Annual Academic Assessment Report Cover Sheet

Assessment reports are due the 1st Wednesday after the Fall Term

Email to: assessment@unlv.edu

Program Information:

<table>
<thead>
<tr>
<th>Program Assessed</th>
<th>Computer Science BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department</td>
<td>Computer Science</td>
</tr>
<tr>
<td>College</td>
<td>Engineering</td>
</tr>
<tr>
<td>Department Chair</td>
<td>Dr. Laxmi Gewali</td>
</tr>
<tr>
<td>Assessment Coordinator</td>
<td>Dr. Laxmi Gewali and Wolfgang Bein</td>
</tr>
<tr>
<td>Date Submitted</td>
<td>12/9/2016</td>
</tr>
</tbody>
</table>

Contact Person for This Report

<table>
<thead>
<tr>
<th>Name</th>
<th>Dr. Laxmi Gewali or Wolfgang Bein</th>
</tr>
</thead>
<tbody>
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<td>702-895-4028</td>
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</tr>
</tbody>
</table>

Please attach a narrative (not to exceed 4 pages, excluding appendices) addressing the following:

- What are the student learning outcomes? Please provide a numbered list.
- Which learning outcomes were assessed?
- How were they assessed? (Programs must use at least one direct assessment of student learning.)
- Undergraduate programs should assess at least one University Undergraduate Learning Outcome (UULO) each year, which may or may not overlap with a program learning outcome.
- Graduate programs should assess at least one outcome related to one of the following graduate level requirements each year:
  - student engagement in research, scholarship, creative expression and/or appropriate high-level professional practice.
  - activities requiring originality, critical analysis and expertise.
  - the development of extensive knowledge in the field under study.
- What was learned from the assessment results?
- How did the program respond to what was learned?

Please limit the narrative portion of your report to no more than four pages. You may attach appendices with data, tables, charts, or other materials as needed. Please explain the relevant conclusions from any appendices in your narrative. Please contact the Office of Academic Assessment if you have questions or need assistance.
I. Introduction
Outcomes Assessed in 2016

Following 4 Outcomes (out of the 8 total outcomes) were assessed
- **Outcome D**: Use current tools or techniques to implement and evaluate programs or computer-based systems.
- **Outcome F**: Communicate effectively with a range of audiences.
- **Outcome G**: Understand the professional, ethical, legal, and security impacts of computing on individuals, organizations, and society.
- **Outcome H**: Appreciate an application area of computing and recognize the need to engage in continuing professional development

Both **Direct Assessment** and **Indirect Assessment** methods were used to assess the above outcomes
Direct Assessment was done by using either (i) Selected Question Method, or (ii) Model Question Method. Assessment questions in these methods were prepared by the instructors who taught the courses closely related to the corresponding outcomes. These assessment exams were scheduled at the end of the semester. For either method chosen by the instructor, the answers given by the students were organized in a rubric-categorized table. In this table, performance of student’s answers is grouped into four categories: (i) Unsatisfactory, (ii) Below Expectation, (iii) Satisfactory, and (iv) Exceeds Expectation. The tabulated responses are evaluated by the instructor to prepare semester-end assessment pages for each course. Results of the direct assessments for each outcome are summarized in a table. A threshold of 70% of students scoring satisfactory or more was set by the Assessment Committee as successful achievement of the outcome.

Indirect Assessment was done by using the following two instruments:

- Semester-end evaluations of outcomes by students taking the course. The responses were grouped into four categories: (i) Excellent, (ii) Good, (iii) Neutral, (iv) Fair, and (v) Poor. A median score of Good or better is considered achieving satisfactory outcome.
- Exit Interviews. Each graduating student in their 4th year is given a questionnaire to collect their input regarding the level of achievement in each of eight student learning outcomes.

II. Assessment Results

Direct Assessment of Outcome D

Courses used to cover Outcome D:

- CS 218 (1): Assembly Language and Systems Programming
- CS 370 (1): Operating Systems

Direct Assessment examinations were given by instructors of CS 218, and CS 456 to cover Outcome D on the final week of the semester. Tabulated results of direct assessment (Percentage Distribution) are as shown in the following table:

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Unsatisfactory (U)</th>
<th>Below Expectation (BE)</th>
<th>Satisfactory (S)</th>
<th>Exceeds Expectation (EE)</th>
<th>Remark for S+EE (Is it &gt;= 70% Threshold?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2016</td>
<td>3.09</td>
<td>13.14</td>
<td>62.50</td>
<td>21.27</td>
<td>83.77 (&gt;70) Meets Threshold</td>
</tr>
</tbody>
</table>

- Overall Results for Outcome D: In Spring, the targeted threshold of 70% was achieved by a healthy margin.
Notable suggested improvement(s) by instructor(s) and Assessment Committee:

- **Early Intervention:** Early intervention was initiated in Fall 2015 in CS 218. This tool was suggested by the instructor of CS 218 (Edward Jorgensen). The idea is to identify students who are not performing well as observed by examining the first two assignments. Such students are given extra help from lab-monitors, are recommended to advising centers for counseling, and possibly enroll in tutoring sessions. Fifteen students were identified and referred in this manner. It is recommended that early intervention should be expanded.
  - **Enforcing Prerequisite:** The Assessment Committee had previously recommended the need to close the loopholes in prerequisite enforcement to weed out students without the correct background. Almost no students did not fulfill prerequisites.

- Significant progress has been made.

**Direct Assessment of Outcome F:**

Courses used to cover Outcome F:

- CS 301: Social Implications of Computer Technology
- CS 472: Software Engineering

Direct Assessment examinations were given by instructors of CS 301 and CS 472 to cover Outcome F on the final week of the semester. Tabulated results of direct assessment (Percentage Distribution) are as shown in the following table:

<table>
<thead>
<tr>
<th>Outcome F</th>
<th>Unsatisfactory</th>
<th>Below Expectation</th>
<th>Satisfactory</th>
<th>Exceeds Expectation</th>
<th>Remark for S+EE (Is it &gt;= 70% Threshold?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2016</td>
<td>1.86</td>
<td>0.0</td>
<td>37.03</td>
<td>61.11</td>
<td>98.14 (&gt; 70%)</td>
</tr>
</tbody>
</table>

- Overall Results for Outcome F: The targeted achievement level is satisfied by a healthy margin.
- In CS 472, students’ final presentations were assessed. During these project presentations a couple of professors and two industry professionals assessed the students on this outcome.

**Notable suggested improvement(s) by instructor(s) and Assessment Committee.**

- It was suggested that the presentation evaluation metrics could be made more precise.

**Direct Assessment of Outcome G:**
Courses used to cover Outcome G:
- CS 301: Social Implications of Computer Technology

Direct Assessment examinations were given by instructors of CS 301 to cover Outcome G on the final week of the semester. Tabulated results of direct assessment (Percentage Distribution) are as shown in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Unsatisfactory (U)</th>
<th>Below Expectation (BE)</th>
<th>Satisfactory (S)</th>
<th>Exceeds Expectation (EE)</th>
<th>Remark for S+EE (Is it &gt;= 70% Threshold?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2016</td>
<td>5.27</td>
<td>0.0</td>
<td>73.68</td>
<td>21.05</td>
<td>94.73 (&gt;70%)</td>
</tr>
</tbody>
</table>

- **Overall Results for Outcome G**: In Spring 2016 the targeted threshold of 70% was fully achieved.

Notable suggested improvement(s) by instructor(s) and Assessment Committee.
- Though coverage was expanded, students had difficulty fully appreciate the ethical codes of professional associations. Emphasis has to be placed on the coverage the ethics codes of various professional organizations.

**Direct Assessment of Outcome H**:  
Courses used to cover Outcome H:
- CS 489 (3) - Advanced Computer Science Topics

Direct Assessment examinations were given by instructors of CS 489 to cover Outcome H on the final week of the semester. Tabulated results of direct assessment (Percentage Distribution) are as shown in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Unsatisfactory (U)</th>
<th>Below Expectation (BE)</th>
<th>Satisfactory (S)</th>
<th>Exceeds Expectation (EE)</th>
<th>Remark for S+EE (Is it &gt;= 70% Threshold?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2016</td>
<td>0.0</td>
<td>0.0</td>
<td>43.00</td>
<td>57.00</td>
<td>100.00 (&gt;70%)</td>
</tr>
</tbody>
</table>

- **Overall Results for Outcome H**: Outcome for outcome H were fully achieved in CS 489 (3). Similar results occurred in the other sections of 489, into which outcome H maps. The students are highly engaged in application areas.
Notable suggested improvement(s) by instructor(s) and Assessment Committee

- The alumni survey should interest for diverse new application areas (app programming, cloud computing, security). The department should be mindful of these suggestions.

Indirect Assessment for Outcomes D, F, G, and H

Courses evaluated by students for
- Outcome D: CS 218 (Section 1, 2), CS 219, CS 370.
- Outcome F: CS 301 (Section 1, 2, 3), CS 472.
- Outcome G: CS 301 (Section 1, 2, 3).
- Outcome H: CS 489 (Section 1, 2, 3), CS 482, CS 458.

Questionnaires for evaluating outcomes covered by the courses were distributed in the class at the end of the semester by an administrative member arranged by Dean Office / CS Office. Responses to these questions were collected and analyzed to access the outcomes. Outcome wise results are as follows.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No. of Responses</th>
<th>E (%)</th>
<th>G (%)</th>
<th>N (%)</th>
<th>F (%)</th>
<th>P (%)</th>
<th>N/A (%)</th>
<th>Average</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>112</td>
<td>66.34</td>
<td>25.6</td>
<td>4.74</td>
<td>2.04</td>
<td>1.15</td>
<td>0.13</td>
<td>4.55</td>
<td>E</td>
</tr>
<tr>
<td>F</td>
<td>50</td>
<td>41.72</td>
<td>34.85</td>
<td>14.57</td>
<td>5.43</td>
<td>2</td>
<td>1.43</td>
<td>4.04</td>
<td>E/G</td>
</tr>
<tr>
<td>G</td>
<td>22</td>
<td>64.28</td>
<td>22.08</td>
<td>5.84</td>
<td>6.5</td>
<td>1.3</td>
<td>0</td>
<td>4.41</td>
<td>E</td>
</tr>
<tr>
<td>H</td>
<td>92</td>
<td>67.8</td>
<td>22.03</td>
<td>4.68</td>
<td>4.07</td>
<td>1.1</td>
<td>0.32</td>
<td>4.5</td>
<td>E</td>
</tr>
</tbody>
</table>

Conclusion: For the above 4 outcomes, measured indirectly, the median achievement level is good (G) or better. This means achievement levels for Outcomes D, F, G, and H, as measured indirectly, is satisfactory.

Exit Interviews

Each graduating student in their 4th year is given a questionnaire to collect their input regarding the level of achievement in each of eight student learning outcomes. Responses to the outcomes are collected in four categories (Very well, pretty well, somewhat, not at all). In addition, comments can be provided.

Summary results from 24 responses for outcomes D, F, G and H are as follows:
Summary Results of Senior Exit Interview Outcomes D, F, G and H (Spring 2016)

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>very well</th>
<th>pretty well</th>
<th>somewhat</th>
<th>Not at all</th>
<th>% of students rating at least “pretty well”</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>11</td>
<td>10</td>
<td>3</td>
<td>0</td>
<td>87.5</td>
</tr>
<tr>
<td>F</td>
<td>13</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>85.33</td>
</tr>
<tr>
<td>G</td>
<td>15</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>95.83</td>
</tr>
<tr>
<td>H</td>
<td>22</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Comments from students on the exit interview: It was mentioned that the course MATH 351 Discrete Mathematics was not sufficiently geared to the needs of computer science students. The Computer Science Department will articulate with the Mathematics Department to address this issue.

Assessment Result for University Undergraduate Learning Objectives (UULO’s)

Both CS 301 and CS 472 emphasize written and oral communication components. Outcome F overlaps with UULO’s communication objectives such as effectively using the common genres and conventions for writing within a particular discipline, delivering effective oral presentations and production of effective visuals using different media. The direct assessment of Outcome F for CS 301 and CS 472 shows that over 98% of students achieved satisfactory or better. Thus almost all students achieved the UULO’s communication goals. Outcome G in CS 301 also includes the UULO’s Citizenship and Ethics goal, namely to examine various concepts and theories of ethics, and how to assess claims about ethical issues and to apply ethical concepts and to specific ethical dilemmas students will experience in their professional lives. The direct assessment of Outcome G for CS 301 shows that over 94% of students achieved satisfactory or better; almost all students achieved the UULO’s Citizenship and Ethics goals.

III. Plan for Next Assessment Period (Spring 2017 and Fall 2017)

- Repeat assessment of Outcomes A, B, C, D, previously done in 2015, by using both direct and indirect methods.
- Analyze assessed data to obtain key findings.
• Follow-up on the suggestions for improving outcomes as recommended in this assessment period