to account for possible experimental error |
| 5. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability | - Produces a clear and unambiguous needs statement in a design project  
- Identifies constraints on the design problem, and establishes criteria for acceptability and desirability of solutions  
- Carries solution through to the most economic/desirable solution and justifies the approach |
| 6. an ability to function on multi-disciplinary teams                             | - Recognizes participant roles in a team setting and fulfills appropriate roles to assure team success  
- Integrates input from all team members and makes decisions in relation to objective |
<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>Performance Indicators</th>
</tr>
</thead>
</table>
| 7. an understanding of professional and ethical responsibility                  | • Knows code of ethics for the discipline
• Able to evaluate the ethical dimensions of a problem in the discipline            |
| 8. an ability to communicate effectively, both orally and in writing              | • Writing conforms to appropriate technical style format appropriate to the audience
• Appropriate use of graphics
• Mechanics and grammar are appropriate
• Oral: Body language and clarity of speech enhances communication                |
| 9. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context | • Evaluates conflicting/competing social values in order to make informed decisions about an engineering solution
• Evaluates and analyzes the economics of an engineering problem solution
• Identifies the environmental and social issues involved in an engineering solution and incorporates that sensitivity into the design process |
| 10. a recognition of the need for, and an ability to engage in life-long learning | • Expresses an awareness that education is continuous after graduation
• Able to find information relevant to problem solution without guidance             |
| 11. a knowledge of contemporary issues                                           | • Identifies the current critical issues confronting the discipline
• Evaluates alternative engineering solutions or scenarios taking into consideration current issues |
| 12. a willingness to assume leadership roles and responsibilities                | • Expresses a willingness to take on leadership responsibility
• Demonstrates the ability to monitor team progress and make suggestions when needed
• Engages team members in problem solution                                         |

Source: From ABET, Self-Study for a fictitious institution