Weber State University
Annual Assessment of Evidence of Learning

Cover Page

Department/Program:
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Preamble:
The Department of Physics has prided itself on quality instruction and learning, as well as a dedication to educational research and paying careful attention to authentic assessment of learning. However, in recent months we have let the documentation of this erode. A series of sabbaticals and other distractions removed our attention from these efforts over the past year. As this report is being completed, we are renewing efforts to solidify our assessment. These include:

1. Revisiting our Student Learning Outcomes, paying careful attention to them being both authentic to our mission and measureable.
2. Revisiting our curriculum map and explicating how/where we match Student Learning Outcomes to specific course (and other) artifacts. In particular, we should emphasize our use of a capstone course (PHYS 4990) and exit interviews of graduates.
3. Continuing our focused efforts on general education outcomes. Collaborating faculty are analyzing and sharing assessment efforts for two outcomes per year.

A. **Brief Introductory Statement:**
Please review the Introductory Statement and contact information for your department displayed on the assessment site: **http://www.weber.edu/portfolio/departments.html** - if this information is current, please place an 'X' below. No further information is needed. We will indicate "Last Reviewed: [current date]" on the page.

__ Information is current; no changes required.
_X_ Information is not current; updates below.

Update:
Change street address to
1415 Edvalson St, DEPT 2508.

Also note that the office number will changing in May 2016 once we move to Tracy Hall Science Center.

B. Mission Statement
Please review the Mission Statement for your department displayed on the assessment site: **http://www.weber.edu/portfolio/departments.html** - if it is current, please indicate as much; we will mark the web page as "Last Reviewed [current date]". No further information is needed.
If the information is not current, please provide an update:

_X_ Information is current; no changes required.
NOTE: This statement will be reviewed in the near future.

___ Information is not current; updates below.

C. Student Learning Outcomes

Please review the Student Learning Outcomes for your department displayed on the assessment site: **http://www.weber.edu/portfolio/departments.html** - if they are current, please indicate as much; we will mark the web page as "Last Reviewed [current date]". No further information is needed.
If they are not current, please provide an update:

_X_ Information is current; no changes required.

NOTE: We will be revisiting these SLOs in the coming semester and anticipate updates in the near future. Our current Outcomes are mixed in their assessability, and they are notably dated. For example, we say that a graduate should have "thorough knowledge and comprehension," but we need to specify what such knowledge looks like. Further, although we do a better job of describing specific skills possessed by a graduate, we need to revisit the appropriateness of these and further specify them. Other vagaries will be addressed or removed.

___ Information is not current; updates below.

Measurable Learning Outcomes

At the end of their study at WSU, students in this program will:

1) …
2) …
3) …
4) …
5) …
6) etc.

D. **Curriculum**

Please review the Curriculum Grid for your department displayed on the assessment site: **http://www.weber.edu/portfolio/departments.html** - if it is current, please indicate as much; we will mark the web page as "Last Reviewed: [current data]". No further information is needed.
If the curriculum grid is not current, please provide an update:

_X_ Information is current; no changes required.

Note: The extant grid describes *where* we expect to observe our learning outcomes, but it does not explicate *how* we measure such outcomes in those courses, assignments, or extracurricular activities. The Department is reviewing this and will update the Grid in the near future.

___ Information is not current; updates below

Curriculum Map

Core Courses in Department/Program	Department/Program Learning Outcomes							
	Learning Outcome 1	Learning Outcome 2	Learning Outcome 3	Learning Outcome 4	Etc…			

Note[a]: Define words, letters or symbols used and their interpretation; i.e. 1= introduced, 2 = emphasized, 3 = mastered or I = Introduced, E = Emphasized, U = Utilized, A = Assessed Comprehensively; these are examples, departmental choice of letters/numbers may differ
Note[b]*:* Rows and columns should be transposed as required to meet the needs of each individual department

Additional Information (if needed)

E. Assessment Plan

Please review the Assessment Plan for your department displayed on the assessment site: http://www.weber.edu/portfolio/departments.html - if the plan current, please indicate as much; we will mark the web page as "Last Reviewed [current date]". No further information is needed.

The site should contain an up-to-date assessment plan with planning going out a minimum of three years beyond the current year. Please review the plan displayed for your department at the above site. The plan should include a list of courses from which data will be gathered and the schedule, as well as an overview of the assessment strategy the department is using (for example, portfolios, or a combination of Chi assessment data and student survey information, or industry certification exams, etc.).

Please be sure to include your planned assessment of any general education courses taught within your department. This information will be used to update the General Education Improvement and Assessment Committee's planning documentation.

Assessment plan:

The assessment plan is current. However, we are currently reviewing this plan.

F. Report of assessment results for the most previous academic year:

Evidence of Learning: Courses within the Major

As we're undergoing a reevaluation of our assessments and outcomes, our results are scarce. We need to re-specify outcomes and how they connect to the curriculum grid. Until that time, we do not have specific "results". One consideration that our department is making sense of is what we mean by a "threshold" for evidence. Our current efforts are looking into how we can reframe this. Instead of stating that a certain percentage of students will obtain a certain percentage on an exam, we want to qualify and validate our measures.

For example, in our first semester of PHYS 2210 (Physics for Scientists and Engineers), required for all of our majors and for many other pre-professional programs and STEM majors, students need to understand and apply Newton's Laws. Our students' understandings of these ideas can be evaluated in multiple ways:

1. Can a student apply Newton's laws in order to predict the motion of an object?
2. Can a student communicate their reasoning and use of Newton's laws as it applies to the problem?
3. Can a student design an investigation, analyze its results, and then argue how those are a result of Newton's laws?

We are working on how to make sense of all three of these facets of a student's understanding at the same time. A typical exam problem will ask a student to find a numerical answer that can only be determined if they solve equations that state Newton's laws in a particular form. A conceptual question on such an exam could evaluate if a student understands how they are applying such equations (rather than simply reiterating a strategy without reflection). And a lab situation could determine if a student understands how empirical data produce such laws. Typically, an instructor is assigning all of these at the same time, knowing that one by itself is not sufficient. Our challenge now is to determine how to document these multiple facets of a single, fundamental concept.

Evidence of Learning: High Impact or Service Learning

Students in our majors have a capstone Seminar course (PHYS 4990) in which they:

1. Communicate scientific research in physics.
2. Participate in the active exchange of scientific ideas.
3. Synthesize and distill understandings of physics research into a form understandable to a first-year student.

We are working on how to take student presentations and other work from 4990 and use this to document how they can synthesize and communicate their understandings of multiple courses and other experiences into one capstone presentation. We think that this might be the final assessment of a student in our program, but we need to document this.

In addition, our majors complete an exit interview when they finish their degree. We need to look at previous results of these interviews, and also look forward to see how other experiences (volunteerism in the community, undergraduate research, etc.) impact outcomes that we are clarifying.

Evidence of Learning: General Education Courses

Our current assessment plan strategizes how we can focus intently at one outcome from each of the categories in the Physical Science breadth area. This began while our assessment coordinator was on his sabbatical, and as such our momentum for this has been inconsistent. However, a real example of how this can be documented is as follows. Note: We haven't felt comfortable with the use of a "threshold" (e.g., a given percentages of correct student responses that we'd deem successful). Rather, we're trying to document "baseline" understandings that we would desire all of our students to achieve, even if that's unrealistic when students drop classes, miss assignments, etc. In the future, we can document different levels of understanding (above "baseline") and document how these are achieved as well.

Evidence of Learning: Physical Science					
Measurable Learning Outcome Students will…	Method of Measurement	Baseline Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Learning Outcome 1: Forces: Equilibrium and change are determined by forces acting at all organizational levels. (As measured in PHYS 1360)	Measure 1 Essay question, analyze a scale's reading in an elevator	Student explicitly states that no net force is required for a constant velocity (zero acceleration)	18/19 students identified noted that no additional force is required besides the weight of an individual to keep them moving at a constant rate. (One student invented a new gravitational force.)	Students in this course have firsthand experiences with elevators from a lab. This produces a good outcome (in comparison to other measures in the literature using the Force Concept Inventory).	We'll also evaluate the applicability of this assessment measure to other courses and contexts.
	Measure 2 Analysis of motion of bowling ball in hallway	Student correctly uses and reflects upon data to demonstrate that an object in motion continues constantly	19/19 students concluded an object without a net force continued with a constant velocity, and could point to their own data to justify their conclusion.	This assessment is based on a firsthand experience, analysis of data, and class reflection during the course of a week. It's slow, but produces a satisfactory result.	This course is designed to have specific and intensive investigations. No curricular changes are necessary here, but we should consider what other alternatives are possible in courses with different formats.

Evidence of Learning: Physical Science					
Measurable Learning Outcome Students will…	Method of Measurement	Baseline Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Learning Outcome 2: Nature of science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.	Measure 1: Exam question on lab procedures utilized and how hypotheses can be testable.	Student explicitly states how they manipulated a variable they posited was responsible for a phenomenon.	19/19 students describe changing the variable they posited was responsible for a phenomenon, trying to falsify a hypothesis.	In the context of an experiment they actually designed, students can identify how data test their predictions.	This is a favorable outcome. We could also see if students can identify empiricism and testability outside of experiments they conducted themselves.
	Measure 2: Experimental design in independent research	Student can communicate results of an investigation, demonstrating how their data support (or contradict) an argument or explanation	19/19 students were part of research teams that collected and appropriately analyzed data based on investigations they'd designed.	In groups, students can corroborate to see how data shape a scientific explanation.	This is satisfactory; however it is worth seeing how well students could reflect on new data, outside of the group and the investigation they were directly involved with.

*At least one measure per objective must be a direct measure; indirect measures may be used to supplement direct measure(s).

Additional narrative (optional – use as much space as needed):
These are samples. We intend to continue to build upon these as we continue to analyze our General Education coursework and our students' work in these classes.

G. **Summary of Artifact Collection Procedure**

Artifact	When/How Collected?	Where Stored?
"Force" understanding artifacts "Nature of Science" artifacts	Midterm exams Midterm exams Final presentations	Electronic copies Electronic copies Instructor course notes
Physics Major communication skills	Completion of Physics Seminar (PHYS 4990)	Instructor course notes
Physics Major reflection on community service, undergraduate research	Exit interview, upon graduation	Department files

Appendix A

Most departments or programs receive a number of recommendations from their Five-Year Program Review processes. This page provides a means of updating progress towards the recommendations the department/program is acting upon.

Date of Program Review: ####	Recommendation	Progress Description
Recommendation 1	Text of recommendation	#### +1 progress
		#### +2 progress
		#### +3 progress
		#### +4 progress
Recommendation 2	Text of recommendation	#### +1 progress
		#### +2 progress
		#### +3 progress
		#### +4 progress
Recommendation 3	Text of recommendation	#### +1 progress
		#### +2 progress
		#### +3 progress
		#### +4 progress
(add as needed)		

Additional narrative:

Appendix B

Please provide the following information about the full-time and adjunct faculty contracted by your department during the last academic year (summer through spring). Gathering this information each year will help with the headcount reporting that must be done for the final Five Year Program Review document that is shared with the State Board of Regents.

Faculty	
Headcount	20
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)	15
Full-time Tenured	8
Full-time Non-Tenured (includes tenure-track)	2
Part-time	5
With Master's Degrees	
Full-time Tenured	
Full-time Non-Tenured	
Part-time	5
With Bachelor's Degrees	
Full-time Tenured	
Full-time Non-tenured	
Part-time	
Other	
Full-time Tenured	
Full-time Non-tenured	
Part-time	
Total Headcount Faculty	20
Full-time Tenured	8
Full-time Non-tenured	2
Part-time	10

Please respond to the following questions.

1) Based on your program's assessment findings, what subsequent action will your program take?

   As described above, we are working to revitalize and systematize our assessment efforts. In fairness, we know that we have assessment data within individual courses, but we need to find a way to document this to a broader audience.

2) Are there assessment strategies within your department or program that you feel are particularly effective and/or innovative? If so, what are those strategies and what do you learn about your students by using them?

   We are pleased with the strategy we have for general education assessment – emphasizing two outcomes at a time and working with one another to both reflect upon what these really mean as well as how we measure them. We also think that there's a rich collection of information in our capstone project (PHYS 4990) and exit interviews that we have yet to fully document.