

Weber State University  
Annual Assessment of Evidence of Learning

Cover Page

Department/Program: MICROBIOLOGY  
Academic Year of Report: 2014/15  
Date Submitted:  
Report author: Michele Culumber

Contact Information:  
Phone: 801-626-7795  
Email: [mculumber@weber.edu](mailto:mculumber@weber.edu)

**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.**

**Information is not current; updates below.**

Update:

## **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:

**Information is current; no changes required.**

**Information is not current; updates below. *Minor edits***

### **Department of Microbiology Mission Statement**

The department of Microbiology seeks to provide a quality undergraduate education to students of Weber State University in both general education and discipline-specific courses. We strive to provide our graduates with a solid academic foundation for further educational opportunities, and the knowledge and skills for career opportunities upon graduation. We seek to integrate into student's program of study the development of skills including critical thinking, problem solving, teamwork, written and oral communication, and laboratory research techniques. The department provides opportunities for research and other scholarly activities for both faculty and students, and serves as a resource for the campus and the state of Utah in the area of microbiology. We attempt to inspire life-long learning and teach students the broad range of disciplines in microbiology. We also believe that a more knowledgeable public will be able to make more informed decisions with regard to scientific issues that impact their lives.

### **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:

**Information is current; no changes required.**

**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:

\_\_ **Information is current; no changes required.**

**X** **Information is not current; updates below. Amended to include our new course, MICR 3012, Microbiology and Global Public Health**

### Curriculum Map

	Core Concepts					Fundamental Skills							
	CC1	CC2	CC3	CC4	CC5	FS1	FS2	FS3	FS4	FS5	FS6	FS7	FS8
	Model systems for Basic Biology	Integral role in Disease and Human Health	Ubiquitous in nature	Vital Role – Integration of Science and	Indispensable role in Environment and Ecology	Nature of Science	Laboratory Skills	Critical thinking	Data Analysis	Problem Solving	Communication	Cooperation	Values
<b>Required Courses</b>													
2054, Principles of Microbiology	1, A	2	2, A	1	2, A	1	3, A	1	1	1	1	2	1
3053, Microbiological Procedures	2, A					3, A	3, A	3	3	3	3	3	
3154, Microbial Ecology	2, A	2	3, A	2	3, A	3, A	3, A	3, A			2, A	2, A	2
4054, Microbial Physiology	3, A	2	3, A	2	3, A		3, A		3, A			3, A	3
4154, Microbial Genetics	3, A		1	2	3, A	2	3, A	2, A	2, A	2	3, A	3, A	2
<b>Elective Courses</b>													
3012, Microbiology and Global Public Health		2, A		3, A					2, A			2	3
3254, Immunology		3, A		3, A			3, A		2, A		3, A		3, A
3305, Medical Microbiology		3, A		3, A		3, A	3, A	3, A	3, A	3, A	3, A	3, A	2
3403, Tropical Diseases		3, A		3, A		3, A	3, A	3, A		3, A	3, A	3, A	3, A
3484, Environmental Microbiology	3, A	3, A		3, A	3, A	3, A	3, A	3, A		3, A	3, A	3, A	
3502, Environmental Health		2	3		3			2		2			3
3753, Geomicrobiology	2		3, A		3, A	2	3, A	3, A		2, A	2	2	
3853, Food Microbiology	1, A	2, A	1	3, A	1			3, A	3, A	3, A			
4252, Cell Culture	3, A	2	2	2	2	2	3, A	2	3, A	3	2	3, A	
4354, Industrial Microbiology				3, A		3, A	3, A	3, A	3, A				
4554, Virology	3, A	3, A	3, A	3, A	3, A	3	3, A	3	3, A	3	3	3, A	

	Core Concepts					Fundamental Skills							
	CC1	CC2	CC3	CC4	CC5	FS1	FS2	FS3	FS4	FS5	FS6	FS7	FS8
	Model systems for Basic Biology	Integral role in Disease and Human Health	Ubiquitous in nature	Vital Role - Integration of Science and	Indispensable role in Environment and Ecology	Nature of Science	Laboratory Skills	Critical thinking	Data Analysis	Problem Solving	Communication	Cooperation	Values
<b>High Impact Courses</b>													
4800, Directed Research	3	3	3			3	3				3, A		
4830, Directed Readings	3	3	3								3, A		
4991, Microbiology Seminar											3, A		

*Note<sup>a</sup>*: Define words, letters or symbols used and their interpretation; 1= introduced, 2 = emphasized, 3 = mastered, A = Assessed Comprehensively;

Additional Information (if needed)

Shading removed for clarity.

## **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:

Plan through 2017 is current. General education courses will be reviewed annually. Department is completing a program review and may update the assessment schedule.

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

### A. Evidence of Learning: Courses within the Major

#### MICROBIOLOGY 3254: Immunology

Evidence of Learning: MICR 3254					
Measurable Learning Outcome	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Students will...	Direct and Indirect Measures*				
CC2: Integral role in Disease and Human Health	Measure 1: Selected Exam Questions on 6 exams (61 question)	Measure 1: 75% of the students will score 70% or better (54 students)	100% of students met this outcome.	Measure 1: Achieved goal	Measure 1: Continue to evaluate how this outcome is taught and how it is assessed. Consider including in evaluation essay questions
CC4: Vital role-integration of Science and Society	Measure 1: Selected Exam Questions on 6 exams (48 questions)	Measure 1: 75% of the students will score 70% or better (54 students)	98% of students met this outcome.	Measure 1: Achieved goal	Measure 1: Continue to evaluate how this outcome is taught and how it is assessed. Consider including in evaluation essay questions
FS 2: Laboratory Skills: Gram Stain, Quadrant Streak, Aseptic Technique, light microscopy, Dilution calculations, etc.	Measure 1: Lab reports on 5 immunology lab exercises. Did they follow the procedure, accurately do the lab work. Assesses whether the students can perform the lab work	75% of Students will earn better than 80% on 5 lab reports.	Percent earning 80% or better: Measure 1: 92% (50 students)	Criteria was met	Reassess which skills are being taught and provide a separate assessment of these skills from the students' ability to analyze data (FS3). Add more assessment of individual skills since these experiments are group projects.
FS 6: Communication	Measure 1: rubric used for assessing group Oral Powerpoint Presentation about an immunology laboratory technique  Measure 2: rubric used for assessing group Oral Powerpoint Presentation about an immunology topic	75% of Students will earn better than 80% on each assignment.	Percent earning 80% or better:  Measure 1: 100% (50 students)  Measure 2: 98% (48 students)	Criteria was met for measures 1 & 2.	Continue to reassess which skills are being taught and add ones that may be useful in future courses. Add more assessment of individual skills instead of group based skills.
FS8: Values	Measure 1: completed assignment & attended debate about ethics of	75% of Students will earn better	Measure 1: 100% earning 80% or better	Measure 1: Criteria was met based on this assessment.	Measure 1: Continue to provide resources for This exercise



	animal experimentation  Measure 2: attended lecture/discussion on ethics of human experimentation	than 80% on assignment	(50 students)  Measure 2: neglected to take attendance at lecture (50 students)	Measure 2: Criteria was not measured.	Measure 2: Consider adding an assignment about human ethics & human experimentation Consider adding a component about the ethics of reporting lab results accurately & truthfully
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**Outcome added in 2014**

FS 3: Data analysis skills	Measure 1: Assessment of 5 lab reports focusing on any changes made in protocol that would impact results, ability to collect lab results, ability to report data in a table/chart/graph etc. and ability to interpret the results correctly	75% of Students will earn better than 80% on 5 lab reports	Percent earning 80% or better: Measure 1: 92% (50 students)	Criteria was met.	Reassess which skills are being taught and provide a separate assessment of these skills from the students' ability to analyze data (FS3). Add more assessment of individual skills since these experiments are group projects.  <b>Add this learning outcome for this class.</b>
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Data on CC2 and CC4 from Chitester Exams. Other outcomes were assessed with graded laboratory, writing, or presentation assignments.

		N	% Above
Outcome	Included Questions	Students (All Tests)	70% (All Tests)
CC2	61	54	100%
CC4	48	54	98%

MICR 4054 Microbial Physiology, Fall 2014

Evidence of Learning: MICR 4054					
Measurable Learning Outcome	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Students will...	Direct and Indirect Measures*				
CC1: Microbes are model systems for basic biology	Measure 1: Ten Selected Exam Questions	Measure 1: 70% of the students will score 70% or better (54 students)	In 2014, 77% of students met this outcome	Achieved goal	Continue to evaluate how this outcome is taught and how it is assessed.
CC3: Microorganisms are ubiquitous in nature. Diverse physiologies enable microorganisms to live in many environments and have a vital role in the ecosystem	Measure 1: Ten Selected Exam Questions	Measure 1: 70% of the students will score 70% or better (54 students)	In 2014, 70% of students met this outcome.	Achieved goal	Continue to evaluate how this outcome is taught and how it is assessed.
FS 4: Critical Thinking	Measure 1: Ten selected exam questions	70% of Students will earn better than 80% on 5 lab reports.	In 2014, 75% of students met this outcome	Achieved goal	Investigate other assessment measures for this outcome

Questions are available upon request.

	Included Questions	N Students (All Tests)	% Above 70% (All Tests)
C1	10	44	77%
C3	10	44	70%
F4	10	44	75%

MICR 4554 Microbial Physiology, Spring 2015

Evidence of Learning: MICR 4054					
Measurable Learning Outcome	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Students will...	Direct and Indirect Measures*				
CC1: Microbes are model systems for basic biology	Measure 1: Ten Selected Exam Questions	Measure 1: 70% of the students will score 70% or better (54 students)	In 2014, 81% of students met this outcome	Achieved goal	Measure 1: Continue to evaluate how this outcome is taught and how it is assessed. Consider including in evaluation essay questions
CC3: Microorganisms are ubiquitous in nature. Diverse physiologies enable microorganisms to live in many environments and have a vital role in the ecosystem	Measure 1: Ten Selected Exam Questions	Measure 1: 70% of the students will score 70% or better (54 students)	In 2014, 74% of students met this outcome.	Achieved goal	Measure 1: Continue to evaluate how this outcome is taught and how it is assessed. Consider including in evaluation essay questions
FS 4: Critical Thinking	Measure 1: Ten selected exam questions	70% of Students will earn better than 80% on 5 lab reports.	In 2014, 65% of students met this outcome	Achieved goal	Investigate other assessment measures. Include more critical thinking practice in lecture and lab.

Questions are available upon request.

	Included Questions	N Students (All Tests)	% Above 70% (All Tests)
C1	10	32	81%
C3	10	31	74%
F4	10	32	65%

b. Evidence of Learning: High Impact or Service Learning

Learning Objectives: Nature of Science (FS#1), Laboratory Skills (FS#2), Communication (FS#6)

In 2013-2014 (from Annual Report):

- 48 Directed Research students (~13% of majors) worked on mentored projects
  - Two undergraduate research students attended, and presented posters at, the American Society for Microbiology General Meeting in New Orleans. May 2014.
  - Fifteen students presented work at local or regional meetings
  - Twenty-two students earned credit for Physician or Dentist Shadowing
  - 35 Students completed directed readings credit (11%)

Assessment of High Impact Learning:

Directed Research: Faculty assess mentored research projects independently. This may include evaluation of notebooks, written summaries, and publication or presentation of work in scientific publications or conferences.

Titles of student publications and presentations can be found in the annual report.

Directed readings: Faculty assess mentored readings projects independently. This may include thesis papers, book or paper summaries.

Physician and Dental Shadowing and Co-Op Work experiences: Assessment is through student logs and journals and supervisor evaluation letters.

### c. Evidence of Learning: General Education Courses

(duplicate this page as needed or delete if department does not offer GE courses)

#### MICR 2054: Principles of Microbiology

Outcome	Content	Assessment	Measure	Results
SS1: Nature of Science	Current research in microbiology, Historical Microbiology, Classical Experiments in Microbiology, Laboratory Exercises.	Exam questions on Chitester selected from 6 exams in MICR 2054 (see table below)	70% of students will have 70% or better 2 question	Need more specific assessment of this topic, but the criteria was met.
		Graded discussion posts: Students read articles (or view/listen to multimedia) about current microbiological science and answer questions.	Formative assessment only, An example is given in below. Six discussion activities were used in 2014. Discussions were graded on complete/incomplete basis.	In 2016 rubrics will be added for summative assessment of SS1.
SS2: Integration of Science	Role of other disciplines in microbiology, physics, chemistry, biochemistry, and the impact of microbiology on other sciences, ecology, zoology, botany, agriculture, etc.	Exam questions on Chitester selected from 6 exams in MICR 2054 (see table below)	70% of students will have 70% or better 17 questions	73% of students scored 70% or better on these questions
SS3: Science and Society	The impact of microorganisms on the health and well-being of humans, especially their ability to cause disease. Vaccines, antibiotics.	Exam questions on Chitester selected from 6 exams in MICR 2054 (see table below)	70% of students will have 70% or better 45 questions	72% of students scored 70% or better on these questions
SS4: Problem Solving	Microbiological laboratory techniques that require data collection and analysis, e.g. determining the number of cells per milliliter in a food or water sample.	1. Exam questions on Chitester selected from 6 exams in MICR 2054 (see table below)	70% of students will have 70% or better 45 questions	65% of students scored 70% or better on these questions
		2. Lab Exam 3, student use data to calculate the outcomes of microbiological dilutions. They must plan and execute a dilution scheme to quantify bacteria in a sample culture.	70% of students will earn 70% or better on Lab exam 3.	90% of class met the threshold.
		3. Dilution Quiz: 10 questions, take home quiz. Students solve dilution problems	90% of students will earn 80% or better. Canvas Quiz	In 2014, >90% of students met this threshold
LS1: Levels of Organization	Cell structure and function. Three domains of life. Basics of evolution.	Multiple choice and short answer questions on macromolecules, and cell structure and functions.	70% of Students will answer 70% of the questions correctly Measured with ChiTester 57 questions	83% of students scored 70% or better on these questions
LS2: Metabolism and homeostasis	Central metabolic pathways, including anabolism and catabolism, aerobic and anaerobic respiration, and fermentations.	Multiple choice and short answer questions on Glycolysis, Citric Acid Cycle, Electron Transport and related topics	70% of Students will answer 70% of the questions correctly. Measured with ChiTester 106 questions	77% of students scored 70% or better on these questions
LS3: Genetics and Evolution	Central Dogma of biology, DNA replication, transcription, translation, mutations, genetic exchange, and the relationship between genetic change and microbial diversity and evolution. Antibiotic resistance.	Multiple choice and short answer questions on DNA replication and protein synthesis, mutations, and genetic exchange	70% of Students will answer 70% of the questions correctly. Measured with ChiTester 144 questions	83% of students scored 70% or better on these questions
LS4: Ecological Interactions	Impact of microbial activity on their environment. Including human-microbe interactions, Metabolic diversity, nitrogen fixation, waste water treatment.	Multiple choice and short answer questions on the interactions between microorganisms and between microorganisms and the human immune system	80% of Students will answer 70% of the questions correctly. Measured with ChiTester 38 questions	79% of students scored 70% or better on these questions

Chitester data for GE outcomes. Questions are available upon request

	Included Questions	N Students (All Tests)	% Above 70% (All Tests)
LS1	57	79	83%
LS2	106	79	77%
LS3	144	79	83%
LS4	38	79	79%
S1	2	65	60%
S2	17	79	73%
S3	45	77	72%
S4	45	79	65%

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

**Example of Discussion question activity used as formative assessment of S1: Nature of Science.**

Listen to this podcast about the study that linked artificial sweeteners, the gut microbiome, and diabetes.

What was the hypothesis the researchers were trying to test? Did they prove or disprove their hypothesis? What were the strengths and weaknesses of their study? Which experiment was the most influential or provided the most information? Explain.

Which of the remaining questions coming out of this study do you find most interesting? Why?

<http://www.sciencefriday.com/segment/09/19/2014/artificial-sweeteners-might-sour-your-microbiome.html> (Links to an external site.)

## 1113 Introduction to Microbiology

### Course Description:

An introduction to microorganisms, their biology, and their relationships to health, technology, and the environment, with practical applications. Three lecture/demonstrations per week.

### MICR 1113 Life Science Outcomes Measured in Chi-tester Exams

Outcome	Content	Assessment	Measure	Results
Nature of Science	Current research in microbiology, Historical Microbiology, Classical Experiments in Microbiology,	1. Chitester, Selected Question	1. 50% of students will earn 70% or better on questions	61%
Integration of Science	Role of other disciplines in microbiology, physics, chemistry, biochemistry, and the impact of microbiology on other sciences, ecology, zoology, botany, agriculture, etc.	1. Chitester, Selected Question	1. 50% of students will earn 70% or better on questions	59% few questions
Science and Society	The impact of microorganisms on the health and well-being of humans, especially their ability to cause disease. Vaccines, antibiotics	1. Chitester, Selected Question	1. 50% of students will earn 70% or better on questions	50%
Problem Solving	DNA transcription and translation	1. Chitester, Selected Question	1. 50% of students will earn 70% or better on questions	70 %
Levels of Organization	Cell structure and function. Three domains of life. Basics of evolution	1. Chitester, Selected Question	1. 50% of students will earn 70% or better on questions	75%
Metabolism and homeostasis	Central metabolic pathways, including anabolism and catabolism, aerobic and anaerobic respiration, and fermentations.	1. Chitester, Selected Question	1. 50% of students will earn 70% or better on questions	66%
Genetics and Evolution	Central Dogma of biology, DNA replication, transcription, translation, mutations, genetic exchange, and the relationship between genetic change and microbial diversity and evolution. Antibiotic resistance	1. Chitester, Selected Question	1. 50% of students will earn 70% or better on questions	59%
Ecological Interactions	Impact of microbial activity on their environment. Including human-microbe interactions, Metabolic diversity, nitrogen fixation, waste water treatment, other examples	1. Chitester, Selected Question	1. 50% of students will earn 70% or better on questions	54%few questions/responses

### Direct Measures:

Because we have several instructors that teach this course in different formats (including online, face-to-face, and IVC), and using different assessment techniques developing standard assessment tools has been a challenge.

1. Students are assessed using traditional multiple-choice questions on four to seven, unit exams (depending on instructor). Each exam addresses one or more of the natural science or life sciences learning objectives for the life sciences.
2. We are working to develop a standardized assessment tool or tools that can be used to measure the LS learning outcomes for MICR 1113 across sections, instructors, and formats.
3. Overall increase from 2013-14 in the Natural Science outcomes, but a decrease in the LS outcomes. This may be due to more faculty including linked questions in chi-tester. We also had a few new adjuncts teaching in 2014-15 and they need to make some adjustments to their courses.

#### 1113 Chitester

	Included Questions	N Students (All Tests)	% Above 70% (All Tests)
LS1	50	304	75%
LS2	102	354	63%
LS3	34	256	66%
LS4	11	144	70%
S1	89	294	61%
S2	23	262	59%
S3	56	266	50%
S4	62	256	60%

#### Evaluation and Action Plan for MICR 1113:

We feel like the Life Science and Natural Science Outcomes are being met in MICR 1113.

There is a need for standardized assessments, and we have begun discussions about implementing changes.

#### Microbiology 1153: Elementary Public Health

##### Course Description:

Principles and practices of public health, emphasizing prevention and control of communicable and degenerative diseases, and environmental health problems. Three lectures/ demonstrations/ week.

Outcome	Content	Assessment	Threshold	Results
Nature of Science	Historical Microbiology, Classical Experiments in Microbiology,	Measure 1: Selected Chitester exam questions. These are from a selection of sections taught by different faculty.	1. 50 % of students will have 70% or better on these questions	1. 64% of students earned 70% or better.



Integration of Science	Sciences of Public Health: Biomedical Science, Social and Behavioral Science, Health Policy, Epidemiology, Statistics, Environmental Health	Measure 1: Selected Chitester exam questions. These are from a selection of sections taught by different faculty.	1. 50 % of students will have 70% or better on these questions 2	1. 74% of students earned 70% or better
Science and Society	The impact of microorganisms on the health and well-being of humans, especially their ability to cause disease. Vaccines, antibiotics. Socioeconomic impact of health and disease.	Measure 1: Selected Chitester exam questions. These are from a selection of sections taught by different faculty.	1. 50 % of students will have 70% or better on these questions	84% of students earned 70% or better
Problem Solving	Epidemiology, identifying types of epidemiologic studies, calculating incidence rates and relative risks, Interpreting and evaluating health claims (e.g. vaccine side effects)	Measure 1: Selected Chitester exam questions. These are from a selection of sections taught by different faculty.	1. 50 % of students will have 70% or better on these questions	25% of students earned 70% or better* (also see assessment measured through Canvas below)
Levels of Organization	Cell structure and function, microbial diversity, three domains of life	Measure 1: Selected Chitester exam questions. These are from a selection of sections taught by different faculty. Measure 2: Open note quiz on Canvas	1. 50 % of students will have 70% or better on these questions 2. 80% of students will have 70% or better on assignment	1. 42% of students earned 70% or better 2. 93% had better than 70% on assignment
Metabolism and homeostasis	Metabolic diversity in prokaryotic organisms. Organisms used in food production.	Measure 1: Selected Chitester exam questions. These are from a selection of sections taught by different faculty.	1. 50 % of students will have 70% or better on these questions	62% of students earned 70% or better
Genetics and Evolution	Central Dogma of Biology, DNA replication, transcription, translation, mutations, genetic exchange, and the relationship between genetic change and microbial diversity and evolution. Antibiotic resistance, sickle cell anemia	Measure 1: Selected Chitester exam questions. These are from a selection of sections taught by different faculty. Measure 2: Open note quiz on Canvas	1. 50 % of students will have 70% or better on these questions 2. 80% of students will have 70% or better on assignment	1. 64% of students earned 70% or better 2. 89% had 70% or better on assignment
Ecological Interactions	Impact of environmental quality on health and disease. Examples: role of climate change in changing disease patterns, impact of drought on plant pathogens, relationships between UV exposure and skin cancer, air pollution, importance of water and sewage treatment.	Measure 1: Selected Chitester exam questions. These are from a selection of sections taught by different faculty.	1. 50 % of students will have 70% or better on these questions	74% of students earned 70% or better

#### Direct Measures:

Because we have several instructors that teach this course in different formats (including online and face-to-face) and using different assessment techniques developing standard assessment tools has been a challenge.

1. Students are assessed using traditional multiple-choice questions on four to seven, unit exams (depending on instructor). Each exam addresses one or more of the natural science or life sciences learning objectives for the life sciences.
2. More faculty are now aligning questions through Chi-tester.
3. Scores for S4, Problem solving, were especially low. Right now it is difficult to determine if this is because of the selection of questions or if there was something else that happened this year.

4. Some objectives have been assessed using rubric-measured assignments. However, assignments often target more than one objectives and Canvas cannot, at this time, separate those outcomes. Threshold and results are for the overall score for the assignments. Next time, the rubrics will be organized differently to distinguish between the outcomes and simplify the reporting.
  - a. This was tried, and the rubrics work much better, however reporting of the outcomes is too tedious.
5. Assessments, sample questions, and rubrics are available upon request.

1153 Chitester: Data includes all instructors assessing with Chitester-linked outcomes.

	Included Questions	N Students (All Tests)	% Above 70% (All Tests)
LS1	104	178	42%
LS2	80	176	62%
LS3	120	179	64%
LS4	104	184	74%
S1	69	102	67%
S2	103	184	57%
S3	263	184	72%
S4	72	103	25%

Additional Assessments:

Rubric graded assignments: Measured in one section of 1153 using Canvas Rubrics

Outcome	Assessment	Threshold	Fall 14	Spring 15 (measured with multiple questions)
Integration of Sciences	Rubric graded assignments		76% met or exceeded threshold	100%, 100%
Nature of Science	Rubric graded assignments		92% met or exceeded	88%, 75%
Levels of Organization	Rubric graded assignments		97%	97%
Ecological Interactions	Rubric graded assignments		62%	74%,
Science & Society	Rubric graded assignments			95%, 87%, 97%, 100%
Problem solving	Rubric graded assignments			100%

In Spring 15, the rubrics were changed to more accurately assess outcomes for this course, e.g. specific content related to each outcome, however that changed the way that the outcomes are reported. Assignments and rubrics are available upon request.

### G. Summary of Artifact Collection Procedure

Artifact	Learning Outcome Measured	When/How Collected?	Where Stored?
Chitester linked outcomes	All	End of the semester	Chitester database, Reports generated as needed
Lab Exams	Lab Skills	3 times per semester	Exams are stored for a year with the instructor. Scores are collected in an Excel spreadsheet (without identifying information) with the Department Chair.
Chitester rubrics	LS and NS outcomes	End of the semester	Canvas assignments are not accessible after the semester. Assignment grades are kept in Canvas and with the instructor.
Exit Interview Data		Summarized in the Department Annual Report	Chair's office

Summary Information (as needed)

## 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: 2013	Recommendation	Progress Description
Strategic Plan	The department needs to develop a strategic plan “ consistent with the strategic plan of the College and University”	An Advisory Board has been established and has met once. A draft of a strategic plan has been developed and is being revised by the department.
Curriculum, Advising, and Course offerings	Review course offerings, eliminate excess overlap in lab courses, evaluate advising, investigate a core curriculum, or course, with other departments	Developing a lab skills matrix to determine which skills are taught in each course and make sure students have the prerequisite skills for their upper division courses.
		Curriculum review is a goal of new strategic plan. Department is considering adopting AAAS Vision and Change Core Concepts and Skills.
		Each general education course has been assigned a course coordinator who will be responsible for developing, implementing, and gathering assessment data for their course.
Workload	Upper division lab courses are overfull creating a safety hazard and diminishing the laboratory experience	Hired 50/50 job for additional lab aid.
		Exploring ways to involve students as TAs
		Find creative scheduling and teaching options for courses to decrease the number of students in lab at any one time.
New Building	Develop a specific plan for using new resources in the science building...document how the new space will fix identified problems	Continued discussions of equipment inventory and needs.
Safety	Address safety concerns that are not integral to the infrastructure of the building	Done

## 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	11
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)	
Full-time Tenured	7
Full-time Non-Tenured (includes tenure-track)	
Part-time	1
With Master's Degrees	
Full-time Tenured	
Full-time Non-Tenured	
Part-time	3
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	11
Full-time Tenured	7
Full-time Non-tenured	0
Part-time	4

**Please respond to the following questions.**

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

We believe that our general education courses are meeting the learning outcomes for the Natural Science and Life Science learning outcomes, although the Chi-tester aligned questions do not demonstrate this for all outcomes. This next year we will focus on renewing our courses for general education.

Major's courses meet the learning outcomes identified in the curriculum grid. A variety of assessment techniques are used very effectively and demonstrate that students are meeting the learning outcomes. Faculty continue to make improvements to their teaching and assessment practices through workshops and conferences.

During the next two years, the department will reevaluate the program curriculum, especially focusing on laboratory skills that are needed by local employers. The department's advisory board is helping us identifying these skills.

Our department continues to graduate excellent students, who achieve success in graduate and professional school and who are hired in the field following graduation. We are trying to monitor students post-graduation, but this has been difficult. We have worked with the Office of Institutional Assessment to include the Department's exit interview questions with the University's Graduation Survey. The goal was to increase participation in the survey and to have the data in a format that is easier to analyze. Participation with the exit survey was better this past year, and the data are presented in the Department's 2014-15 annual report.

- 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?

Several faculty are experimenting with new assessment techniques, especially formative, in-class, assessments such as classroom response systems. Evaluation of laboratory skills through practical examinations, laboratory notebook evaluations, and laboratory reports, are a vital component of several of our courses.