

## Questions to Guide Development and Review of Undergraduate Course Learning Outcomes (CLOs)

Course Learning Outcomes (CLOs) are statements describing the intellectual abilities, knowledge, and/or values or attitudes that students should demonstrably possess at the end of a course.<sup>1</sup>

CLOs support student learning in multiple ways. First, they provide instructors<sup>2</sup> with a framework for designing a course, including content, assignments, assessments, and instructional strategies.<sup>3</sup> Second, when explicitly linked to assignments and assessments, CLOs also provide students with a learning-based rationale for the work they are asked to do as well as a reference point for monitoring their own learning,<sup>4</sup> thereby supporting engagement and motivation. Third, CLOs provide a reference point for instructors and students to “research” student learning,<sup>5</sup> yielding insights into student abilities relevant to both current and future offerings of the course. Finally, CLOs facilitate the development of a coherent, developmentally organized, *programmatic* curriculum, that as WASC puts it, is “more than simply an accumulation of courses or credits,”<sup>6</sup> by allowing faculty to specify a course’s contribution to the program’s intended learning outcomes (PLOs), and to connect the course to the learning taking place in the courses that precede and follow it. When connections between CLOs and PLOs are explicitly communicated in syllabi and curriculum maps, students and instructors alike are able to develop a more holistic view of the major. In short, and as reflected in UC Merced’s mission, learning outcomes underpin a “student-centered” approach to education.

The following list of questions is suggested as a guide for developing and evaluating the quality of CLOs that best enable these applications. The questions do not address the specific intellectual content as that is the purview of the faculty as disciplinary experts with responsibility for curriculum.

- 1) Do the CLOs support the course goals<sup>7</sup> as outlined, for example, in the description of the course in the UC Merced catalog or in the course outline/syllabus?
- 2) Have the program’s intended learning outcomes (PLOs) been considered in the development of the CLOs, with CLOs supporting PLO development at a level appropriate to the course’s position in the program’s curriculum? Is this relationship made explicit to all stakeholders? Have the CLOs of both prerequisite/preceding and following courses been considered in order to both build upon prior student learning and to anticipate future instruction?
- 3) Do course readings, projects, assessments, etc. appear to support development of the CLOs?
- 4) Are specific, active verbs used to describe how students will demonstrate learning? For example, upon reading a CLO, could a student or faculty member imagine the kind of assignment that might be used to evaluate student abilities? Or, to put it another way, are the CLOs measurable?<sup>8</sup>
- 5) Are the CLOs comprehensible to students, expecting that understanding may evolve and deepen with learning?
- 6) For General Education courses, do the CLOs align with at least three of UC Merced’s Eight Guiding Principles of General Education<sup>9</sup> as required by [policy](#)<sup>10</sup>?

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<sup>1</sup> Including for-credit, individualized courses of study like independent research. See appendix IV for suggestions regarding graduate-level outcomes for independent study.

<sup>2</sup> Including teaching assistants, or even perhaps tutors.

<sup>3</sup> See backward design as an example. See Wiggins, Grant, and Jay McTighe. *Understanding by Design*. Alexandria: Association for Supervision and Curriculum Development, 2011. Print or ebook.

<sup>4</sup> To learn and practice metacognition.

<sup>5</sup> For example, through Classroom Assessment Techniques (CATS). See Angelo, Thomas A. and K. Patricia Cross. *Classroom Assessment Techniques: A Handbook for College Teachers*. San Francisco: John Wiley & Sons, 1993. Second Edition. Print.

<sup>6</sup> WASC Criterion for Review 2.2.

<sup>7</sup> See Appendix I for an explanation of the difference between goals and outcomes

<sup>8</sup> See Appendix II for an example

<sup>9</sup> See Appendix III

<sup>10</sup> UGC Procedures and Policies for the Approval of New Undergraduate Courses and Undergraduate Course Changes

## Appendix I

### *What are Learning Goals & Outcomes?*

#### *What is a learning goal?*

- A *broad, general* statement describing what an instructor or community of instructors (eg. program, school or institution) intend students will leave a course, program, school or university *able to do, know, behave or feel*.

#### *How will the instructor, program or institution and the students themselves know if they have met the learning goal?*

- By assessing whether students have achieved the learning outcome(s) articulated for the goal.

#### *What is a learning outcome?*

- A *specific*, statement describing what a student will know, be able to do, or how s/he will behave or feel as a result of instruction and other educational experiences.
- Learning outcomes describe what the *student* will do *not* the instructor.
- Learning outcomes describe what the student will know or do in a way that is *measurable*. Therefore, *action verbs* are used to specify the observable, measurable actions the student will undertake to achieve the outcome and, consequently, goal.
- By using action verbs to specify student actions, one is identifying the types of assessment that can be used to assess student achievement of the learning outcome and, therefore, goal.

#### *Can a learning goal be met by more than one outcome?*

- Yes. There are many ways to meet a learning goal, which is the same as saying the same goal can be met via different learning outcomes. Such learning outcomes typically vary with respect to the *level of expertise* they describe.
- Different levels of expertise are outlined in Bloom's taxonomies for understanding, skills and affect.
- By progressively increasing the levels of expertise expected of students as they move through a course or program, we can consciously articulate and encourage the growth of student abilities and knowledge in measurable ways through time.

## Appendix II: Example Learning Outcomes<sup>11</sup>

The following example of learning outcomes was adapted with the most modest of modifications from *Reaching All Students* (2007, p. 5). Changes include

- substituting the term outcomes for objectives
- adding italics to highlight the importance of active verbs in learning outcomes
- replacing passive verbs with active verbs in a few places
- amending the organization so that all statements begin with verbs linked to the heading phrase

*All credit belongs to the authors; see the footnoted reference.* Find the excellent resource from which this was excerpted in its entirety at <http://www.cirtl.net/publications.html>.

### **Sample Course Learning Outcomes: Organic Chemistry**

This course will provide an audience of junior and senior students majoring in chemistry or the allied chemical sciences with a foundation in the theoretical principles and descriptive chemistry of the elements. The goal is to introduce the concepts of symmetry and their application to molecular orbital theory, and to use this framework to understand the chemistry of the elements with a focus on the transition elements.

By the end of this course, it is expected that every student will be able to

1. *determine* the point-group symmetry of a molecule and *use* the point-group symmetry to *deduce* select spectroscopic properties.
2. *derive* a molecular orbital diagram for a molecule in an ideal geometry and *use* the diagram *to aid in prediction of* chemical behavior.
3. *demonstrate* a basic knowledge of the descriptive chemistry of the element families and *show* familiarity with literature resources that can provide further information.
4. *predict* the chemical behavior of significant classes of inorganic molecules, including transition metal coordination compounds and organometallic compounds.
5. *propose* several plausible reaction mechanisms for a given chemical transformation, *derive* rate laws for these mechanisms, and *interpret* experimental kinetic data to *provide support for or against* a given mechanism.
6. *access* the chemical literature to find specific chemical information.

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<sup>11</sup> Sellers, S.L., J. Roberts, L. Giovanetto, K. Friedrich, C. Hammagran. 2007. *Reaching All Students: A resource for teaching in science, technology, engineering and mathematics*. Second Edition. Center for Integration of Research, Teaching and Learning. Madison, Wisconsin. <http://www.cirtl.net/publications.html>.

## Appendix III

### UC Merced's Eight Guiding Principles of General Education

**Scientific Literacy:** To have a functional understanding of scientific, technological and quantitative information, and to know both how to interpret scientific information and effectively apply quantitative tools;

**Decision Making:** To appreciate the various and diverse factors bearing on decisions and the know-how to assemble, evaluate, interpret and use information effectively for critical analysis and problem solving;

**Communication:** To convey information to and communicate and interact effectively with multiple audiences, using advanced skills in written and other modes of communication;

**Self and Society:** To understand and value diverse perspective in both the global community contexts of modern society in order to work knowledgeably and effectively in an ethnically and culturally rich setting;

**Ethics and Responsibility:** To follow ethical practices in their professions and communities, and care for future generations through sustainable living and environmental and societal responsibility;

**Leadership and Teamwork:** To work effectively in both leadership and team roles, capably making connections and integrating their expertise with the expertise of others;

**Aesthetic Understanding Creativity:** to appreciate and be knowledgeable about human creative expression, including literature and the arts; and

**Development of Personal Potential:** To be responsible for achieving the full promise of their abilities, including psychological and physical well-being.

## Appendix IV

### Why develop a “syllabus” for graduate independent study and research units?

For these types of graduate credits, it can be useful to conceive of the syllabus as a student’s work plan for the semester, complete with a set of desired work products (outcomes). In turn, these “outcomes” provide evidence of the professional abilities a student is developing, with benefits to both the individual student and the program. Potential advantages of this approach include the following.

- 1) The syllabus can form part of the official record of a student’s academic advancement, as well as his or her ability to manage that progress (with the support of an advisor), particularly when paired with evidence that outcomes have been met.
- 2) Students can be asked to draft the syllabus, providing an opportunity to practice (with feedback) an essential professional skill: the ability to establish achievable goals that advance research progress in the face of the competing demands common to academia<sup>12</sup> and professional life more generally. Student abilities in this important area might be expected to improve over the course of their graduate education.
- 3) Development of the document provides the student and advisor with a structured opportunity to reflect on student progress in light of programmatic expectations and timelines and the student’s professional goals.
- 4) Discussing progress on desired outcomes allows the faculty member and student to regularly calibrate their expectations and understandings. As Barbara Lovitts highlights in her book *Making the Implicit Explicit: Creating Performance Expectations for the Dissertation*,<sup>13</sup> faculty and students may have different understandings of the nature of research, including what constitutes quality research. These differences likely reflect the fact that, while faculty are practiced researchers, students are in the process of learning to be researchers.
- 5) Approaching the syllabus in this way also enables us to concurrently address WASC’s expectation that expectations for learning are explicitly shared with students through syllabi, and that we have some way of documenting the work for which students earn units.<sup>14</sup>

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<sup>12</sup> Including the ability to manage teaching, research and service simultaneously, a fundamental skill of successful faculty.

<sup>13</sup> Lovitts, Barbara E. 2007. *Making the Implicit Explicit: Creating Performance Expectations for the Dissertation*. Stylus: Sterling, Virginia.

<sup>14</sup> The Department of Education and thus WASC are now asking institutions to develop and demonstrably adhere to a [Credit Hour Policy](#) that accounts for non-traditional courses like online courses, independent study, studio class, internships, etc.

## Syllabus Template for Graduate Independent Study, Research, or Directed Reading Courses (Ex. 295, 298, 299)

Course Name & Number:

Semester and Year:

Instructor:

Student (as relevant):

Meeting Schedule (ex. weekly or monthly):

Number of units: <sup>15</sup>

Course Goal(s):

What does the program intend students to learn through the activities undertaken for these credits? This can take the form of a slightly modified course catalogue description.

Learning Outcomes:

For units earned in graduate-level independent research and study courses, learning outcomes include the kinds of work products expected of an apprentice researcher that demonstrate evidence of research and professional skills, and associated knowledge,<sup>16</sup> appropriate to the student's level of advancement in the degree program. What attributes of a successful, disciplinary professional are students developing through these units and how will they share their progress with their advisor, committee and/or program? What outcomes support progress toward successful achievement of program benchmarks like qualifying exams or timely completion of the thesis or dissertation?

*Example outcomes include:*

- dissertation proposals or chapters
- literature reviews
- grant proposals
- professional presentations, including conference posters or presentations
- drafts of publishable papers or articles<sup>17</sup>
- development of research techniques
- research results, and associated documents like a professional lab notebook
- one or more written summaries of work undertaken/progress made
- presentations or progress updates at lab meetings
- minutes from meeting with advisors to discuss progress or projects

**Relationship to Program Learning Outcomes and, as applicable, Program Requirements:**

Briefly describe the Program Learning Outcome(s) that these independent research activities support and, as relevant, any program requirements students will be meeting through enrollment for these credits.

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<sup>15</sup> One unit is equal to 45 hours of work per semester as per the [UC Merced Credit Hour Policy](#). The outcomes outlined below should be consistent with the credits earned.

<sup>16</sup> As broadly outlined in the PLOs and perhaps more specifically in program rubrics. See below.

<sup>17</sup> Depending on the program, this might be a required element for the degree completion.

Evaluation/Grading System: How will learning and progress be evaluated?

## Questions to Guide Development and Review of Undergraduate Program Learning Outcomes (PLOs)

Program Learning Outcomes (PLOs) are intended to describe the intellectual abilities, knowledge and values that students should demonstrably possess at graduation, as a result of a cohesive and coherent degree program that, as WASC puts it, is “more than simply an accumulation of courses or credits.”<sup>1, 2</sup>

PLOs have multiple functions. They provide a framework within which instructors<sup>3</sup> and students can contextualize courses, connecting and building on learning throughout the degree program. They also facilitate opportunities for educational synergies, by communicating program aims to diverse stakeholders including students, faculty, teaching assistants, disciplinary experts, co-curricular staff, parents, employers, donors, etc. Finally, PLOs provide a reference point for “researching” student learning, with the goal of better supporting all students in the development of skills and knowledge judged important to a meaningful post-graduate life and career. In short, and as reflected in UC Merced’s mission, PLOs underpin a “student-centered” approach to education.

To guide development of PLOs that best enable these applications, WASC developed the *Rubric for Assessing the Quality of Academic Program Outcomes*. Appended here, the rubric describes the generic attributes of quality PLOs.<sup>4</sup> It does not address the specific intellectual content as that is the purview of the faculty as disciplinary experts with responsibility for curriculum. Finally, while it is useful for students to have a consistent set of expectations, it is appropriate to expect that PLOs will be revised and refined over time.

In light of this rubric, WASC’s Accreditation Standards more generally, and what is understood to be effective educational practice, the following list of questions is suggested as a guide for developing and evaluating the quality of PLOs.

- 1) Is the set of outcomes comprehensive? Does it provide a framework for a curriculum and a degree that is holistic?
- 2) Have national disciplinary standards, or relevant peer-reviewed literature, been considered in their development?
- 3) Are “core” intellectual skills like oral and written communication, information literacy, quantitative skills, and critical thinking (as defined in a disciplinary context) addressed in some way? Are relevant aspects of UC Merced’s Eight Guiding Principles of General Education<sup>5</sup> addressed?
- 4) Will the PLOs be comprehensible to students, expecting that understanding may evolve and deepen with learning?
- 5) Are specific, active verbs used to describe how students will demonstrate learning? For example, upon reading a PLO, could a student or faculty member imagine the kind of assignment or prompt that might be asked of a student in order to evaluate student abilities? Or, to put it another way, are the PLOs measurable?
- 6) Do the PLOs support program intentions as described in marketing materials, the program website, and the catalog?
- 7) Do the PLOs articulate intellectual skills, knowledge, and values appropriate for a graduate at the given degree level (B.A./B.S., Masters or PhD)?

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<sup>1</sup> WASC Criterion for Review 2.2.

<sup>2</sup> See Appendix I for an explanation of the difference between goals and outcomes

<sup>3</sup> Including teaching assistants

<sup>4</sup> Specifically, the developed and highly developed categories. See Appendix II.

<sup>5</sup> See Appendix III.



## Appendix I

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## Appendix II



## PROGRAM LEARNING OUTCOMES

### Rubric for Assessing the Quality of Academic Program Learning Outcomes

Criterion	Initial	Emerging	Developed	Highly Developed
Comprehensive List	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).	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.	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.	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.
Assessable Outcomes	Outcome statements do not identify what students can do to demonstrate learning. Statements such as "Students understand scientific method" do not specify how understanding can be demonstrated and assessed.	Most of the outcomes indicate how students can demonstrate their learning.	Each outcome describes how students can demonstrate learning, e.g., "Graduates can write reports in APA style" or "Graduates can make original contributions to biological knowledge."	Outcomes describe how students can demonstrate their learning. Faculty have agreed on explicit criteria statements, such as rubrics, and have identified examples of student performance at varying levels for each outcome.
Alignment	There is no clear relationship between the outcomes and the curriculum that students experience.	Students appear to be given reasonable opportunities to develop the outcomes in the required curriculum.	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.	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.
Assessment Planning	There is no formal plan for assessing each outcome.	The program relies on short-term planning, such as selecting which outcome(s) to assess in the current year.	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.	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.
The Student Experience	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.	Students have some knowledge of program outcomes. Communication is occasional and informal, left to individual faculty or advisors.	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.	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 outcomes and levels of performance. Program policy calls for inclusion of outcomes in all course syllabi, and they are readily available in other program documents.

### **How Visiting Team Members Can Use the Learning Outcomes Rubric**

Conclusions should be based on a review of learning outcomes and assessment plans. Although you can make some preliminary judgments about alignment based on examining the curriculum or a curriculum map, you will have to interview key departmental representatives, such as department chairs, faculty, and students, to fully evaluate the alignment of the learning environment with the outcomes.

#### ***The rubric has five major dimensions:***

1. **Comprehensive List.** The set of program learning outcomes should be a short but comprehensive list of the most important knowledge, skills, and values students learn in the program, including relevant institution-wide outcomes such as those dealing with communication skills, critical thinking, or information literacy. Faculty generally should expect higher levels of sophistication for graduate programs than for undergraduate programs, and they should consider national disciplinary standards when developing and refining their outcomes, if available. There is no strict rule concerning the optimum number of outcomes, but quality is more important than quantity. Faculty should not confuse learning processes (e.g., completing an internship) with learning outcomes (what is learned in the internship, such as application of theory to real-world practice). Questions. Is the list reasonable, appropriate and well-organized? Are relevant institution-wide outcomes, such as information literacy, included? Are distinctions between undergraduate and graduate outcomes clear? Have national disciplinary standards been considered when developing and refining the outcomes? Are explicit criteria – as defined in a rubric, for example – available for each outcome?
2. **Assessable Outcomes.** Outcome statements should specify what students can do to demonstrate their learning. For example, an outcome might state that “Graduates of our program can collaborate effectively to reach a common goal” or that “Graduates of our program can design research studies to test theories and examine issues relevant to our discipline.” These outcomes are assessable because faculty can observe the quality of collaboration in teams, and they can review the quality of student-created research designs. Criteria for assessing student products or behaviors usually are specified in rubrics, and the department should develop examples of varying levels of student performance (i.e., work that does not meet expectations, meets expectations, and exceeds expectations) to illustrate levels. Questions. Do the outcomes clarify how students can demonstrate learning? Have the faculty agreed on explicit criteria, such as rubrics, for assessing each outcome? Do they have examples of work representing different levels of mastery for each outcome?
3. **Alignment.** Students cannot be held responsible for mastering learning outcomes unless they have participated in a program that systematically supports their development. The curriculum should be explicitly designed to provide opportunities for students to develop increasing sophistication with respect to each outcome. This design often is summarized in a curriculum map—a matrix that shows the relationship between courses in the required curriculum and the program’s learning outcomes. Pedagogy and grading should be aligned with outcomes to foster and encourage student growth and to provide students helpful feedback on their development. Since learning occurs within and outside the classroom, relevant student services (e.g., advising and tutoring centers) and co-curriculum (e.g., student clubs and campus events) should be designed to support the outcomes. Questions. Is the curriculum explicitly aligned with the program outcomes? Do faculty select effective pedagogy and use grading to promote learning? Are student support services and the co-curriculum explicitly aligned to promote student development of the learning outcomes?
4. **Assessment Planning.** Faculty should develop explicit plans for assessing each outcome. Programs need not assess every outcome every year, but faculty should have a plan to cycle through the outcomes over a reasonable period of time, such as the period for program review cycles. Questions. Does the plan clarify when, how, and how often each outcome will be assessed? Will all outcomes be assessed over a reasonable period of time? Is the plan sustainable, in terms of human, fiscal, and other resources? Are assessment plans revised, as needed?
5. **The Student Experience.** At a minimum, students should be aware of the learning outcomes of the program(s) in which they are enrolled; ideally, they should be included as partners in defining and applying the outcomes and the criteria for levels of sophistication. Thus it is essential to communicate learning outcomes to students consistently and meaningfully. Questions: Are the outcomes communicated to students? Do students understand what the outcomes mean and how they can further their own learning? Do students use the outcomes and criteria to self-assess? Do they participate in reviews of outcomes, criteria, curriculum design, or related activities?

## Appendix III

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