Feedback for the 2011-2012 Annual Assessment Report
Department of Chemistry

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October 2012
California State University, Sacramento
To: Dean, College of Natural Sciences and Mathematics  
Chair, Department of Chemistry

From: Office of Academic Program Assessment (OAPA)  

Date: Oct. 2012

Subject: Feedback for the 2011-2012 Annual Assessment Report

CC: Office of Academic Affairs

The 2011-2012 annual assessment reports are based on the learning outcome assessment template prepared by the Office of Academic Affairs in support of the IPP (Instructional Program Priorities) process in 2012. This memo offers a summary of the documentation provided by the Department, a description of the assessment strategies used to assess program learning outcomes, and feedback for improving assessment practices in the future.

We have used appropriate WASC (Western Associate of Schools and Colleges) rubrics for guidance on effective practices in several areas, including the quality of the learning outcomes, assessment plans, methods/data/analysis, program review, and the use of assessment data for curriculum improvement, academic planning, and budgeting. This report and the following appendices can be used to help a department, a program, or a college to determine the extent to which such an assessment system is in place and what additional components or processes may need to be developed or improved for the programs in the department:

Appendix 1: WASC “Rubric for Assessing the Quality of Academic Program Learning Outcomes”
Appendix 2a: WASC “Rubric for Assessing the Use of Capstone Experience for Assessing Program Learning Outcomes”
Appendix 2b: WASC “Rubric for Assessing the Use of Portfolio for Assessing Program Learning Outcomes”
Appendix 3: Background Information for Academic Program Assessment and Review
Appendix 4: Sacramento State Baccalaureate Learning Goals for the 21st Century & AAC&U’s 15 VALUE Rubrics
Appendix 5: Relevant Verbs in Defining Learning Outcomes
Appendix 6: Future Considerations for Program Review and Assessment
Appendix 7: WASC: “Rubric for Assessing the Integration of Student Learning Assessment into Program Reviews”
Appendix 8: Glossary

Lastly, we would like to recognize and thank Dr. Don Taylor (Interim Assistant Vice President, Academic Programs and Global Engagement), Janett Torset and Korin Vallejo for their assistance in this assessment review process.

If you have any questions about the content of this report or the assessment of your academic program, please contact Dr. Amy Liu (amyliuus@yahoo.com), Director of the Office of Academic Program Assessment.
Executive Summary

The five Chemistry undergraduate programs have done an excellent job assessing and tracking student learning. It is among the few departments that have compared their students’ performance to national standards, conducted extensive analysis of the data, and tracked their student performances over many years.

As the Department moves forward, we encourage it to:

1. Look at good rubrics, such as the VALUE rubrics, to develop more sophisticated rubrics that would better capture key elements of complex program learning outcomes the department wants to assess, including library and scientific information literacy and problem solving, critical thinking, communication, and laboratory skills;
2. Use the newly developed rubrics to set standards of performance for the program learning outcomes;
3. Make sure that each program learning outcome and criterion is measurable by using specific action verbs based on Bloom’s taxonomy;
4. Link the capstone data and the ACS (American Chemical Society) exam to student attributes and analyze them according to the new rubrics, specific learning outcomes and/or criteria, and degree path;
5. Connect past and future data from ACS exam and capstone projects to retention and graduation rates and to budgeting and planning;
6. Collect data from external constituents such as alumni and employers to assess the longer-term effect of learning outcomes; and
7. Develop an effective and efficient assessment plan to assess the learning outcomes for its graduate and minor programs.
This report focuses on the key assessment questions in bold below.

1. Have formal program (not course) learning outcomes been developed and/or assessed for all the programs in the department?

The five Chemistry undergraduate programs have done an excellent job assessing and tracking student learning. It is among the few departments that have compared their students’ performance to national standards, carried out extensive analysis of the data, and tracked their student performances over many years.

While the assessment for chemistry undergraduate programs is good, no formal assessment plan has been developed for the two graduate programs, even though the department has been discussing and revising the curricula for these programs. No program assessment, including learning outcomes and data collection, has been conducted for the minor.

<table>
<thead>
<tr>
<th></th>
<th>Assessment Plan</th>
<th>Program Learning Outcomes</th>
<th>Data Collected</th>
<th>Data Used</th>
<th>Fall 2011 Enrollment</th>
<th>External Accreditation</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS Chemistry</td>
<td>Developed</td>
<td>Developed and assessed</td>
<td>Yes</td>
<td>Yes</td>
<td>150</td>
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</tr>
<tr>
<td>BS Biochemistry</td>
<td>Developed</td>
<td>Developed and assessed</td>
<td>Yes</td>
<td>Yes</td>
<td>133</td>
<td>No</td>
</tr>
<tr>
<td>BA Chemistry, Forensic Con.</td>
<td>Developed</td>
<td>Developed and assessed</td>
<td>Yes</td>
<td>Yes</td>
<td>69</td>
<td>No</td>
</tr>
<tr>
<td>BA Chemistry, Biochemistry Con.</td>
<td>Developed</td>
<td>Developed and assessed</td>
<td>Yes</td>
<td>Yes</td>
<td>137</td>
<td>No</td>
</tr>
<tr>
<td>BA Chemistry</td>
<td>Developed</td>
<td>Developed and assessed</td>
<td>Yes</td>
<td>Yes</td>
<td>34</td>
<td>No</td>
</tr>
<tr>
<td>Total BA/BS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>523</td>
<td></td>
</tr>
<tr>
<td>MS (two graduate programs?)</td>
<td>Not developed</td>
<td>Not developed nor assessed</td>
<td>Not Sure</td>
<td>Not Sure</td>
<td>36</td>
<td>No</td>
</tr>
<tr>
<td>Minor</td>
<td>Not developed</td>
<td>Not developed nor assessed</td>
<td>No</td>
<td>No</td>
<td>91</td>
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<tr>
<td>Total Department</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>650</td>
<td></td>
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</tbody>
</table>

2. What is the quality of these outcomes based on the WASC “Rubric for Assessing the Quality of Academic Program Learning Outcomes” (Appendix 1)?

Based on the criteria in Appendix 1, the Department is between the “Emerging” and the “Developed” stages.

Relevant outcomes are identified and concrete plans for collecting evidence for each program outcome are used routinely by faculty who are teaching the core classes. The undergraduate programs have a set of learning outcomes that focus on key knowledge, skills, and values.
National disciplinary standards have been considered and relevant institution-wide skills have also been included. They are designed to provide many opportunities for students to develop and apply sophisticated knowledge and skills as they move from the lower division classes to the capstone classes and graduation. However, we are not sure what the difference is between problem-solving skills (rubric questions 4, 5, and 7) and laboratory skills (4, 5, and 9) when two of the three criteria are the same (4 and 5, Table 2 on page 5 of the annual assessment report). The same is true for scientific information literary (6, 8, and 7) and communication skills (6, 8, 1, 2, 3). More information is needed here: more explicit criteria should be developed or attached at the end of the report (if any) for each of these skills. AAC&U’s VALUE rubrics (See Appendix 4) may be a good place to start. Look into borrowing some VALUE rubrics and adjust criteria to meet the programs’ needs.

In fact, the faculty need to agree on explicit criteria statements for each of the program learning outcomes. As the department develops its graduate program learning outcomes, distinctions should be made between expectations for undergraduate and graduate programs for common learning outcomes if communication skills are required for both graduate and undergraduate students. Faculty also need to identify examples of student performance at varying levels for the communication outcome for the undergraduate and the graduate programs. It would also be much easier to understand a learning outcome if complete sentences and strong action verbs are used to clearly describe each level of performances for each learning outcome. This is especially the case for learning outcomes that are similar at the graduate and undergraduate level.

Refer to AAC&U’s 15 VALUE rubrics as needed (Appendix 4).

3. Are the program learning outcomes aligned closely with the University Baccalaureate Learning Goals (UBLG)?

Yes. The undergraduate program learning outcomes are aligned closely with the University Baccalaureate Learning Goals. See Appendix 4 for more details.

4. What methods are used to collect the data for EACH of the learning outcomes? Is the data collected of high quality (valid and reliable)?

The American Chemistry Society (ACS) exam and capstone projects (at least 8 sections of classes for MS Biochemistry alone) are the two methods used to obtain evidence for the learning outcomes in all undergraduate programs. These two methods have allowed all the undergraduate programs to compare student performance with a national norm, carry out extensive data analysis, and track student performance over many years.

However, we are not quite clear about the following questions: 1) what are the standards (scores) that students should get in the ACS exam or the capstone projects to be considered competent in the knowledge or skills taught by each undergraduate program and 2) what are the criteria used by ACS or by the undergraduate program, and why?

Table 1 on page 4 in the annual assessment report presented by the department is excellent; it provides a lot of information to help readers understand the extensive faculty involvement in data collection and analysis, including the summary of the courses and methods used for assessment.
Adding to Table 1 how each program learning outcome is connected to the measurement information can create a great measurement map that shows explicitly how different methods can be used to assess each program learning outcome.

Refer to WASC rubrics as needed (Appendix 2a = Capstone, key assignments, or papers; Appendix 2b = Portfolio).

5. Has the program used alumni surveys to collect data to assess the longer-term effects of the program learning outcomes? Are the methods/results reliable and/or valid?

Alumni surveys have not been systematic in the past, but the department plans to conduct them in the future.

6. How have the findings from the learning outcomes assessment been utilized to revise or maintain elements of the curriculum?

Data are collected, discussed, and used to improve student learning. Most faculty from the department are working together to make sure students will have many opportunities to develop their knowledge and skills. We are not sure if the Department has conducted any follow-up assessment to determine whether any program changes have significantly improved student learning. In the future, we hope the department will consider collecting this data and evidence from external constituents such as alumni and/or employers to assess the longer term effect of its learning outcomes.
## Appendix 1: WASC “Rubric for Assessing the Quality of Academic Program Learning Outcomes”

[http://www.aacu.org/value/index.cfm](http://www.aacu.org/value/index.cfm)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Initial</th>
<th>Emerging</th>
<th>Developed</th>
<th>Highly Developed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Comprehensive List</strong></td>
<td>The list of outcomes is problematic: e.g., very incomplete, overly detailed, inappropriate, disorganized. It may include only discipline-specific learning, ignoring relevant institution-wide learning. The list may confuse learning processes (e.g., doing an internship) with learning outcomes (e.g., application of theory to real-world problems).</td>
<td>The list includes reasonable outcomes but does not specify expectations for the program as a whole. Relevant institution-wide learning outcomes and/or national disciplinary standards may be ignored. Distinctions between expectations for undergraduate and graduate programs may be unclear.</td>
<td>The list is a well-organized set of reasonable outcomes that focus on the key knowledge, skills, and values students learn in the program. It includes relevant institution-wide outcomes (e.g., communication or critical thinking skills). Outcomes are appropriate for the level (undergraduate vs. graduate); national disciplinary standards have been considered.</td>
<td>The list is reasonable, appropriate, and comprehensive, with clear distinctions between undergraduate and graduate expectations, if applicable. National disciplinary standards have been considered. Faculty have agreed on explicit criteria for assessing students’ level of mastery of each outcome.</td>
</tr>
<tr>
<td><strong>2. Assessable Outcomes</strong></td>
<td>Outcomes statements do not identify what students can do to demonstrate learning. “Statements understand scientific method” do not specify how understanding can be demonstrated and assessed.</td>
<td>Most of the outcomes indicate how students can demonstrate their learning.</td>
<td>Each outcome describes how students can demonstrate learning, e.g., “Graduates can write reports in APA style” or “Graduate can make original contributions to biological knowledge.”</td>
<td>Outcomes describe how students can demonstrate their learning. Faculty have agreed on explicit criteria statements such as rubrics, and have identified example of student performance at varying levels of each outcome.</td>
</tr>
<tr>
<td><strong>3. Alignment</strong></td>
<td>There is no clear relationship between the outcomes and the curriculum that students experience.</td>
<td>Students appear to be given reasonable opportunities to develop the outcomes in the required curriculum.</td>
<td>The curriculum is designed to provide opportunities for students to learn and to develop increasing sophistication with respect to each outcome. This design may be summarized in a curriculum map.</td>
<td>Pedagogy, grading, the curriculum, relevant student support services, and co-curriculum are explicitly and intentionally aligned with each outcome. Curriculum map indicates increasing levels of proficiency.</td>
</tr>
<tr>
<td><strong>4. Assessment Planning</strong></td>
<td>There is no formal plan for assessing each outcome.</td>
<td>The program relies on short-term planning, such as selecting which outcome(s) to assess in current year.</td>
<td>The program has a reasonable, multi-year assessment plan that identifies when each outcome will be assessed. The plan may explicitly include analysis and implementation of improvements.</td>
<td>The program has a fully-articulated, sustainable, multi-year assessment plan that describes when and how each outcome will be assessed and how improvements based on findings will be implemented. The plan is routinely examined and revised, as needed.</td>
</tr>
<tr>
<td><strong>5. The Student Experience</strong></td>
<td>Students know little or nothing about the overall outcomes of the program. Communication of outcomes to students, e.g. in syllabi or catalog, is spotty or nonexistent.</td>
<td>Students have some knowledge of program outcomes. Communication is occasional and informal, left to individual faculty or advisors.</td>
<td>Students have a good grasp of program outcomes. They may use them to guide their own learning. Outcomes are included in most syllabi and are readily available in the catalog, on the web page, and elsewhere.</td>
<td>Students are well-acquainted with program outcomes and may participate in creation and use of rubrics. They are skilled at self-assessing in relation to the outcome levels of performance. Program policy calls for inclusion of outcomes in all course syllabi, and they are readily available in other program documents.</td>
</tr>
</tbody>
</table>
### Appendix 2a: WASC “Rubric for Assessing the Use of Capstone Experience For Assessing Program Learning Outcomes”
(This rubric can be used with any key assignment, project, or paper)

http://www.aacu.org/value/index.cfm

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Initial</th>
<th>Emerging</th>
<th>Developed</th>
<th>Highly Developed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Relevant Outcomes and Lines of Evidence Identified</strong></td>
<td>It is not clear which program outcomes will be assessed in the capstone course.</td>
<td>The relevant outcomes are identified, e.g., ability to integrate knowledge to solve complex problems; however, concrete plans for collecting evidence for each outcome have not been developed.</td>
<td>Relevant outcomes are identified. Concrete plans for collecting evidence for each outcome are agreed upon and used routinely by faculty who staff the capstone course.</td>
<td>Relevant evidence is collected; faculty have agreed on explicit criteria statements, e.g., rubrics, and have identified examples of student performances at varying levels of mastery for each relevant outcome.</td>
</tr>
<tr>
<td><strong>Valid Results</strong></td>
<td>It is not clear that potentially valid evidence for each relevant outcome is collected and/or individual faculty use idiosyncratic criteria to assess student work or performances.</td>
<td>Faculty have reached general agreement on the types of evidence to be collected for each outcome; they have discussed relevant criteria for assessing each outcome but these are not yet fully defined.</td>
<td>Faculty have agreed on concrete plans for collecting relevant evidence for each outcome. Explicit criteria, e.g., rubrics, have been developed to assess the level of student attainment of each outcome.</td>
<td>Assessment criteria, such as rubrics, have been pilot-tested and refined over time; they usually are shared with students. Feedback from external reviewers has lead to refinements in the assessment process, and the department uses external benchmarking data.</td>
</tr>
<tr>
<td><strong>Reliable Results</strong></td>
<td>Those who review student work are not calibrated to apply assessment criteria in the same way; there are not checks for inter-rater reliability.</td>
<td>Reviewers are calibrated to apply assessment criteria in the same way or faculty routinely check for inter-rater reliability.</td>
<td>Reviewers are calibrated to apply assessment criteria in the same way, and faculty routinely check for inter-rater reliability.</td>
<td>Reviewers are calibrated, and faculty routinely find assessment data have high inter-rater reliability.</td>
</tr>
<tr>
<td><strong>Results are Used</strong></td>
<td>Results for each outcome may or may not be are collected. They are not discussed among faculty.</td>
<td>Results for each outcome are collected and may be discussed by the faculty, but results have not been used to improve the program.</td>
<td>Results for each outcome are collected, discussed by faculty, analyzed, and used to improve the program.</td>
<td>Faculty routinely discuss results, plan needed changes, secure necessary resources, and implement changes. They may collaborate with others, such as librarians or Student Affairs professional, to improve results. Follow-up studies confirm that changes have improved learning.</td>
</tr>
<tr>
<td><strong>The Student Experience</strong></td>
<td>Students know little or nothing about the purpose of the capstone or outcomes to be assessed. It is just another course or requirement.</td>
<td>Students have some knowledge of the purpose and outcomes of the capstones. Communications is occasional, informal, left to individual faculty or advisors.</td>
<td>Students have a good grasp of purpose and outcomes of the capstone and embrace it as a learning opportunity. Information is readily available in advising guides, etc.</td>
<td>Students are well-acquainted with purpose and outcomes of the capstones and embrace it. They may participate in refining the experience, outcomes, and rubrics. Information is readily available.</td>
</tr>
</tbody>
</table>
### Appendix 2b: WASC “Rubric for Assessing the Use of Portfolio For Assessing Program Learning Outcomes”

[http://www.aacu.org/value/index.cfm](http://www.aacu.org/value/index.cfm)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Initial</th>
<th>Emerging</th>
<th>Developed</th>
<th>Highly Developed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarification of Students’ Task</td>
<td>Instructions to students for portfolio development provide insufficient detail for them to know what faculty expect. Instructions may not identify outcomes to be addressed in the portfolio.</td>
<td>Students receive some written instructions for their portfolios, but they still have problems determining what is required of them and/or why they are compiling a portfolio.</td>
<td>Students receive written instructions that describe faculty expectations in detail and include the purpose of the portfolio, types of evidence to include, role of the reflective essay (if required), and format of the finished product.</td>
<td>Students in the program understand the portfolio requirement and the rationale for it, and they view the portfolio as helping them develop self-assessment skills. Faculty may monitor the developing portfolio to provide formative feedback and/or advise individual students.</td>
</tr>
<tr>
<td>Valid Results</td>
<td>It is not clear that valid evidence for each relevant outcome is collected and/or individual reviewers use idiosyncratic criteria to assess student work.</td>
<td>Appropriate evidence is collected for each outcome, and faculty have discussed relevant criteria for assessing each outcome.</td>
<td>Appropriate evidence is collected for each outcome; faculty use explicit criteria, such as agreed-upon rubrics, to assess student attainment of each outcome. Rubrics are usually shared with students.</td>
<td>Assessment criteria, e.g., in the form of rubrics, have been pilot-tested and refined over time; they are shared with students, and student may have helped develop them. Feedback from external reviewers has led to refinements in the assessment process. The department also uses external benchmarking data.</td>
</tr>
<tr>
<td>Reliable Results</td>
<td>Those who review student work are not calibrated to apply assessment criteria in the same way; there are not checks for inter-rater reliability.</td>
<td>Reviewers are calibrated to apply assessment criteria in the same way or faculty routinely check for inter-rater reliability.</td>
<td>Reviewers are calibrated to apply assessment criteria in the same way, and faculty routinely check for inter-rater reliability.</td>
<td>Reviewers are calibrated, and faculty routinely find assessment data have high inter-rater reliability.</td>
</tr>
<tr>
<td>Results are Used</td>
<td>Results for each outcome may or may not be collected. They are not discussed among faculty.</td>
<td>Results for each outcome are collected and may be discussed by the faculty, but results have not been used to improve the program.</td>
<td>Results for each outcome are collected, discussed by faculty, analyzed, and used to improve the program.</td>
<td>Faculty routinely discuss results, plan needed changes, secure necessary resources, and implement changes. They may collaborate with others, such as librarians or Student Affairs professional, to improve results. Follow-up studies confirm that changes have improved learning.</td>
</tr>
<tr>
<td>If e-portfolios Are Used</td>
<td>There is no technical support for students or faculty to learn the software or to deal with problems.</td>
<td>There is informal or minimal formal support for students and faculty.</td>
<td>Formal technical support is readily available and proactively assists in learning the software and solving problems.</td>
<td>Support is readily available, proactive, and effective. Tech support personnel may also participate in refining the overall portfolio process.</td>
</tr>
</tbody>
</table>
Appendix 3: Background Information for Academic Program Assessment and Review

Ideally, academic program assessment and review at Sacramento State should be an ongoing process that facilitates continuous program improvement and includes the following areas:

**Assessment Plan:** Each program needs to develop a program assessment plan which contains the following elements: program goals and learning outcomes, methods for assessing progress toward these outcomes, and a timetable. This plan should be updated annually or as frequently as needed.

**Annual Program Assessment Report:** Program learning outcomes (PLOs) should be directly aligned with course learning outcomes (CLOs) and the University Baccalaureate Learning Goals (UBLGs). Programs are asked to provide the Office of Academic Affairs with an annual report (annual assessment report - AAR) on program assessment activities that occurred during the past academic year. These reports should identify learning goals and outcomes that were targeted for program assessment, measures used to evaluate progress toward those outcomes, data and analysis, and changes made or planned in response to the results. Annual program assessment and the assessment reports provide a solid foundation and data for the six year program review at Sacramento State.

**Program Review:** Each department undertakes an extensive program review every six years. As part of the program review process, departments are asked to use annual program assessment data to evaluate how well students are meeting program learning outcomes and university learning goals.

Thus, each department in our university should have in place a system for collecting and using evidence to improve student learning. So far, not all departments have established program learning outcomes and/or approaches to assess learning for all degree programs; it is essential to make these expectations explicit. This will help departments and colleges to assure that every degree program has or will have in place a quality assurance system for assessing and tracking student learning, and use this information to improve their respective programs. Importantly, departments should also present learning expectations, data, findings, and analysis in a way that is easy to understand and/or to use by the faculty, students, administration, the general public, accreditation agencies, and policy-makers.

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1 Adapted from the information at [http://webapps2.csus.edu/assessment/]
Appendix 4: Sacramento State Baccalaureate Learning Goals for the 21st Century & AAC&U's 15 VALUE Rubrics


1. Competence in the Disciplines: The ability to demonstrate the competencies and values listed below in at least one major field of study and to demonstrate informed understandings of other fields, drawing on the knowledge and skills of disciplines outside the major.

2. Knowledge of Human Cultures and the Physical and Natural World through study in the sciences and mathematics, social sciences, humanities, histories, languages, and the arts. Focused by engagement with big questions, contemporary and enduring.

3. Intellectual and Practical Skills, Including: inquiry and analysis, critical, philosophical, and creative thinking, written and oral communication, quantitative literacy, information literacy, teamwork and problem solving, practiced extensively, across the curriculum, in the context of progressively more challenging problems, projects, and standards for performance.
   3.1 Inquiry and analysis (First VALUE rubric)
   3.2 Critical thinking (Second VALUE rubric)
   3.3 Creative thinking (Third VALUE rubric)
   3.4 Written communication (Fourth VALUE rubric)
   3.5 Oral communication (Fifth VALUE rubric)
   3.6 Reading (Sixth VALUE rubric)
   3.7 Quantitative literacy (Seventh VALUE rubric)
   3.8 Information literacy (Eighth VALUE rubric)
   3.9 Teamwork (Ninth VALUE rubric)
   3.10 Problem solving (Tenth VALUE rubric)

4. Personal and Social Responsibility (Values), including: civic knowledge and engagement—local and global, intercultural knowledge and competence*, ethical reasoning and action, foundations and skills for lifelong learning anchored through active involvement with diverse communities and real-world challenges.
   4.1 Civic knowledge and engagement—local and global (Eleventh VALUE rubric)
   4.2 Intercultural knowledge and competence (Twelfth VALUE rubric)
   4.3 Ethical reasoning (Thirteenth VALUE rubric)
   4.4 Foundations and skills for lifelong learning (Fourteenth VALUE rubric)

5. Integrative Learning **, including: synthesis and advanced accomplishment across general and specialized studies.
   a. Integrative and applied learning (Fifteenth VALUE rubric)

All of the above are demonstrated through the application of knowledge, skills, and responsibilities (values) to new settings and complex problems.

*Understanding of and respect for those who are different from oneself and the ability to work collaboratively with those who come from diverse cultural backgrounds.

** Interdisciplinary learning, learning communities, capstone or senior studies in the General Education program and/or in the major connecting learning goals with the content and practices of the educational programs including GE, departmental majors, the co-curriculum and assessments.
Appendix 5: Relevant Verbs in Defining Learning Outcomes
(Based on Bloom’s Taxonomy)

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Comprehension</th>
<th>Application</th>
<th>Analysis</th>
<th>Synthesis</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cite</td>
<td>Arrange</td>
<td>Apply</td>
<td>Analyze</td>
<td>Arrange</td>
<td>Appraise</td>
</tr>
<tr>
<td>Define</td>
<td>Classify</td>
<td>Change</td>
<td>Appraise</td>
<td>Assemble</td>
<td>Assess</td>
</tr>
<tr>
<td>Describe</td>
<td>Convert</td>
<td>Compute</td>
<td>Break Down</td>
<td>Categorize</td>
<td>Choose</td>
</tr>
<tr>
<td>Identify</td>
<td>Describe</td>
<td>Construct</td>
<td>Calculate</td>
<td>Collect</td>
<td>Compare</td>
</tr>
<tr>
<td>Indicate</td>
<td>Defend</td>
<td>Demonstrate</td>
<td>Categorize</td>
<td>Combine</td>
<td>Conclude</td>
</tr>
<tr>
<td>Know</td>
<td>Diagram</td>
<td>Discover</td>
<td>Compare</td>
<td>Compile</td>
<td>Contrast</td>
</tr>
<tr>
<td>Label</td>
<td>Discuss</td>
<td>Dramatize</td>
<td>Contrast</td>
<td>Compose</td>
<td>Criticize</td>
</tr>
<tr>
<td>List</td>
<td>Distinguish</td>
<td>Employ</td>
<td>Criticize</td>
<td>Construct</td>
<td>Decide</td>
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<tr>
<td>Match</td>
<td>Estimate</td>
<td>Illustrate</td>
<td>Debate</td>
<td>Create</td>
<td>Discriminate</td>
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<td>Name</td>
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</tr>
<tr>
<td>Outline</td>
<td>Generalize</td>
<td>Manipulate</td>
<td>Differentiate</td>
<td>Explain</td>
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<td>Test</td>
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Appendix 6: Future Considerations for Programs Review & Assessment

In the future, please keep the following questions in mind when the unit (program, department, or the college) reflects on assessing student learning outcomes and improving the programs:

1) **What are your program learning outcomes:** what should your graduates know, value, and be able to do (at or near the time of graduation)? What are the explicit criteria or rubric to use in assessing a particular program learning outcome? What are the standards of performance for each outcome? Have the programs achieved the learning outcomes: the standards? Is each outcome assessable?

2) **Is an assessment plan for each unit (program, department, or college) in place?** Is the curriculum map developed? Does the plan clarify when, how, and how often each outcome will be assessed and used? Will all outcomes be assessed over a reasonable period of time, such as within a six-year program review cycle? Is the plan sustainable in terms of human, fiscal, and other resources? Is the assessment plan revised as needed?

3) **What are the data, findings and analyses for EACH program learning outcome? What is the quality of the data: how reliable and valid is the data?** Other than GPA, what data/evidences are used to determine whether your graduates have achieved the stated outcomes for the degree (BA/BS or MA/MS)? If two or more pieces of assessment data are used for each outcome, is the data consistent or contradictory?

4) **Who is going to use the data?** Are the data, findings, or analyses clearly presented so that they are easy to understand and/or use? Is the data used only for the course or for the program where the data is collected, or do you want the data to be used broadly for the curriculum, budgeting, or strategic planning at the department, the college, or the university?

5) **Has the program conducted follow-up assessment to evaluate the effectiveness of program changes made based on assessment data?** If yes, **how effective are those changes to improve student learning and success?** If no, what’s your plan to assess the effectiveness of those changes?

6) **Are students aware of these learning outcomes?** Do they often use them to assess the learning outcomes themselves? Where are the program learning outcomes published for view, e.g., across programs, with students, in the course syllabus, the department websites or catalogs? Are they widely shared?

7) **Are the program learning outcomes in the annual assessment report aligned closely with the most updated assessment plan and with the missions of the university and the department/college?**

8) **Is each program learning outcome aligned closely with the curriculum, the key assignment, pedagogy, grading, the curriculum, the co-curriculum, or relevant student support services?**
## Appendix 7: WASC: “Rubric for Assessing the Integration of Student Learning Assessment into Program Reviews”

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Initial</th>
<th>Emerging</th>
<th>Developed</th>
<th>Highly developed</th>
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<tbody>
<tr>
<td><strong>Required Elements of the Self-Study</strong></td>
<td>Program faculty may be required to provide a list of program-level student learning outcomes.</td>
<td>Faculty are required to provide the program’s student learning outcomes and summarize annual assessment findings.</td>
<td>Faculty are required to provide the program’s student learning outcomes, annual assessment findings, and resulting changes. They may be required to submit a plan for the next cycle of assessment studies.</td>
<td>Faculty are required to evaluate the program’s student learning outcomes, annual assessment findings, benchmarking results, subsequent changes, and evidence concerning the impact of these changes. They present a plan for the next cycle of assessment.</td>
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<tr>
<td><strong>Process of Review</strong></td>
<td>Internal and external reviewers do not address evidence concerning the quality of student learning in the program other than grades.</td>
<td>Internal and external reviewers address indirect and possibly direct evidence of student learning in the program; they do so at the descriptive level, rather than providing an evaluation.</td>
<td>Internal and external reviewers analyze direct and indirect evidence of student learning in the program and offer evaluative feedback and suggestions for improvement. They have sufficient expertise to evaluate program efforts; departments use the feedback to improve their work.</td>
<td>Well-qualified internal and external reviewers evaluate the program’s learning outcomes, assessment plan, evidence, benchmarking results, and assessment impact. They give evaluative feedback and suggestions for improvement. The department uses the feedback to improve student learning.</td>
</tr>
<tr>
<td><strong>Planning and Budgeting</strong></td>
<td>The campus has not integrated program reviews into planning and budgeting processes.</td>
<td>The campus has attempted to integrate program reviews into planning and budgeting processes, but with limited success.</td>
<td>The campus generally integrates program reviews into planning and budgeting processes, but not through a formal process.</td>
<td>The campus systematically integrates program reviews into planning and budgeting processes, e.g., through negotiating formal action plans with mutually agreed-upon commitments.</td>
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<td><strong>Annual Feedback on Assessment Efforts</strong></td>
<td>No individual or committee on campus provides feedback to departments on the quality of their outcomes, assessment plans, assessment studies, impact, etc.</td>
<td>An individual or committee occasionally provides feedback on the quality of outcomes, assessment plans, assessment studies, etc.</td>
<td>A well-qualified individual or committee provides annual feedback on the quality of outcomes, assessment plans, assessment studies, etc. Departments use the feedback to improve their work.</td>
<td>A well-qualified individual or committee provides annual feedback on the quality of outcomes, assessment plans, assessment studies, benchmarking results, and assessment impact. Departments effectively use the feedback to improve student learning. Follow-up activities enjoy institutional support.</td>
</tr>
<tr>
<td><strong>The Student Experience</strong></td>
<td>Students are unaware of and uninvolved in program review.</td>
<td>Program review may include focus groups or conversations with students to follow up on results of surveys.</td>
<td>The internal and external reviewers examine samples of student work, e.g., sample papers, portfolios and capstone projects. Students may be invited to discuss what they learned and how they learned it.</td>
<td>Students are respected partners in the program review process. They may offer poster sessions on their work, demonstrate how they apply rubrics to self-assess, and/or provide their own evaluative feedback.</td>
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Appendix 8: Glossary

A glossary of terms used in this report and by WASC accreditation is provided below. As WASC points in its most updated Handbook of Accreditation:

“Many of these terms have multiple meanings and/or have been used in different ways by different associations, institutions, and individuals. The definitions that follow represent the way WASC typically uses these words for purposes of institutional review and reporting. If local usage differs significantly from the definitions below, the institutions should consider translating its terms for accreditation purposes to avoid misunderstanding on the part of the evaluation term, WASC staff, and others” (WASC Handbook of Accreditation 2012:39).

To avoid misunderstanding by WASC and confusion at Sacramento State, we have decided to use the same definitions from the most updated draft of WASC 2013 Handbook of Accreditation which can be located at http://www.wassenior.org/files/WASC%20Draft%202013%20Handbook%20of%20Accreditation_0.pdf

AAC&U - the Association of American Colleges and University. Washington-based national organization dedicated to promotion of liberal learning and its integration with professional and civic education.

Assessment (of student learning) - an ongoing, iterative process consisting of four basic steps: 1. defining learning outcomes; 2. choosing a method or approach and then using it to gather evidence of learning; 3. analyzing and interpreting the evidence; and 4. using this information to improve student learning.

Assessment Planning (Institutional) - the development of a design by which an institution sets goals and objectives and identifies the means to measure their accomplishment. Institutional planning may address educational programs, support services, the physical plant, budgets and finances, and other aspects of institutional operation and future development.

Accountability - in higher education, being answerable to the public, e.g., students, parents, policymakers, employers. Historically, accountability has focused on financial resources; emphasis now extends to students’ academic progress, including retention, acquisition of knowledge and skills, and degree completion.

Alignment - connections among functions or dimensions of an institution that support achievement of goals, e.g., among curriculum, pedagogy, and expected outcomes; or priorities, planning, and resource allocation.

Benchmark - a point of reference or standard of excellence in relation to which something can be compared and judged. A specific level of student performance may serve as the benchmark that students are expected to meet at a particular point in time or developmental level. Retention and graduation rates may also be benchmarked against those of peer institutions or national norms.
Capstone – a culminating project or experience, usually associated with undergraduates but also applicable to graduate education, that generally takes place in the student’s final year of study and requires review, synthesis, and application of what has been learned over the course of the student’s college experience. The result may be a product (e.g., original research, an innovative engineering design, an art exhibit) or a performance (e.g., a recital, an internship, student teaching). The capstone can provide evidence for assessment of a range of outcomes, e.g., core competencies, general education outcomes, and institution-level outcomes, as well as those for the major or graduate degree.

Closing the Loop - refers to the four-step assessment cycle (see “assessment of student learning”) and the need to complete the cycle in order to improve learning. “Completing the cycle” may be understood as 1. completing step 4; or 2. completing step 4 and then repeating the cycle to see whether the changes implemented have produced the desired result.

Criterion-Referenced - testing or assessment in which student performance is judged in relation to pre-established standards and not in relation to the performance of other students.

Co-curricular Learning - learning that takes place in activities and programs that are not part of the prescribed sequence of courses in an academic program.

Culture of Evidence – a habit of using evidence in assessment, decision making, planning, resource allocation, and other institutional processes that is embedded in and characteristic of an institution’s actions and practices.

Curriculum Map - a visual representation, usually in the form of a table or matrix, that shows the alignment of course outcomes with program learning outcomes. Well-crafted curriculum maps also show development of proficiency levels, for example using terminology such as “beginning,” “intermediate,” and “advanced” or “introduced,” “developed,” and “mastered.”

Degree Qualifications Profile (DQP) – a framework funded by the Lumina Foundation that describes the kinds of learning and levels of performance that may be expected of students who have earned an associate, baccalaureate, or master’s degree.

Direct Method - in assessment of student learning, a way of gathering evidence of learning directly, e.g., through scoring of actual student work or performances, rather than indirectly, e.g., through self-reports, surveys, etc. Direct evidence can be supplemented by indirect evidence and descriptive data.

External Validation - corroboration or confirmation through an outside source. External validation has two dimensions: 1. data from external sources may be used to confirm that something has been accurately judged and documented; and 2. external reviewers may be invited to examine the evidence. External validation can bring fresh perspectives and lend credibility. See also “external evaluator.”
**Formative Assessment** - assessment intended to provide feedback and support for improved performance as part of an ongoing learning process, whether at the student, program, or institution level. See also “summative assessment.”

**Goal** - 1. In assessment of student learning, a high-level, very general statement of learning expected of graduates, aligned with the institution’s mission, vision, and values (more specific learning outcomes are derived from goals); 2. A statement developed by an institution or program related to strategic planning, financial development, and other important issues.

**High-Impact Practice (HIP):** HIPs include first year seminars, common intellectual experiences, learning communities, writing-intensive courses, collaborative assignments, undergraduate research, diversity/global learning, service learning, internships, and capstone courses or projects. Research suggests that if students experience one or more HIPS in the course of their studies, they are more likely to persist, achieve higher levels of learning, and complete their degrees.

**Indirect Method** - in assessment of student learning, a way to capture evidence of learning in the form of opinions—for example, of students, employers, and alumni—by means of surveys, focus groups, exit interviews, etc. Indirect evidence is mediated by personal perceptions and experiences, and learning can only be inferred. Indirect evidence may be supplemented by descriptive data.

**LEAP - Liberal Education and America’s Promise** – a project of AAC&U, the LEAP outcomes (also known as Essential Learning Outcomes) total 12, grouped under the headings “Knowledge of Human Cultures and the Natural and Physical World,” “Intellectual and Practical Skills,” “Personal and Social Responsibility,” and “Integrative and Applied Learning.”

**Mission** - in higher education, an institution’s formally adopted statement of its fundamental reasons for existence, its shared purposes and values, and the students that it aims to serve. The mission is central to decisions about priorities and strategic objectives and provides a context for WASC decisions about quality and accreditation.

**Norming** - 1. in assessment of student learning, a process of training raters to evaluate student products and performances consistently, typically using criterion-referenced standards and rubrics; 2. in accreditation, can be applied to other reviewing and rating processes, e.g. institutional evaluation, Commission actions.

**Norm-Referenced** - testing or assessment in which student performance is judged in relation to the performance of a larger group of students, not measured against a pre-established standard.

**Objective** - in assessment of student learning, a concise statement of what the instructor (or program or institution) intends a student to learn (on some campuses, objectives then lead to development of learning outcomes); 2. Sometimes used interchangeably with “outcome,” but “outcome” has become the more common usage because of its more direct focus on the result (or “outcome”) for the student; 3. in institution- or program-level planning, more specific statements
derived from general goals; 4. in psychometrics, a test consisting of factual questions requiring short answers that can be reliably scored using an answer key, minimizing subjective judgments.

**OAPA** - Office of Academic Program Assessment at Sacramento State located in Library 67.

**Outcome** - in assessment of student learning, a concise statement of what the student should know or be able to do. Well-articulated learning outcomes describe how a student can demonstrate the desired outcome; verbs such as “understand” or “appreciate” are avoided in favor of observable actions, e.g., “identify,” “analyze.” Learning outcomes can be formulated for different levels of aggregation and analysis. Student learning outcomes are commonly abbreviated as SLOs, course learning outcomes as CLOs, program learning outcomes as PLOs, and institution-level outcomes as ILOs. 2. Other outcomes may address access, retention and graduation, and other indicators aligned with institutional mission and goals.

**Persistence** - like “retention,” refers to the rate at which students return to college from semester to semester and year to year, or “persist” in their education. Some educators interpret “retention” as putting the responsibility for degree completion on the institution, whereas “persistence” puts the responsibility on the student.

**Portfolio** - in assessment of student learning, a method of collecting student work so that the evidence can be reviewed in relation to specific learning outcomes. Most student portfolios also include a reflection on the learning process. Portfolios are highly adaptable: they may be developmental (showing progress from rough draft to finished product) or cumulative (i.e., students’ “best work”); and they may be assembled at the level of the individual student, program, or institution.

**Program** - 1. A systematic, usually sequential, grouping of courses that forms a considerable part, or all, of the requirements for a degree in a major or professional field; 2. sometimes refers to the total educational offering of an institution.

**Program Review** - a systematic process of examining the capacity, processes, and outcomes of a degree program or department in order to judge its quality and effectiveness and to support improvement. Historically, program review focused primarily on capacity and research output; more recently, educational outcomes and student success have been included. While student success and assessment of learning at the program level are an important part of program review, they should not be confused with the more encompassing process of program review.

**Reliability** - in psychometrics and assessment of student learning, the consistency and dependability of judgments and measurements. See also “validity.”

**Retention** - typically refers to the rate at which students return and re-enroll in college from semester to semester and year to year; retention rates from first to second year are of particular interest, since that is when the heaviest attrition is likely to occur.

**Rigor** - in education, refers both to a challenging curriculum and to the consistency or stringency with which high standards for student learning and performance are upheld.
**Rubric** – a tool for scoring student work or performances, typically in the form of a table or matrix, with criteria that describe the dimensions of the outcome down the left-hand vertical axis, and levels of performance across the horizontal axis. The work or performance may be given an overall score (holistic scoring), or criteria may be scored individually (analytic scoring). Rubrics are also used to communicate expectations to students. 2. WASC has developed a number of rubrics to assist teams and institutions in evaluating various aspects of their curriculum and assessment processes.

**Signature Assignment** - an embedded assessment method using an assignment—either the identical assignment or multiple assignments all constructed according to a common template—across multiple courses or sections of courses. A sample of students’ work products is then examined using a rubric to arrive at judgments about the quality of student learning across the course, program, or institution. Alternatively, a signature question may be embedded, for example, in final exams.

**Standard** - broadly refers to statements of expectations for student learning, which may include content standards, performance standards, and benchmarks. In the K-12 arena, standards generally describe content, but not level of mastery. In higher education, in contrast, standards generally refer to expected levels of mastery or proficiency. Not to be confused with standards of accreditation.

**Standard of Performance** - the degree of skill or proficiency with which a student demonstrates a learning outcome. WASC Standard 2, CFR 2.2a, requires institutions to report on their students’ levels of performance at or near the time of graduation in five core competencies: writing, oral communication, quantitative reasoning, critical thinking, and information literacy. Standards of performance are set by faculty and other educators on campus.

**Standardized** - a good practice meaning that a protocol or set of guidelines is consistently followed. For example, individuals may be trained in using scoring rubrics or conducting focus groups such that their activities are “standardized” to support the collection of reliable data. Commercially available tests are often referred to as “standardized tests,” and “standardized” has acquired negative connotations in some circles.

**Standards of Accreditation** - standards of accreditation are the principles used as a basis for judgment in accreditation reviews. WASC has four Standards that flow from three Core Commitments. They are used to guide institutions in assessing institutional performance, to identify areas needing improvement, and to serve as the basis for judgment of the institution by evaluation teams and the Senior College Commission

**Student-Centeredness** - 1) a shift in perspective from teaching and inputs (e.g., assignments) to desired outcomes and what students actually learn; 2) an approach that places the student (the learner) at the center of the educational process by providing more curricular flexibility, more accessible services, a supportive campus climate, and so on.
**Student Success** – a phrase often used as shorthand for retention and degree completion. For WASC, student success includes quality of learning and rigor as well as retention and completion.

**Summative Assessment** - 1. assessment that occurs at the conclusion or end point of a course, program, or college experience to determine whether student learning outcomes have been achieved; 2. applied organizationally, the use of certain methods to evaluate the overall effectiveness of a program, an institution, or some element of the course of study. See also “formative assessment.”

**Sustainability** - ability of an educational institution to maintain effective functioning and improve over the long term. Assumes financial viability, but also availability of human capital and other resources, as well as vision, planning, and flexibility.

**Triangulation** - the use of multiple methods to generate more robust evidence and to see whether results converge or diverge.

**Validity** - in psychometrics and assessment of student learning, refers to how well a particular assessment method actually measures what it is intended to measure. Considerations include construct validity, content validity, and face validity. May also refer to consequences, i.e., whether an assessment has “consequential validity” and will support subsequent actions to improve learning. See also “reliability.”

**VALUE rubrics** - Valid Assessment of Learning in Undergraduate Education; a set of fifteen rubrics developed by AAC&U in collaboration with hundreds of faculty to assess learning outcomes defined by the LEAP project. Institutions may download the rubrics at no cost and are encouraged to modify them to suit local needs.

**Value-added** - 1. in higher education, the contribution that institutions make to their students’ learning and development, documented from students’ entry to exit; 2. a WASC value, namely to promote an accreditation process that adds value to institutions and helps them to achieve their own goals.

**WASC** - “Western Association of Schools and Colleges” The three Commissions under the WASC umbrella: the Accrediting Commission for Schools (ACS); the Accrediting Commission for Community and Junior Colleges (ACCJC); and the Accrediting Commission for Senior Colleges and Universities (ACSCU), also referred to as the Senior College Commission. In the context of the 2013 Handbook, WASC refers to the Senior College Commission.