MISSION STATEMENT

The University of Montana-Missoula dedicates itself and its resources to the growing utility of computers in research and education, as well as the increased impact of computers on our modern society. This strongly implies that knowledge of computers and their capabilities should be a part of the basic education of all students.

The Department of Computer Science then has a two-fold mission: 1) to provide appropriate non-major courses to meet the needs of all students, and 2) to offer a major and minor for those students who want to pursue a career in this discipline. The objective of the undergraduate major/minor curriculum in computer science is to develop professionally competent and broadly educated computer scientists who wish to pursue professional careers or graduate studies.

DEPARTMENT OBJECTIVES and ALIGNMENT WITH STRATEGIC ISSUES

We recently compiled a mapping of our departments alignment for an external accreditation report. In that report, we outlined the following alignment and justification.

UM Strategic Issue #1: Partnering for Student Success

- Program Objective 1. Graduates will have an understanding of the principles of computer science and knowledge of the discipline.
- Program Objective 4. Graduates will experience career success, including acceptance to and matriculation from graduate programs.

UM Strategic Issue #2: Education for the Global Century

- Program Objective 2. Graduates will have an understanding and appreciation of the context in which computing activities occur.
- Program Objective 3. Graduates will have an understanding of the social context of computing.
Globalization has been enabled and even catalyzed by technology. Instant communications, social media, and big-data analytics are all under the purview of computer science, and all have had a dramatic effect in globalization. Providing the students with an understanding of this context is an important component of our program and its objectives.

UM Strategic Issue #3: Discovery and Creativity to Serve Montana and the World

- Program Objective 2. Graduates will have an understanding and appreciation of the context in which computing activities occur.
- Program Objective 3. Graduates will have an understanding of the social context of computing.

UM Strategic Issue #4: Dynamic Learning Environment

- Program Objective 1. Graduates will have an understanding of the principles of computer science and knowledge of the discipline.

Computer science is a dynamic, ever-changing topic. Teaching such a topic requires a dynamic learning environment in order to be effective and in order to remain accurate.

**STUDENT LEARNING GOALS AND MEASUREMENT TOOLS**

<table>
<thead>
<tr>
<th>Student Learning Goals</th>
<th>Capstone Projects</th>
<th>In-Class</th>
<th>Exit Survey</th>
<th>Exit Exam</th>
<th>Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. An ability to apply knowledge of computing and mathematics appropriate to the discipline</td>
<td></td>
<td></td>
<td></td>
<td>2012-2013</td>
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<tr>
<td>2. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution</td>
<td></td>
<td>2011-2013</td>
<td>2012-2013</td>
<td>2009-2010</td>
<td>2008-2010</td>
</tr>
<tr>
<td>3. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs</td>
<td>2008-2013</td>
<td>2011-2013</td>
<td>2012-2013</td>
<td>2009-2013</td>
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<tr>
<td>4. An ability to function effectively on teams to accomplish a common goal</td>
<td>2009-2013</td>
<td>2012</td>
<td>2008-2013</td>
<td></td>
<td>2008</td>
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<tr>
<td>11</td>
<td>An ability to apply design and development principles in the construction of software systems of varying complexity.</td>
<td>2009-2013</td>
<td>2008</td>
<td>2009-2013</td>
<td>2008-2010</td>
</tr>
<tr>
<td>10</td>
<td>An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices</td>
<td>2008, 2010</td>
<td>2008</td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td>Recognition of the need for and an ability to engage in continuing professional development</td>
<td>2011</td>
<td>2008, 2012-13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>An ability to analyze the local and global impact of computing on individuals, organizations, and society</td>
<td></td>
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<tr>
<td>5</td>
<td>An understanding of professional, ethical, legal, security and social issues and responsibilities</td>
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</tbody>
</table>

3
RESULTS AND MODIFICATIONS

The Computer Science department has recently compiled these data for an external assessment. We attach our tables, which are formatted somewhat differently, and too long to be reproduced here.

APPENDICES

1. Because the reporting of results and modifications is somewhat extensive, it has been included as an attachment.

2. A curriculum map has been attached, it shows the relation between our course offerings and our department's objectives.

FUTURE PLANS FOR CONTINUED ASSESSMENT

In 2014, the Computer Science department completed an external assessment review from the board overseeing our discipline. This resulted in a six year period of accreditation. In the future, we will continue to make ABET (Accreditation Board for Engineering and Technology) accreditation our top priority. For continued success, we are required to define outcomes, determine performance indicators and measurements to be made, assess data from measurements, reflect on results, and change curriculum and/or departmental policy accordingly. The expectations for documenting this process are high, and we anticipate that continued success with ABET will also satisfy the requirements of Northwest accreditation.
<table>
<thead>
<tr>
<th>Course</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>U 121 (CSCI 106) Careers in Computer Science</td>
<td>a. An ability to apply knowledge of computing and mathematics appropriate to the discipline</td>
</tr>
<tr>
<td>U 131 (CSCI 135) Fundamentals of Computer Science I</td>
<td>b. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution</td>
</tr>
<tr>
<td>U 132 (CSCI 136) Fundamentals of Computer Science II</td>
<td>c. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs</td>
</tr>
<tr>
<td>U 241 (CSCI 232) Data Structures</td>
<td>d. An ability to function effectively on teams to accomplish a common goal</td>
</tr>
<tr>
<td>U 242 (CSCI 205) Programming Languages</td>
<td>e. An understanding of professional, ethical, legal, security and social issues and responsibilities</td>
</tr>
<tr>
<td>U 332 (CSCI 332) Algorithms</td>
<td>f. An ability to communicate effectively with a range of audiences</td>
</tr>
<tr>
<td>U 344 (CSCI 460) Operating Systems</td>
<td>g. An ability to analyze the local and global impact of computing on individuals, organizations, and society</td>
</tr>
<tr>
<td>U 346 (CSCI 323) Software Engineering</td>
<td>h. Recognition of the need for and an ability to engage in continuing professional development</td>
</tr>
<tr>
<td>U 415 (CSCI 315) Computers, Ethics, and Society</td>
<td>i. An ability to use current techniques, skills, and tools necessary for computing practice.</td>
</tr>
<tr>
<td>U 365 (CSCI 340) Database Design and Database</td>
<td>j. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.</td>
</tr>
<tr>
<td>U 488 (CSCI 466) Computer Networks</td>
<td>k. An ability to apply design and development principles in the construction of software systems of varying complexity.</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>A. An ability to apply knowledge of computing and mathematics appropriate to the discipline</td>
<td>In-class: Fundamentals of CS II, Spring 2011</td>
</tr>
<tr>
<td></td>
<td>In-class: Data Structures &amp; Algs, Fall 2011</td>
</tr>
<tr>
<td></td>
<td>In-class: Fundamentals of CS II, Spring 2012</td>
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<td></td>
<td>In-class: Fundamentals of CS II, Spring 2012</td>
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<tr>
<td></td>
<td>In-class: Data Structures &amp; Algs, Fall 2011</td>
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<tr>
<td></td>
<td>In-class: Prog. Languages, Spring 2012</td>
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<td></td>
<td>In-class: Networks, Spring 2013</td>
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<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
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<td></td>
<td>In-class: Fundamentals of CS I, Fall 2012</td>
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<tr>
<td></td>
<td>In-class: Architecture, Spring 2013</td>
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<td>Exit Exam: Spring 2012</td>
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<td>Exit Exam: Spring 2013</td>
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<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
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<tr>
<td>B. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution</td>
<td>In-class: Fundamentals of CS II, Spring 2011</td>
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<td>In-class: Data Structures &amp; Algs, Fall 2011</td>
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<td>In-class: Fundamentals of CS II, Spring 2012</td>
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<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
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<td></td>
<td>In-class: Prog. Languages,</td>
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<td></td>
<td>Spring 2012</td>
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<td>In-class: Networks, Spring</td>
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<td>2013</td>
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<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
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<td></td>
<td>In-class: Fundamentals of CS I, Fall 2012</td>
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<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
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<td></td>
<td>In-class: Software Engineering, Fall 2012</td>
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<tr>
<td>Exit Exam: Fall 2009</td>
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<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
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<tr>
<td>Exit Exam: Spring 2010</td>
<td>Student must provide an analysis of the number of comparisons made in a particular algorithm</td>
</tr>
<tr>
<td>E-portfolio: Fall 2008</td>
<td>Competency with Analysis</td>
</tr>
<tr>
<td>E-portfolio: Fall 2009</td>
<td>Competency with Analysis</td>
</tr>
<tr>
<td>E-portfolio: Spring 2010</td>
<td>Competency with Analysis</td>
</tr>
<tr>
<td>Exit Survey: Spring 2012</td>
<td>Ability to analyze a problem, and identify and define the computing requirements</td>
</tr>
<tr>
<td>Exit Survey: Spring 2013</td>
<td>Ability to analyze a problem, and identify and define the computing requirements</td>
</tr>
<tr>
<td>C. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs</td>
<td>In-class: Fundamentals of CS II, Spring 2011</td>
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<tr>
<td></td>
<td>Can design an appropriate class diagram.</td>
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<td></td>
<td>Can implement a program from an existing design.</td>
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<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
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<td></td>
<td>In-class: Data Structures &amp; Algs, Fall 2011</td>
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<td>In-class: Fundamentals of CS II, Spring 2012</td>
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<tr>
<td></td>
<td>In-class: Prog. Languages, Spring 2012</td>
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</tbody>
</table>
|                 | In-class: Networks, Spring 2013 | Demonstrate ability to frame a solution to a given programming problem as pseudo-code and to then implement that pseudo code as actual working code. | 3.0   | 3.2    | Root cause is related to the low-level way in which C handles things like strings and buffers, and student inexperience in these.  
- Include more practice and projects in Networks that exercise these skills.  
- Students rarely begin their projects with pseudo code. Future projects will include specific criteria calling for this as a deliverable and in the grading of the project. |
<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>Assessment Events and Dates</th>
<th>Performance Criteria</th>
<th>Perf.</th>
<th>Target</th>
<th>Actions</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Demonstrate ability to generate code that anticipates error conditions and that handles the conditions in a logical and orderly manner.</td>
<td>2.80</td>
<td>3.20</td>
<td>The Networks course owner will explore the addition of test cases to projects. Also, he will explore adding questions to the write-up that will test the student’s understanding and ability to predict how a given operation will behave given an error condition. This course will be handled by a different instructor in next cycle so it is unclear how these recommendations will play-out.</td>
</tr>
<tr>
<td></td>
<td>In-class: Software Engineering, Fall 2012</td>
<td>Capable of designing an appropriate system diagram for a given application or problem.</td>
<td>3.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capable of designing an appropriate class diagram for a given application or problem.</td>
<td>3.35</td>
<td>3.2</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td>In-class: Architecture, Spring 2013</td>
<td>Demonstrate appropriate use of abstraction in the design of hardware/logic components.</td>
<td>3.4</td>
<td>3.4</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td>Exit Exam: Fall 2009</td>
<td>Write a procedure to implement binary search.</td>
<td>4.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Student must describe a method by which he or she would determine the effectiveness of a software system.</td>
<td>3.5</td>
<td>3.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td>Exit Exam: Spring 2010</td>
<td>Write a procedure to implement binary search.</td>
<td>4.0</td>
<td>3.0</td>
<td>No deficiencies noted Score of 4.0 same as before</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
<td>Perf.</td>
<td>Target</td>
<td>Actions</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Student must describe a method by which he or she would determine the effectiveness of a software system.</td>
<td>3.67</td>
<td>3.0</td>
<td>No deficiencies noted Score of 3.67 improved from 3.5</td>
</tr>
<tr>
<td>Exit Exam: Spring 2012</td>
<td></td>
<td>Student must describe a method by which he or she would determine the effectiveness of a software system.</td>
<td>4.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>Exit Exam: Spring 2013</td>
<td></td>
<td>Student must describe at least one method to determine the reliability and maintainability of a software system.</td>
<td>4.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>Exit Survey: Spring 2012</td>
<td></td>
<td>How well do you think our program helped develop your ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs?</td>
<td>1.71</td>
<td>2.0</td>
<td>No deficiencies noted (note that a lower value is better—this is a condition imposed by the survey software)</td>
</tr>
<tr>
<td>Exit Survey: Spring 2013</td>
<td></td>
<td>How well do you think our program helped develop your ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs?</td>
<td>1.74</td>
<td>2.0</td>
<td>No deficiencies noted (note that a lower value is better—this is a condition imposed by the survey software)</td>
</tr>
<tr>
<td>Capstone Project: Spring 2008</td>
<td>Complete (max 15)</td>
<td>Complete (max 15)</td>
<td>15</td>
<td>13</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>Capstone Project: Spring 2008</td>
<td>Accurate (max 15)</td>
<td>Accurate (max 15)</td>
<td>15</td>
<td>13</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
<td>Perf.</td>
<td>Target</td>
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<td>Specific (max 10)</td>
<td>10</td>
<td>8</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technically appropriate (max 10)</td>
<td>10</td>
<td>8</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>Capstone Project: Spring 2009</td>
<td>Software design seemed appropriate to you (25%)</td>
<td>4.4</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Capstone Project: Spring 2009</td>
<td>System implementation seemed correct to you (25%)</td>
<td>4.9</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Capstone Project: Spring 2011</td>
<td>Software design seemed appropriate to you (25%)</td>
<td>4.67</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Capstone Project: Spring 2011</td>
<td>System implementation seemed correct to you (25%)</td>
<td>4.50</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Capstone Project: Spring 2012</td>
<td>Software design seemed appropriate to you (25%)</td>
<td>4.08</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Capstone Project: Spring 2012</td>
<td>System implementation seemed correct to you (25%)</td>
<td>3.96</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Capstone Project: Spring 2013</td>
<td>Software design seemed appropriate to you (25%)</td>
<td>3.63</td>
<td>4.0</td>
<td>Will evaluate at next faculty meeting.</td>
<td></td>
</tr>
<tr>
<td>Capstone Project: Spring 2013</td>
<td>System implementation seemed correct to you (25%)</td>
<td>4.0</td>
<td>4.0</td>
<td>Will evaluate at next faculty meeting.</td>
<td></td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
<td>Perf</td>
<td>Target</td>
<td>Actions</td>
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</tr>
<tr>
<td>D. An ability to function effectively on teams to accomplish a common goal</td>
<td>E-portfolio: Fall 2008</td>
<td>Demonstrate an ability to work effectively in teams</td>
<td>1.9</td>
<td>2.5</td>
<td>Difficult to assess how effectively students worked together in e-portfolios. Even when projects involved teamwork, it’s not clear whether these teams worked together effectively. E-portfolios are likely not the best way to evaluate this learning outcome; instead, perhaps we should gather this data via peer evaluations and instructor evaluations in classes that rely heavily on group work.</td>
</tr>
<tr>
<td></td>
<td>In-class: Software Engineering, Fall 2012</td>
<td>Students are able to communicate effectively with their teammates.</td>
<td>3.59</td>
<td>3.2</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Students are able to disagree and agree and come to a common resolution.</td>
<td>3.29</td>
<td>3.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Students are able to contribute in meaningful ways to the overall goal.</td>
<td>3.47</td>
<td>3.2</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td>Exit Survey: Spring 2008</td>
<td>Do you think you’ve had enough opportunities to develop skills at working on a team while in our program?</td>
<td>4.66</td>
<td>4.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td>Exit Survey: Spring 2012</td>
<td>How well do you think our program provided you with opportunities to develop skills at working on a team?</td>
<td>1.57</td>
<td>2.0</td>
<td>Switched to Moodle survey. Now lower number is associated with better performance. No deficiencies noted.</td>
</tr>
<tr>
<td></td>
<td>Exit Survey: Spring 2013</td>
<td>How well do you think our program provided you with opportunities to develop skills at working on a team?</td>
<td>1.62</td>
<td>2.0</td>
<td>Switched to Moodle survey. Now lower number is associated with better performance. No deficiencies noted.</td>
</tr>
<tr>
<td></td>
<td>Capstone Project: Spring 2009</td>
<td>According to the group presentation, students appeared to collaborate effectively to complete this project (15%)</td>
<td>4.7</td>
<td>4.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
<td>Perf.</td>
<td>Target</td>
<td>Actions</td>
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</tr>
<tr>
<td>Capstone Project: Spring 2011</td>
<td></td>
<td>According to the group presentation, students appeared to collaborate effectively to complete this project (15%)</td>
<td>4.67</td>
<td>4.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>Capstone Project: Spring 2012</td>
<td></td>
<td>According to the group presentation, students appeared to collaborate effectively to complete this project (15%)</td>
<td>4.39</td>
<td>4.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>Capstone Project: Spring 2013</td>
<td></td>
<td>According to the group presentation, students appeared to collaborate effectively to complete this project (15%)</td>
<td>4.38</td>
<td>4.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>In-class: Cmp, Ethics, and Society, Fall 2008</td>
<td></td>
<td>Ability to discuss the technical attributes of various algorithms, mostly in the context of performance measures.</td>
<td>Sat.</td>
<td>NA</td>
<td>The average performance for this criterion was, in general, at an appropriate level. The students understood the concepts related to evaluating the performance of algorithms in different scenarios. Note that this assessment was performed prior to receiving training on best assessment practices. The student outcomes identified were from the previous set of outcomes. We have listed the associated current outcome here. A target performance was not identified at the time of measurement, and neither were formal measurement criteria. Those listed in the “Additional Information” section are an interpretation based upon the write-up (see the “Additional Information” section later in this Chapter).</td>
</tr>
</tbody>
</table>

E. An understanding of professional, ethical, legal, security and social issues and responsibilities
<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>Assessment Events and Dates</th>
<th>Performance Criteria</th>
<th>Perf.</th>
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<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-class: Careers in CS, Fall 2011</td>
<td>The student is able to respond to a given scenario in a way consistent with the ACM Code of Ethics</td>
<td>2.12</td>
<td>2.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Exit Exam: Spring 2012</td>
<td>Name a Professional Code of Conduct and one rule that applies to computing professionals</td>
<td>2.33</td>
<td>2.5</td>
<td>The range is out of 3.0. The incorrect answers can be attributed to students not being able to name a code of conduct, or apparently not understanding that a “code of conduct” refers to a collection of rules agreed upon by a professional organization. Almost all students were able to name a professional rule/responsibility.</td>
<td></td>
</tr>
<tr>
<td>Exit Exam: Spring 2013</td>
<td>Name a Professional Code of Conduct and one rule that applies to computing professionals</td>
<td>4.0</td>
<td>2.5</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>E-portfolio: Fall 2008</td>
<td>Students can identify, assess, and resolve social, professional and ethical issues related to cybertechnology.</td>
<td>0.7</td>
<td>2.5</td>
<td>Mostly due to no examples. Continue to request that students post examples of their writings for CS415 (Computer Ethics &amp; Society) course on their e-portfolios.</td>
<td></td>
</tr>
<tr>
<td>E-portfolio: Fall 2009</td>
<td>Students can identify, assess, and resolve social, professional and ethical issues related to cybertechnology.</td>
<td>3.3</td>
<td>3.0</td>
<td>Dramatic improvement over previous year. No deficiencies noted.</td>
<td></td>
</tr>
<tr>
<td>E-portfolio: Spring 2010</td>
<td>Students can identify, assess, and resolve social, professional and ethical issues related to cybertechnology.</td>
<td>3.3</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Exit Survey: Spring 2008</td>
<td>How well do you feel that you understand social, professional and ethical issues related to computing?</td>
<td>4.5</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
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</tr>
<tr>
<td>Exit Survey: Spring 2012</td>
<td>How well do you think our program helped you understand social, professional and ethical issues related to computing?</td>
<td>1.43</td>
<td>2.0</td>
<td>Switched to Moodle delivered survey where lower score indicates better performance. No deficiencies noted.</td>
<td></td>
</tr>
<tr>
<td>Exit Survey: Spring 2013</td>
<td>How well do you think our program helped you understand social, professional and ethical issues related to computing?</td>
<td>1.85</td>
<td>2.0</td>
<td>Switched to Moodle delivered survey where lower score indicates better performance. No deficiencies noted.</td>
<td></td>
</tr>
<tr>
<td>F. An ability to communicate effectively with a range of audiences</td>
<td>In-class: Algorithms, Fall 2008</td>
<td>Student’s writing is well-organized and clear with no grammatical and spelling errors</td>
<td>Sat.</td>
<td>NA</td>
<td>The average performance for this criterion exceeded expectations. Note that this assessment was performed prior to receiving training on best assessment practices. The student outcomes identified were from the previous set of outcomes. We have listed the associated current outcome here. A target performance was not identified at the time of measurement, and neither were formal measurement criteria. Those listed here are an interpretation based upon the write-up (see the “Additional Information” section later in this Chapter).</td>
</tr>
<tr>
<td>In-class: Cmp., Ethics, and Society, Fall 2010</td>
<td>Organization</td>
<td>.92</td>
<td>90</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Content</td>
<td>.88</td>
<td>90</td>
<td>A specific lesson on good presentation techniques was added to the course effective Fall 2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subject Knowledge</td>
<td>.91</td>
<td>90</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Graphics</td>
<td>.80</td>
<td>90</td>
<td>A specific lesson on good presentation techniques was added to the course effective Fall 2012</td>
<td></td>
</tr>
<tr>
<td>Student Outcome</td>
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<tr>
<td></td>
<td></td>
<td>Mechanics</td>
<td>.94</td>
<td>90</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eye Contact</td>
<td>.89</td>
<td>90</td>
<td>A specific lesson on good presentation techniques was added to the course effective Fall 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elocution</td>
<td>.90</td>
<td>90</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>Exit Exam: Fall 2009</td>
<td>Essay on computing impacts on individuals and society (approximately one page). Essay should present a logical argument.</td>
<td>3.5</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Exit Exam: Spring 2010</td>
<td>Essay on computing impacts on individuals and society (approximately one page). Essay should present a logical argument.</td>
<td>3.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Exit Exam: Spring 2012</td>
<td>Essay on computing impacts on individuals and society (approximately one page). Essay should present a logical argument.</td>
<td>3.42</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Exit Exam: Spring 2013</td>
<td>Essay on computing impacts on individuals and society (approximately one page). Essay should present a logical argument.</td>
<td>4.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
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</tr>
<tr>
<td></td>
<td>E-portfolio: Fall 2008</td>
<td>Students can communicate effectively</td>
<td>2.4</td>
<td>2.5</td>
<td>Perhaps give students presentation requirements (in addition to content requirements) to help them more effectively display their e-portfolios. Other than that, most evaluators found the e-portfolios themselves evidence that our students are communicating effectively, so not much else to be done here. Oral communication is not illustrated via e-portfolios, but can be determined better by other assessment measurements (capstone projects, in-class assessment, etc.) General comment: Other possible suggestion: Should we provide our students with more training (either through our own dept or other depts) in how to give effective oral presentations, and how to engage in groupwork most effectively?</td>
</tr>
<tr>
<td></td>
<td>E-portfolio: Fall 2009</td>
<td>Students can communicate effectively</td>
<td>2.7</td>
<td>3.0</td>
<td>Slightly below target. With only 5 students being analyzed and with lack of design and original assignment documentation, it is difficult to determine whether action should be taken to correct the assessment or course content. Will attempt to encourage students to include documentation in order to better assess this outcome.</td>
</tr>
<tr>
<td>Student Outcome</td>
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</tr>
<tr>
<td></td>
<td>E-portfolio: Spring 2010</td>
<td>Students can communicate effectively</td>
<td>2.9</td>
<td>3.0</td>
<td>Below target, but improved from last year. Will continue giving students presentation requirements (in addition to content requirements) to help them more effectively display their e-portfolios. Score of 2.9 improved from 2.7</td>
</tr>
<tr>
<td></td>
<td>Exit Survey: Spring 2008</td>
<td>How well do you feel you can communicate orally?</td>
<td>4.33</td>
<td>4.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do you think that our program has provided you with enough opportunities to help you develop your oral presentation skills?</td>
<td>4.0</td>
<td>4.0</td>
<td>No deficiencies noted, though the score was marginal in oral presentations. While no action is to be taken at this time, the faculty will keep an eye on this.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How well do you feel you can communicate in writing?</td>
<td>4.25</td>
<td>4.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do you think that our program has provided you with enough opportunities and feedback to help you develop your writing skills?</td>
<td>4.25</td>
<td>4.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td>Exit Survey: Spring 2012</td>
<td>How well do you think our program provided you with opportunities to develop your oral presentation skills?</td>
<td>1.29</td>
<td>2.0</td>
<td>Switched to a Moodle delivered survey where lower number indicates better performance. No deficiencies noted.</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
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<td>Target</td>
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</tr>
<tr>
<td>How well do you think our program provided you with opportunities and feedback to develop your writing skills?</td>
<td>2.14</td>
<td>2.0</td>
<td>These results confirm a conclusion previously drawn by faculty. This was based upon other measures (such as the advisory board meeting on 10/10/2011). Remedial approaches were discussed at a subsequent faculty meeting (11/4/2011) and several alternatives (some generated as suggestions at Advisory Board Meeting) were discussed and approved. Increased exposure to real world situations should increase communications skills (or at least bolster appreciation of importance). Will attempt to increase internship opportunities. Increase student-to-student mentoring. Increase communications assignments in core courses (more writing assignments). Additionally, the faculty members were already considering revamping the upper division writing curriculum. One alternative being examined is something similar to that utilized in the Division of Biological Sciences. Their program uses a point system (instead of a single course) and various writing-intensive courses contribute to the necessary point total. This requires Faculty Senate approval (through the Academic Standards &amp; Curriculum Review Committee, ASCRC) and so will be revisited next year after the curriculum changes submitted this year have had a chance to make their way through the system.</td>
<td></td>
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</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
<td>Perf.</td>
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</tr>
<tr>
<td>Exit Survey: Spring 2013</td>
<td>How well do you think our program provided you with opportunities to develop your oral presentation skills?</td>
<td>1.62</td>
<td>2.0</td>
<td>Switched to a Moodle delivered survey where lower number indicates better performance. No deficiencies noted.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How well do you think our program provided you with opportunities and feedback to develop your writing skills?</td>
<td>2.11</td>
<td>2.0</td>
<td>This is a slight improvement over the results from the previous year (was 2.14). This will be discussed at the next faculty meeting; however, it should be pointed out that the changes that are being enacted to combat this (see last year’s comments) are mid-stream so it may be too soon to see improvement.</td>
<td></td>
</tr>
<tr>
<td>Capstone Project: Spring 2008</td>
<td>Professional (max 15)</td>
<td>14.33</td>
<td>13</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Consistent (max 15)</td>
<td>13.66</td>
<td>13</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transitions (max 10)</td>
<td>8.66</td>
<td>8</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visually Attractive (max 10)</td>
<td>9.33</td>
<td>9</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Capstone Project: Spring 2009</td>
<td>Students can communicate effectively orally (20%)</td>
<td>4.3</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Presentation materials were properly arranged and visually attractive (15%)</td>
<td>4.2</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Capstone Project: Spring 2011</td>
<td>Students can communicate effectively orally (20%)</td>
<td>4.08</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Project report and presentation materials were properly arranged and visually attractive (15%)</td>
<td>4.13</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Capstone Project: Spring 2012</td>
<td>Students can communicate effectively orally (20%)</td>
<td>4.42</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Student Outcome</td>
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</tr>
<tr>
<td>Capstone Project: Spring 2013</td>
<td>Presentation materials were</td>
<td>4.08</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>properly arranged and visually</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>attractive (15%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capstone Project: Spring 2013</td>
<td>Students can communicate</td>
<td>4.38</td>
<td>4.0</td>
<td>Will evaluate at next faculty meeting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>effectively orally (20%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capstone Project: Spring 2013</td>
<td>Presentation materials were</td>
<td>3.88</td>
<td>4.0</td>
<td>Will evaluate at next faculty meeting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>properly arranged and visually</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>attractive (15%)</td>
<td></td>
<td></td>
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<tr>
<td>G. An ability to analyze the local and global impact of computing on</td>
<td>Exit Exam: Fall 2009</td>
<td>Discuss three ways that computing impacts</td>
<td>4.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>individuals, organizations, and society</td>
<td></td>
<td>individuals and society either or negatively</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. An ability to analyze the local and global impact of computing on</td>
<td>Exit Exam: Spring 2010</td>
<td>Name a Professional Code of Conduct and one rule that applies</td>
<td>3.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>individuals, organizations, and society</td>
<td></td>
<td>to computing professionals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. An ability to analyze the local and global impact of computing on</td>
<td>Exit Exam: Spring 2012</td>
<td>Discuss three ways that computing impacts</td>
<td>4.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>individuals, organizations, and society</td>
<td></td>
<td>individuals and society either or negatively</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. An ability to analyze the local and global impact of computing on</td>
<td>Exit Exam: Spring 2013</td>
<td>Name a Professional Code of Conduct and one rule that applies</td>
<td>3.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>individuals, organizations, and society</td>
<td></td>
<td>to computing professionals</td>
<td></td>
<td></td>
<td></td>
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<td>Student Outcome</td>
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<tr>
<td></td>
<td>Exit Survey: Spring 2012</td>
<td>How well do you think our program prepared you to analyze the local and global impact of computing on individuals, organizations, and society?</td>
<td>1.57</td>
<td>2.0</td>
<td>Implemented in Moodle where low scores indicate higher performance. No deficiencies noted.</td>
</tr>
<tr>
<td>H. Recognition of the need for and an ability to engage in continuing professional development</td>
<td>In-class: Careers in CS, Fall 2011</td>
<td>Students are able to state their preferred mode(s) of continuing education, and provide 3 reasons in support of their choice(s).</td>
<td>2.38</td>
<td>2.4</td>
<td>the instructor indicated that he had already taken steps to automate or make “more objective” the assessment of the continuing education survey results (essentially a codification of the process he used in this first assessment). A lesson has been added/augmented on the importance of lifelong learning.</td>
</tr>
<tr>
<td></td>
<td>Exit Survey: Spring 2008</td>
<td>Do you feel that you possess sufficient fundamental knowledge of computer science and the motivation to be a life-long learner in the CS or IT field?</td>
<td>4.0</td>
<td>4.0</td>
<td>No deficiencies noted. No action will be taken at this time. This is a marginal score and will continue to be observed.</td>
</tr>
<tr>
<td></td>
<td>Exit Survey: Spring 2012</td>
<td>How well did our program motivate you to be a lifelong learner in the field of computer science?</td>
<td>1.57</td>
<td>2.0</td>
<td>No deficiencies noted. This survey is implemented in Moodle and lower scores indicate better performance.</td>
</tr>
<tr>
<td></td>
<td>Exit Survey: Spring 2013</td>
<td>How well did our program motivate you to be a lifelong learner in the field of computer science?</td>
<td>2.11</td>
<td>2.0</td>
<td>This will be discussed at the next faculty meeting. This is down from last year, so it is unclear whether this is an anomaly or is an actual indicator that this has fallen-off.</td>
</tr>
<tr>
<td>I. An ability to use current techniques, skills, and tools</td>
<td>In-class: Operating Systems, Fall 2009</td>
<td>Can learn and/or utilize the appropriate tools necessary to develop a software solution</td>
<td>3.64</td>
<td>3.6</td>
<td>No deficiencies noted.</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>Assessment Events and Dates</th>
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<th>Perf.</th>
<th>Target</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>necessary for computing practice</td>
<td></td>
<td>Can utilize contemporary implementation techniques in the development of a solution</td>
<td>3.45</td>
<td>3.6</td>
<td>Faculty who were implementing these criteria in their courses were asked to target low-level C techniques and structure including the use of multiple linked object files, prototyping, passing arguments by reference, dereferencing variables, etc. A decision was made to incorporate a more in depth treatment of these topics in the CSCI 205 course (Programming Languages), including plenty of hands-on implementation experience in the form of programming assignments. Treatment incorporated Spring 2010.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can learn and/or utilize the appropriate tools necessary to develop a software solution</td>
<td>3.42</td>
<td>3.2</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>In-class: Database Design, Spring 2011</td>
<td></td>
<td>Can utilize contemporary implementation techniques in the development of a solution</td>
<td>3.25</td>
<td>3.2</td>
<td>No weaknesses identified; however, the weakest performance was on the second portion of the project (where the students write specifications on a project in which they are interested). The instructor will instead have them continue with the more rigorously defined first project. Additionally, more examples will be provided depicting model-to-implementation conversions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can learn and/or utilize the appropriate tools necessary to develop a software solution</td>
<td>3.82</td>
<td>3.7</td>
<td>In addition to performance level being at 3.82, it should be noted that this score represented an average across three projects and that continuous improvement was demonstrated across the three. No deficiencies noted.</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
<td>Perf.</td>
<td>Target</td>
<td>Actions</td>
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<tr>
<td></td>
<td>In-class: Operating Systems, Fall 2012</td>
<td>Can learn and/or utilize the appropriate tools necessary to develop a software solution</td>
<td>3.81</td>
<td>3.6</td>
<td>No deficiencies noted. The assessment demonstrates improvement from the last cycle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can utilize contemporary implementation techniques in the development of a solution</td>
<td>3.69</td>
<td>3.6</td>
<td>No deficiencies noted. The assessment demonstrates improvement from the last cycle.</td>
</tr>
<tr>
<td></td>
<td>In-class: Architecture, Spring 2013</td>
<td>Demonstrate ability to translate high-level flow-control constructs into equivalent machine-level instructions.</td>
<td>3.5</td>
<td>3.4</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>Exit Exam: Fall 2009</td>
<td>Describe three nontrivial features of the most sophisticated IDE that you use</td>
<td>4.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Exit Exam: Fall 2009</td>
<td>Describe three nontrivial features of the most sophisticated version control system that you use</td>
<td>4.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Exit Exam: Spring 2010</td>
<td>Describe three nontrivial features of the most sophisticated IDE that you use</td>
<td>3.83</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Exit Exam: Spring 2010</td>
<td>Describe three nontrivial features of the most sophisticated version control system that you use</td>
<td>3.5</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Exit Exam: Spring 2012</td>
<td>Describe a sophisticated IDE and a sophisticated version control system that you use. Describe two nontrivial features of each system.</td>
<td>4.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Exit Exam: Spring 2013</td>
<td>Describe a sophisticated IDE and a sophisticated version control system that you use. Describe two nontrivial features of each system.</td>
<td>3.67</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
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<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
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<td></td>
<td>Exit Survey: Spring 2008</td>
<td>I am comfortable with my knowledge and my ability to apply techniques in the area of computer systems (which includes computer architecture, operating systems, and networking).</td>
<td>5.0</td>
<td>4.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td>Exit Survey: Spring 2012</td>
<td>How well do you think our program prepared you to use current techniques, skills, and tools necessary for computing practice?</td>
<td>1.71</td>
<td>2.0</td>
<td>No deficiencies noted. This survey is implemented in Moodle whose implementation makes lower scores indicate better performance.</td>
</tr>
<tr>
<td></td>
<td>Exit Survey: Spring 2013</td>
<td>How well do you think our program prepared you to use current techniques, skills, and tools necessary for computing practice?</td>
<td>1.85</td>
<td>2.0</td>
<td>No deficiencies noted. This survey is implemented in Moodle whose implementation makes lower scores indicate better performance.</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
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<tr>
<td>J. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices</td>
<td>In-class: Algorithms, Fall 2008</td>
<td>Ability to discuss the technical attributes of various algorithms, mostly in the context of performance measures.</td>
<td>None (see note)</td>
<td></td>
<td>Note that this assessment was performed prior to receiving training on best assessment practices. The student outcomes identified were from the previous set of outcomes. We have listed the associated current outcome here. A target performance was not identified at the time of measurement, and neither were formal measurement criteria. Those listed below are an interpretation based upon the write-up (see the “Additional Information” section later in this Chapter). The average performance for this criterion was, in general, at an appropriate level. The students understood the concepts related to evaluating the performance of algorithms in different scenarios. Future evaluations of this nature should include a requirement to look at more challenging algorithms.</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
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<tr>
<td>In-class: Algorithms, Fall 2010</td>
<td>binary search</td>
<td>48</td>
<td>25</td>
<td>This in-class assessment took the form of a survey administered to the class early in the semester (entrance survey). Fifteen students (the entire Algorithms class fall 2010) were involved in this assessment. The results were discussed in a sub-committee meeting on 9/9/2011. Target Performance levels and suggested remedial actions were generated. These levels and suggested actions were subsequently presented to the entire faculty at a faculty meeting on 9/14/2011. The performance criteria summarized here include a compilation of student answers to the question “ever heard of these algorithms” with available answers: what's that?, heard of it, remember basic idea, and could implement. Additional questions were administered and cataloged. Their results can be found in the additional information section at the end of the Student Outcomes section. Average performance was 40.8 (where answers of “what's that?”, “heard of it”, “remember basic idea”, and “could implement” were awarded scores of 1, 2, 3, and 4 respectively. The results of the self-evaluation were largely positive with the major topics</td>
<td></td>
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<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
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<td></td>
<td></td>
<td>mergesort</td>
<td>39</td>
<td>25</td>
<td>covered in the data structures course achieving excellent results. There were some interesting findings regarding the proficiency of the students in various scripting and functional programming languages, but nothing requiring corrective action. The weakest results were in the area of recognizing breadth and depth first traversals. BFS and DFS concepts will be emphasized in the data structures course.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>heapsort</td>
<td>38</td>
<td>25</td>
<td></td>
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<td></td>
<td></td>
<td>quicksort</td>
<td>40</td>
<td>25</td>
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<td></td>
<td>depth-first search</td>
<td>24</td>
<td>25</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>breadth-first search</td>
<td>22</td>
<td>25</td>
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<td></td>
<td></td>
<td>topological sort</td>
<td>19</td>
<td>25</td>
<td></td>
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<td></td>
<td></td>
<td>Dijkstra's algorithm</td>
<td>28</td>
<td>25</td>
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<td></td>
<td>binary tree</td>
<td>54</td>
<td>25</td>
<td></td>
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<td></td>
<td></td>
<td>heap</td>
<td>52</td>
<td>25</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td>queue</td>
<td>57</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>stack</td>
<td>55</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>linked list</td>
<td>54</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Exit Survey: Spring 2008</td>
<td>I am comfortable with my knowledge and my ability to apply techniques in the area of algorithm analysis.</td>
<td>4.0</td>
<td>4.0</td>
<td>No deficiencies noted. While no specific actions were identified, it should be noted that Dr. Michael Rosulek was hired in time for the fall 2009 semester, and was hired specifically to bolster the department’s skills in theory, algorithms, and algorithm analysis.</td>
<td></td>
</tr>
<tr>
<td>K. An ability to apply design and development principles in the construction of software systems of varying complexity.</td>
<td>In-class: Advanced Programming I, Fall 2008</td>
<td>Correctness of design</td>
<td>93%</td>
<td>80%</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Correctness of Implementation</td>
<td>93%</td>
<td>80%</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mapping from Design to Implementation</td>
<td>96%</td>
<td>80%</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
<td>Perf.</td>
<td>Target</td>
<td>Actions</td>
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<td></td>
<td>In-class: Operating Systems, Fall 2009</td>
<td>Can read and comprehend project specifications and/or design documents and apply.</td>
<td>3.36</td>
<td>3.6 (90%)</td>
<td>Analysis of the in-class assessment indicated that most of the problems encountered by the students were with low-level C data manipulation, including pointers, memory allocation and manipulation, system calls, etc. Instructors of courses that support the above skills will target the shortcomings. Programming Languages was altered in 2010.</td>
</tr>
<tr>
<td></td>
<td>In-class: Database, Spring 2011</td>
<td>Can correctly implement the intent of the design.</td>
<td>3.27</td>
<td>3.6 (90%)</td>
<td>Additionally, it was decided that more exercises within the operating systems course should be implemented that would provide some transitional help for those who had not seen such material in a while, and other projects that would provide experience and practice (additional experience to the changes mentioned above relative to the student outcome regarding use of current techniques, skills, and tools) in these areas.</td>
</tr>
<tr>
<td></td>
<td>In-class: Advanced Programming I, Fall 2011</td>
<td>Can apply design principles to develop a solution based on project specifications.</td>
<td>3.33</td>
<td>3.2</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can implement the intent of the design.</td>
<td>3.33</td>
<td>3.2</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can apply design principles to develop a solution based on project specifications.</td>
<td>3.36</td>
<td>3.2</td>
<td>The performance level was averaged across three projects. Continuous improvement was demonstrated across the three. Though no deficiencies were noted.</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
<td>Perf.</td>
<td>Target</td>
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</tr>
<tr>
<td>Can implement the intent of the design.</td>
<td>In-class: Operating Systems, Fall 2012</td>
<td>3.36</td>
<td>3.2</td>
<td>The instructor identified two changes that could be implemented to facilitate better transfer of outcome abilities: 1) Introduce more flexibility in the design criteria and problem set selection 2) Since projects build upon one another and there is little time between to correct/complete the previous implementations in time for the next, therefore, base code for later projects should be made available to prevent a situation where the student cannot make progress due to early mistakes or misunderstandings.</td>
<td></td>
</tr>
<tr>
<td>Can apply design principles to develop a solution based on project specifications.</td>
<td>Exit Exam: Fall 2009</td>
<td>3.69</td>
<td>3.6 (90%)</td>
<td>No deficiencies noted. The assessment demonstrates improvement from the last cycle. The performance is now above target in both criteria</td>
<td></td>
</tr>
<tr>
<td>Can implement the intent of the design.</td>
<td>Exit Exam: Spring 2010</td>
<td>3.69</td>
<td>3.6 (90%)</td>
<td>No deficiencies noted. The assessment demonstrates improvement from the last cycle. The performance is now above target in both criteria</td>
<td></td>
</tr>
<tr>
<td>Describe a software design method you have used and the characteristics of the design you produced from this method</td>
<td></td>
<td>3.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Describe three important differences between object-oriented design and data-driven design</td>
<td></td>
<td>3.5</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Describe a software design method you have used and the characteristics of the design you produced from this method</td>
<td></td>
<td>3.0</td>
<td>3.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
<td>Perf.</td>
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<tr>
<td></td>
<td></td>
<td>Describe three important differences between object-oriented design and data-driven design</td>
<td>2.83</td>
<td>3.0</td>
<td>It was noted that the second criterion is now below threshold. At this early stage in the development of the exit exam instrument, it was decided that no specific actions would be taken to combat this issue. This criterion will be closely watched and if continued poor performance is observed, an in-depth analysis will be performed.</td>
</tr>
<tr>
<td>Exit Exam: Spring 2012</td>
<td></td>
<td>Describe three important factors that must be considered when choosing between an object-oriented design and data-driven design for a project. Describe how these factors relate to the choice between design methodologies.</td>
<td>2.33</td>
<td>3.0</td>
<td>The primary cause of the low scores appears to be students stated unfamiliarity with “data-driven design.” Consequently, students appeared to be guessing at what this term meant. Dr. Ray Ford volunteered to research what is currently taught relative to these two approaches and the importance and pertinence of data-driven design.</td>
</tr>
<tr>
<td>Exit Exam: Spring 2013</td>
<td></td>
<td>Describe three important differences between object-oriented design and data-driven design.</td>
<td>3.67</td>
<td>3.0</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td>E-portfolio: Fall 2008</td>
<td></td>
<td>Illustrate competency in Software Design.</td>
<td>2.6</td>
<td>2.5</td>
<td>No deficiencies noted</td>
</tr>
<tr>
<td></td>
<td>Competency with Implementation</td>
<td>2.9</td>
<td>2.5</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
<tr>
<td>E-portfolio: Fall 2009</td>
<td></td>
<td>Illustrate competency in Software Design.</td>
<td>2.9</td>
<td>3.0</td>
<td>Slightly below target. With only 5 students being analyzed and with lack of design and original assignment</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Assessment Events and Dates</td>
<td>Performance Criteria</td>
<td>Perf.</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Competency with Implementation</td>
<td>2.95</td>
<td>3.0</td>
<td>documentation, it is difficult to determine whether action should be taken to correct the assessment or course content. Will attempt to encourage students to include documentation in order to better assess this outcome.</td>
</tr>
<tr>
<td>E-portfolio: Spring 2010</td>
<td>Illustrate competency in Software Design.</td>
<td>3.1</td>
<td>3.0</td>
<td>No deficiencies identified Score of 3.1 improved from 2.9</td>
<td></td>
</tr>
<tr>
<td>Exit Survey: Spring 2008</td>
<td>Competency with Implementation</td>
<td>3.0</td>
<td>3.0</td>
<td>No deficiencies identified Score of 3.0 improved from 2.95</td>
<td></td>
</tr>
<tr>
<td>Exit Survey: Spring 2008</td>
<td>I am comfortable with my knowledge and my ability to apply techniques in the area of software design (including database and algorithm design).</td>
<td>5.0</td>
<td>4.0</td>
<td>No deficiencies noted</td>
<td></td>
</tr>
</tbody>
</table>