

# Department of Earth and Environmental Sciences, CSCI



## ASSESSMENT PLAN: B.S. in Environmental Science

Updated Date: Fall 2014, by Michael Massey

### PROGRAM MISSION

[CSUEB Missions, Commitments, and ILOs, 2012](#)

#### **CSUEB Environmental Science Program Description**

The Environmental Science program provides interdisciplinary scientific preparation for students wishing to pursue knowledge and employment in the fields of environmental research, consulting, and oversight. Additional objectives of the program include provision of sufficient preparation for graduate studies in environmental sciences and allied fields and partial satisfaction of the Single Subject Matter Preparation Program for a teaching credential in science.

The Bachelor of Science degree major in Environmental Science is an interdisciplinary program of study in the Department of Earth and Environmental Sciences with faculty participation from the Departments of Biological Sciences, Chemistry and Biochemistry, and Geography and Environmental Studies. In contrast to the B.A. degree major in Environmental Studies, the B.S. degree major in Environmental Science requires students to take a structured core of science courses from a variety of physical and life science disciplines, as well as a specialized upper division science coursework.

### PROGRAM DRAFT STUDENT LEARNING OUTCOMES (PLOs)

Students graduating with a B.S. in Environmental Science will be able to:

<i>PLO 1</i> <i>ILO 1,6</i>	Demonstrate practical skills and theoretical knowledge of the biology, chemistry, geology, and physics relevant to the Earth system, in both laboratory and field settings ( <i>physical and life science</i> )
<i>PLO 2</i> <i>ILO 1,2,4,6</i>	Collect, analyze, and interpret quantitative and qualitative data, individually and in groups, in order to characterize and address environmental issues ( <i>data and analysis</i> )
<i>PLO 3</i> <i>ILO 1,3,5,6</i>	Critically consider scientific findings within the context of the social, cultural, economic, ethical, and human dimensions of contentious environmental issues ( <i>socioeconomic context</i> )
<i>PLO 4</i> <i>ILO 1,3,4,5,6</i>	Synthesize knowledge of the major components of the Earth system, including physical, biological, and human systems, as well as human impacts ( <i>synthesis</i> )
<i>PLO 5</i> <i>ILO 1,2,3,4,5,6</i>	Critically analyze environmental issues through the evaluation of scientific literature, and present their positions clearly and persuasively in written and oral form ( <i>communication</i> )

### Year 1: 2013-2014

1. Which PLO(s) to assess	PLO 4 ( <i>synthesis</i> ), PLO 5 ( <i>communication</i> )
2. Assessment indicators	<i>Brownfield Remediation Capstone Report, Hazardous Waste Management Research Report</i>
3. Sample (courses/# of students)	ENSC 4800, ENSC 4140
4. Time (which quarter(s))	Winter 2014
5. Responsible person(s)	Michael Massey
6. Ways of reporting (how, to who)	The report was delivered to the Chair, and distributed to the faculty. It was also included within the department report.
7. Ways of closing the loop	Areas of improvement were discussed at faculty meetings, improvements and revisions to future courses are expected

### Year 2: 2014-2015

1. Which PLO(s) to assess	PLO2 ( <i>data and analysis</i> )
2. Assessment indicators	Course assignments and projects, with department rubric
3. Sample (courses/# of students)	GEOL 4320, ENSC 2900
4. Time (which quarter(s))	Spring 2015
5. Responsible person(s)	Michael Massey, Jean Moran, affiliated faculty
6. Ways of reporting (how, to who)	Reports first to the Chair and then to the entire faculty for comment & discussion. An end-of-year meeting will be devoted to evaluating assessment results and “closing the loop.”
7. Ways of closing the loop	Students’ quantitative “areas for improvement” will be incorporated into modified/updated core courses for majors

### Year 3: 2015-2016

1. Which PLO(s) to assess	PLO 1 ( <i>physical and life science</i> ), PLO 3 ( <i>socioeconomic context</i> )
2. Assessment indicators	Short assessment test given in capstone seminar, seminar paper focusing on the socioeconomic context of environmental science
3. Sample (courses/# of students)	ENSC 4800 and one of ENSC 3500, ENSC 4140, ENSC 4200, or other upper-division core
4. Time (which quarter(s))	Winter 2016
5. Responsible person(s)	Affiliated faculty (designing assessment), Michael Massey
6. Ways of reporting (how, to who)	Reports first to the Chair and then to the entire faculty for comment & discussion. An end-of-year meeting will be devoted to evaluating assessment results and “closing the loop.”
7. Ways of closing the loop	Disciplinary knowledge assessment will aid with program revision concurrent with quarter-to-semester conversion.

### Year 4: 2016-2017

1. Which PLO(s) to assess	PLO 2 ( <i>data and analysis</i> )
2. Assessment indicators	Course assignments and projects, with department rubric
3. Sample (courses/# of students)	GEOL 4320, ENSC 2900
4. Time (which quarter(s))	Winter 2017, Spring 2017
5. Responsible person(s)	Michael Massey, Jean Moran, affiliated faculty
6. Ways of reporting (how, to who)	Reports first to the Chair and then to the entire faculty for comment & discussion. An end-of-year meeting will be devoted to evaluating assessment results and "closing the loop."
7. Ways of closing the loop	Assess progress made since 2014-2015, adjust strategies. Revise program requirements concurrently with quarter-to-semester conversion.

### Year 5: 2017-2018

1. Which PLO(s) to assess	PLO 4 ( <i>synthesis</i> ), PLO 5 ( <i>communication</i> )
2. Assessment indicators	<i>Brownfield Remediation Capstone Report, Hazardous Waste Management Research Report</i> , or other course assignments
3. Sample (courses/# of students)	ENSC 4800, ENSC 4140, other upper-division core
4. Time (which quarter(s))	Winter 2018
5. Responsible person(s)	Michael Massey
6. Ways of reporting (how, to who)	Reports first to the Chair and then to the entire faculty for comment & discussion. An end-of-year meeting will be devoted to evaluating assessment results and "closing the loop."
7. Ways of closing the loop	Assess progress made since 2013-2014, adjust strategies.

## Appendix: Current PLOs, Rationale for the Draft Revised PLOs

### RATIONALE FOR PLO (PLO) REVISION, INITIATED IN 2014

The Environmental Science Program Learning Outcomes underwent a proposed revision in Spring of 2014. The draft revised learning outcomes were used in this document (since this document has a five-year scope), even though the draft revisions await the approval of affiliated faculty, before becoming official. The current learning outcomes are listed below.

The rationale for the revision is based on a desire to emphasize the quantitative and systems-focused nature of the interdisciplinary program, as well as to highlight the interconnected nature of scientific progress, science, natural systems, and society. Additionally, the revised PLOs are written with the goal of effective, holistic learning outcome assessment.

The current PLOs are heavily discipline-focused, with PLOs 1, 2, and 3 all related to specific physical and life sciences. These three PLOs were combined into one (revised PLO 1) in the revision process. The program maintains its focus on science, since this learning outcome is in the primary position. The revised PLO 2 is entirely new, and highlights the importance of data collection and analysis in science, since natural science is heavily quantitative and data-driven. The revised PLO 3 is also entirely new, and acknowledges that environmental scientists must be cognizant of social and human factors such as culture, diversity, and socioeconomic status. The revised PLO 4 highlights the importance of synthesis and systems-level thinking in an interdisciplinary field such as environmental science, and PLO 5 maintains the program's goal of encouraging critical thinking and clear expression.

### CURRENT PROGRAM/STUDENT LEARNING OUTCOMES (PLOs)

Students graduating with a B.S. in Environmental Science will be able to:

<i>PLO 1</i>	Apply knowledge of the principles of form, function and organization of organisms at the levels of molecules, cells, tissues, organs, organisms, populations, and communities
<i>PLO 2</i>	Apply knowledge of the fundamental principles of chemistry, chemical structure, bonding, equilibrium, dynamics, and reactions, as well as classes of organic compounds and reactions
<i>PLO 3</i>	Characterize the nature and distribution of earth materials, the processes by which the materials are formed and altered, and the nature and development of the landscape
<i>PLO 4</i>	Synthesize knowledge of the major components of the physical environment, including landforms, climate, vegetation, and soils
<i>PLO 5</i>	Critically analyze environmental issues through the evaluation of scientific literature, and present their positions clearly and persuasively in written and oral form