

Weber State University
Biennial Report on Assessment of Student Learning

Cover Page

Department/Program: Department of Microbiology
Academic Year of Report: 2020/21 (covering Summer 2019 through Spring 2021)
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We have updated the Institutional Effectiveness website, which includes an update for each program page. All Biennial Assessment and Program Review reports will now be available on a single page. Please review your page for completeness and accuracy, and indicate on the list below the changes that need to be made. Access your program page from the top-level [results](#) page. Select the appropriate college and then your program from the subsequent page.

A. Mission Statement

Information is current; no changes required.

Update if not current:

B. Student Learning Outcomes

(please note the addition of certificate and associate credential learning outcomes)

Information is current; no changes required.

Update if not current: Learning outcomes are being updated for the next assessment cycle

C. Curriculum (please note, we are using Google Sheets for this section so that updates are easier to make)

Information is current; no changes required.

Update if not current (you may request access to the Google Sheet if that is easiest, or we can make the updates):

(Please review your current curriculum grid and verify that at least one course has been identified for each outcome in which you expect your students to demonstrate the desired competency of a graduating student. This could be shown in a variety of ways: classroom work, clinical or internship work, a field test, an ePortfolio, etc.)

D. Program and Contact Information

Information is current; no changes required.

Update if not current:

E. Assessment Plan

We have traditionally asked programs to report on outcome achievement by students at the course level. We are encouraging programs to consider alternative assessment approaches and plans that are outcome-based as opposed to course-based, though course-based assessment can continue to be used. A complete assessment plan will include a timeline (which courses or which outcomes will be assessed each year), an overall assessment strategy (course-based, outcome-based, reviewed juries, ePortfolio, field tests, etc.), information about how you will collect and review data, and information about how the department/program faculty are engaged in the assessment review.

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

Update if not current:

We assessed three upper division courses for this report. MICR 3012, MICR 3502, and MICR 4054.

Assessment plan is being revised for next assessment cycle. Department Program Outcomes are being revised, and we will be using an outcome-based approach for major-level courses. General Education assessment will remain the same.

F. Student Achievement

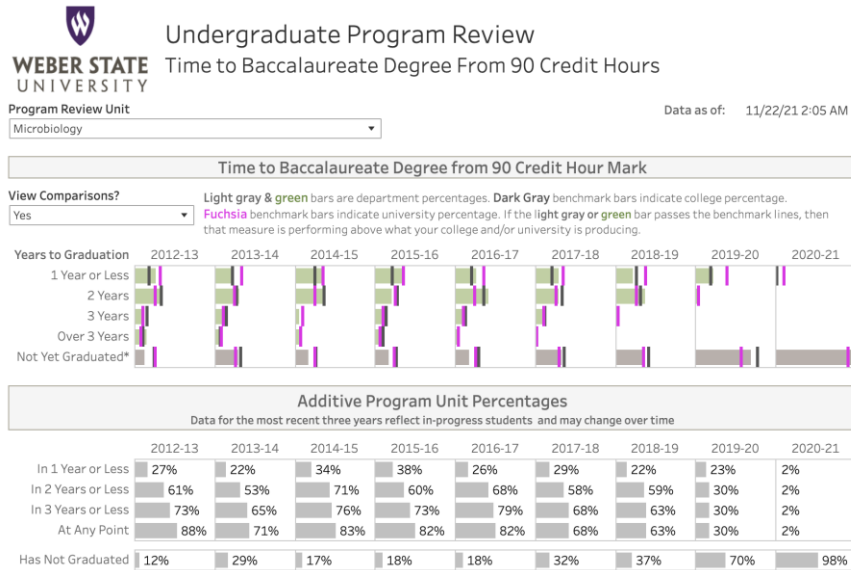
- i. Percent of students completing degrees after 90 credit hours within 2 years and a reflection on that metric (this information can be accessed on the Program Review Undergraduate dashboard – tab labeled, ‘Time to Grad from 90CH – please reach out to oi@weber.edu if you need help with this metric). What department initiatives are in place to address this?

Please see the figure below:

From 2015-16 through 2018-19, this program averages a 61.3% completion within 2 years of 90CH. We have seen a decrease in the number of students completing their degrees within two years of reaching 90 CH. Some of this may be due to pandemic-related impacts on students and course offerings. Many support courses were only offered online during 2020-21 and many students chose not to take courses online or virtually. To help address this issue, we are making some changes to course scheduling:

- More courses are being offered in a variety of formats (virtual, online, hybrid, and face-to-face) to give students more opportunities to fill in credits with more flexibility.
- In Fall, 2022 we will begin offering our majors-level upper division courses (MICR 4054 and MICR 4154) both fall and spring semesters. This should provide more flexibility for offering content and prevent a course bottleneck for graduating seniors.
- We have added another department advisor to help encourage students to seek advising.

- Two advisors are bilingual (Spanish) speakers.



Evidence of Learning

There are varieties of ways in which departments can choose to show evidence of learning.

1) Course-based assessment

- a. This is the format we have traditionally suggested programs use for assessment. The familiar 'evidence of learning worksheets' are included in the template and can also be accessed from the IE website. The critical pieces to include are:
 - i. learning outcomes addressed in the course,
 - ii. method(s) of measurement used,
 - iii. threshold for 'acceptable – that is, the target performance,
 - iv. actual results of the assessment,
 - v. interpretation/reflection on findings,
 - vi. the course of action to be taken based upon the interpretation,
 - vii. how that action will be evaluated.

2) Outcome-based assessment

- a. Moving from course-based to outcome-based assessment has the potential for programs to gather and reflect upon data that are more meaningful, and to connect assessment findings from throughout the program. The approach may be much easier for associates and certificate programs where only select students in classes are earning the credential. For more information email (gniklason@weber.edu)

b. Reporting options include:

- i. A traditional evidence-of-learning [worksheet](#) with an outcome (across multiple courses) as the focus (instead of a course with multiple outcomes).
- ii. A report that is more [narrative-based](#).
- iii. Other tools such as an ePortfolio in which key or signature assignments have been identified by the faculty, and uploaded by the student with their reflection. The key or signature assignments are aligned to student learning outcomes. (ePortfolio is an excellent assessment tool for certificates and associate degrees.)
- iv. There are other approaches such as juried reviews, physical portfolios, field tests, etc.

- 3) General Education course assessment needs to continue to be reported at the course level using either the [traditional template](#) or a more [narrative-based format](#). See the [Checklist and Template](#) page for area-specific worksheets as well.

Note: if you cannot download templates directly from this document, please visit our [template page](#) for downloads.

A. Evidence of Learning: Courses within the Major
Course: MICR 3012 Microbiology and Global Public Health Sections included: Spring 2021 online

Program Outcome 2:	Microbes are integral to human health and disease
Aligned Course Outcome(s):	<ul style="list-style-type: none"> Review the burden of communicable diseases in low- and high-income countries Discuss the determinants of selected communicable diseases, including emerging and re-emerging infectious diseases and antimicrobial resistance Understand key concepts concerning the prevention, transmission, and treatment of those diseases
Method(s) of measurement:	Two, unit reflection assignments on AIDs and TB. Open note canvas quiz case studies. AIDS: 25 points TB: 15 points Both cases involved multiple choice and essay responses
Target Performance:	80% of students will earn 80% or better on these case studies.
Actual Performance:	AIDS Case: 90% of students earned 80% or better TB: 97% of students earned 80% or better
Interpretation/Reflection on findings:	Students demonstrated that they met the course outcomes of describing important communicable diseases (AIDS and TB). They were able to discuss antimicrobial resistance, and factors for the prevention and treatment of these diseases.
Action Plan/Use of Results:	The results of these case studies indicate that the students are able to apply the main ideas of this module on disease burden to meet this outcome.
Intended evaluation of plan (closing the loop):	We will continue to add or update the assessments as need to meet course modifications.

Program Outcome 4:	Microbes have a vital role in science and society
Aligned Course Outcome(s):	<ul style="list-style-type: none"> Describe the most important conceptual relationships between culture and health. Describe some key measures to promote behavior change for better health Describe the impact of disease on poverty
Method(s) of measurement:	Ebola Case study Neglected Tropical Diseases Slide -rubric graded
Target Performance:	80% of students will earn 80% or better on these case studies. 80% of students will earn 80% or better.
Actual Performance:	Ebola: 91% of students earned 80% or better NTD: 80% of students earned 80% or better
Interpretation/Reflection on findings:	Students demonstrated and articulated the impact that diseases can have on a society.

Action Plan/Use of Results:	The results of these case studies indicate that the students are able to apply the main ideas of this module on disease burden to meet this outcome.
Intended evaluation of plan (closing the loop):	The entirety of this course is on the impact of diseases on societies. Almost any of the assignments could be used to assess this outcome.

Program Outcome FS3:	Critical Thinking
Aligned Course Outcome(s):	<ul style="list-style-type: none"> Compare and contrast low- and high- income countries in terms of their leading causes of death, the burden of disease, demographics, and risk factors for disease.
Method(s) of measurement:	Visualizing the Burden of Disease assignment. Students create and then explain a graphic that contrasts the burden of disease in low- and high-income countries.
Target Performance:	80% of students will earn 80% or better.
Actual Performance:	100% of students met this criterion.
Interpretation/Reflection on findings:	Students demonstrated that they can visualize epidemiological data and explain the impacts of that data.
Action Plan/Use of Results:	Because this appears to be a somewhat easy assignment to accomplish, some additional criteria will be added so that students need to explore the data more deeply.
Intended evaluation of plan (closing the loop):	Develop assignment to more directly address critical thinking.

Program Outcome FS8:	Values
Aligned Course Outcome(s):	<ul style="list-style-type: none"> Discuss key ethical and human rights concerns as they relate to global health Identify key ethical principles for priority setting in health
Method(s) of measurement:	Ch 5 Reflection Ethical and Human Rights
Target Performance:	80% of students will earn 80% or better.
Actual Performance:	90% of students met this criterion.
Interpretation/Reflection on findings:	Students demonstrated that they understand the complexities of ethical issues in global health
Action Plan/Use of Results:	Students explore more specific ethical issues during this course. This assignment allows them to argue for a mechanism for allocating resources to a problem
Intended evaluation of plan (closing the loop):	Ethics and equity are ongoing themes in this course. No further action is needed.

Because this course does not have exams and because all quizzes and assignments are non-proctored, the target criteria are higher than other courses in the major.

Course: MICR 3502 SUS Environmental Health

Sections included: Summer 2021

Note: This course does not have assigned assessment objectives for the department of microbiology at this time (see curriculum map).

Report due 11/15/2021

Program Outcome 1:	Comprehend the interconnection between environmental, social, and economic systems in relation to sustainability. (SUS) outcome
Aligned Course Outcome(s):	Students will demonstrate that they understand the impact that environmental issues have on social/economic status of countries and communities.
Method(s) of measurement:	Unit 3 reflection: Pick a topic from this unit (Water Quality, Air Quality, Food Safety, or Solid and Liquid Wastes) and a specific environmental agent (pathogen or toxin) and describe how it is impacting a developing country. The product is a rubric-graded Google Slides Presentation.
Target Performance:	80% of students will earn 80% or better. (18 Students Su 21)
Actual Performance:	88% of students met this criterion.
Interpretation/Reflection on findings:	The students in this class did an outstanding job of presenting the challenges developing countries have with the impacts of environmental issues. (examples are available upon request). Projects were well researched and provided important information.
Action Plan/Use of Results:	This assessment will also be used in the ePortfolios for Environmental Science majors.
Intended evaluation of plan (closing the loop):	This course does not have any associated exams, so summative assessment is difficult. However, this and the other unit reflections provide evidence that the students are meeting this outcome.

Because this course does not have exams and because all quizzes and assignments are non-proctored, the target criteria are higher than other courses in the major.

Course: MICR 4054 Microbial Physiology, Sections included: Fall 2020

Program Outcome 1:	Model systems for basic biology
Aligned Course Outcome(s):	<ul style="list-style-type: none"> • Understand the diversity of metabolism found in bacteria • Understand central metabolic pathways found in bacteria share similarities to plants and animals • Understand that some metabolic pathways are only found in archaea or bacteria
Method(s) of measurement:	Response to 10 exams questions dispersed over three exams
Target Performance:	70% of students will earn 70% or better on these case studies.
Actual Performance:	80% of the students scored 75% or better
Interpretation/Reflection on findings:	The questions covered of a variety of metabolic pathways found in microbes. This suggests students have developed a fundamental understanding of metabolic pathways.
Action Plan/Use of Results:	Although the results are useful, other methods for assessment might be more useful to show integration of concepts from other courses.
Intended evaluation of plan (closing the loop):	New instructors will be teaching this course and a review of aligned course outcomes should be updated

Program Outcome 3:	Ubiquitous in Nature
Aligned Course Outcome(s):	<ul style="list-style-type: none"> • Microorganisms are ubiquitous, because microbes can perform fundamental metabolic functions of catabolism and anabolism in diverse environments

	<ul style="list-style-type: none"> • Microorganisms are ubiquitous because they have developed adaptations to inhabit some of the most extreme environments on earth • Microorganisms are ubiquitous because they have developed adaptations to use organic, inorganic and photosynthetic forms of energy
Method(s) of measurement:	Response to 10 exams questions dispersed over three exams
Target Performance:	70% of students will earn 70% or better on these case studies.
Actual Performance:	80% of the students scored 70% or better
Interpretation/Reflection on findings:	The findings are important to justify this course as a required course for the microbiology curriculum. Although students in microbiology take Biochemistry, this course shows both the similarity to human/animal metabolism and the incredible diversity in metabolic pathways which allow microorganisms to inhabit diverse habitats.
Action Plan/Use of Results:	Although exams questions provide good information on the student learning outcomes, rubric based assignments may provide more detailed information on student learning.
Intended evaluation of plan (closing the loop):	New instructors will be teaching this course and a review of aligned course outcomes should be updated.

Program Outcome FS2:	Laboratory skill
Aligned Course Outcome(s):	Fundament skills such as sterile technique, pipetting, use of the spectrophotometer and use of the high-speed centrifuge are performed in several different laboratory protocols
Method(s) of measurement:	Surveillance of student groups during the laboratory period
Target Performance:	Although students work in groups, encourage each student to perform each skill.
Actual Performance:	Although not individually assessed, students are given the opportunity to perform each skill.
Interpretation/Reflection on findings:	This is an important LO that is difficult to specifically assessed. Constant surveillance and encouragement for students to perform the lab skills is needed to achieve high mastery of lab skills.
Action Plan/Use of Results:	Develop a plan to assess each other skills
Intended evaluation of plan (closing the loop):	Purchasing of additional equipment so students can work in groups of two instead of four will provide more opportunities for students to practice or master skills.

Program Outcome FS4:	Data analysis
Aligned Course Outcome(s):	Results from experiments are calculated and compared to standard values Results from experiments are calculated and graphed to show relationships over time Results from experiments are calculated and graphed to show difference between treatment groups
Method(s) of measurement:	Response to 10 exams questions from the laboratory final exam
Target Performance:	70% of students will earn 70% or better on these case studies.
Actual Performance:	75% of the students scored 80% or better
Interpretation/Reflection on findings:	Students demonstrated that they can analyze data from experiments in several different ways: calculate values and compare to standard values, analyze data from graphs that show changes over time and analyze data from graphs that show changes between treatment groups.

Action Plan/Use of Results:	A comprehensive laboratory exam provided information about student's ability to analyze data. Another approach would be to use a rubric based analysis of lab reports.
Intended evaluation of plan (closing the loop):	As experiments are revised or changed over time, it would be important to target certain experiments for continuous assessment over time.

Core Concept 5 and Fundamental Skill 7 were not assessed in MICR 4054 in 2020.

c. Evidence of Learning: General Education Courses

Course: MICR 1153 Sex, Travel, Food

This course underwent some important changes during 2019-2020, including a name change. The content was not change significantly, but the method of delivery did in some cases. Most courses shifted on online or virtual, and now more instructors teach this course.

Gen Ed Learning Goal	Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Students will demonstrate understanding of:	Students will demonstrate their understanding by:	Direct and Indirect Measures*				
NS1: 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.	Learning Outcome 1. Discuss and identify health claims that can be evaluated scientifically Describe the different types of epidemiological studies	Measure 1: Chitester based questions	70% of students earn 70% or better on 4 questions.	Measure 1: 53% of students earn 70% or higher	Measure 1: It is difficult assess this measure with multiple choice exams.	Measure 1: Students may need more practice
		Measure 2: Rubric graded Canvas Discussion Assignments	70% of students will reach "Mastery" (4 of 5-point scale); Less than 10% will be developing or below (1-2 on 5 point scales)	Measure 2: 0% Exceeds expectations. 70% Mastery 28% Developing 2% Below expectations	Measure 2: Target was met.	Measure 2: No changes needed
		Measure 3: Rubric graded Signature Assignment	70% of students will reach "Mastery" (4 of 5 point scale); Less than 10% will be developing or below (1-2 on 5 point scales)	26% Exceeds expectations. 64% Mastery 10% Developing 0% Below expectations	Target was met	

GE Learning Goal	Measurable Learning Outcome	Method of Measure.	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
NS 2Integration of Science All natural phenomena are interrelated and share basic	Discuss and identify current public health issues, including a diverse	Measure 1: Chitester based questions	70% of students earn 70% or better on 10 questions.	75%	Target was met	

organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.	selection of diseases, with respect to the social, economic, and environmental forces that impact the pattern of diseases worldwide.	Measure 2: Rubric graded Canvas Discussion Assignments	70% of students will reach "Mastery" (4 of 5-point scale); Less than 10% will be developing or below (1-2 on 5 point scales)	Measure 2: 31% Exceeds expectations. 67% Mastery 3% Developing 0% Below expectations	Target was met	
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GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
NS 3 Science and Society The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the earth's environment.	Recognize the impact that the sciences of public health have had on society and the role of science in determining public health practices (e.g vaccinations, education, regulations) Identify and explain the public health interventions that have improved life expectancy and quality of life through the control of infectious diseases	Measure 1: Chitester based questions	70% of students earn 70% or better on 44 questions.	93%	Target was met	
		Measure 2: Rubric graded Canvas Discussion Assignments	70% of students will reach "Mastery" (4 of 5-point scale); Less than 10% will be developing or below (1-2 on 5 point scales)	Measure 2: 29% Exceeds expectations. 53% Mastery 16% Developing 2% Below expectations	Target was met	
		Measure 3: Rubric graded Signature Assignment	70% of students will reach "Mastery" (4 of 5-point scale); Less than 10% will be developing or below (1-2 on 5 point scales)	31% Exceeds expectations. 67% Mastery 2% Developing 0% Below expectations	Target was met	

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
NS 4: Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	Examine data from epidemiological studies to prove or disprove associations between a risk factor and a disease. Calculate incidence rates and relative risks in epidemiological studies	Measure 1: Chitester based questions	70% of students earn 70% or better on 12 questions.	48%	Measure was not met this semester. However, in Spring/Summer of 2020 the threshold was met at 74% with the same assessment.	Closely monitor this objective to determine trends.
		Measure 2: Rubric graded Canvas Discussion Assignments	70% of students will reach "Mastery" (4 of 5-point scale); Less than 10% will be developing or below (1-2 on 5-point scales)	Measure 2: 36% Exceeds expectations. 56% Mastery 8% Developing 0% Below expectations	The target was met	
		Measure 3: Rubric graded Signature Assignment	70% of students will reach "Mastery" (4 of 5-point scale); Less than 10% will be developing or below (1-2 on 5-point scales)	31% Exceeds expectations. 60% Mastery 10% Developing 0% Below expectations	The target was met	

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
LS 1: Levels of Organization All life shares an organization that is based on molecules and cells and extends to organisms and ecosystems.	Describe the beneficial aspects of microbiology Identify the primary structures and the functions of cells Compare and contrast prokaryotic and eukaryotic cells. Identify the primary structures of viruses.	Measure 1: Chitester based questions	70% of students earn 70% or better on 14 questions.	95%	The target was met	Students appear able to memorize the main terms and structures of cells and viruses and compare prokaryotic and eukaryotic cells. However, when asked to use these terms in a written context they struggle. This may indicate that they are not completely understanding the topics, or they are not carefully reading the discussion prompts. They need more practice.
		Measure 2: Rubric Graded discussion question	70% of students will reach "Mastery" (4 of 5-point scale); Less than 10% will be developing or below (1-2 on 5 point scales)	13% Exceeds expectations. 40% Mastery 41% Developing 6% Below expectations	The target was not met. But, very few students were in the below expectations.	
		Measure 3: Rubric graded Signature Assignment	70% of students will reach "Mastery" (4 of 5-point scale); Less than 10% will be developing or below (1-2 on 5-point scales)	26% Exceeds expectations. 64% Mastery 10% Developing 0% Below expectations	The target was met.	

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
LS 2: Metabolism and homeostasis: Living things obtain and use energy, and maintain homeostasis via organized chemical reactions known as metabolism.	Identify the outcomes of different metabolic strategies of microorganisms (fermentation, aerobic and anaerobic respiration, phototrophy)	Measure 1: Chitester based questions	70% of students earn 70% or better on 19 questions.	87%	Target was met.	
		Measure 2: no second measure was done				

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
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LS 3:Genetics and evolution: Shared genetic processes and evolution by natural selection are universal features of all life	Understand the basics of bacterial genetics including DNA replication and protein synthesis. Students will be able to discuss how genetic mutations and recombination leads to vast microbial diversity through the process of natural selection. Students will understand the implications of bacterial genetics and evolution on human health.	Measure 1: Chitester based questions	70% of students earn 70% or better on 27 questions.	80%	Target was met	Students appear able to memorize the main terms and structures of cells and viruses and compare prokaryotic and eukaryotic cells. However, when asked to use these terms in a written context they struggle. This may indicate that they are not completely understanding the topics, or they are not carefully reading the discussion prompts. They need more practice.
		Measure 2: Rubric Graded discussion question	70% of students will reach "Mastery" (4 of 5-point scale); Less than 10% will be developing or below (1-2 on 5 point scales)	24% Exceeds expectations. 36% Mastery 38% Developing 3% Below expectations	Target was not met. But very few students were below expectations.	

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
LS 4: Ecological interactions: All organisms, including humans, interact with their environment and other living organisms.	Describe human body as an ecosystem for microorganisms and discuss the symbiotic relationship between humans and microorganisms, including both positive and negative outcomes.	Measure 1: Chitester based questions	70% of students earn 70% or better on 11 questions.	78%	Target was met	
		Measure 2: No second measure				

Data is from Spring 2021. Course was an online section with 46 students. Exams were open-book on Chitester. 46 students Questions available upon request. Students who did not complete assignments were not included.

Notes:

With the switch away from Chitester, questions in Canvas Quizzes will be retagged with learning outcomes.

Future assessments will include assessments from a different instructor each year.

Additional narrative (optional – use as much space as needed):

Evidence of Learning: General Education, Life Science Courses

Course: MICR 1113 Introduction to Microbiology. Fall 2020. One section

Gen Ed Learning Goal Students will demonstrate understanding of:	Measurable Learning Outcome Students will demonstrate their understanding by:	Method of Measurement Direct and Indirect Measures*	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
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.	Learning Outcome 1. Discuss the scientific method including common tools and social constraints. Discuss examples throughout the semester.	Measure 1: at least 15 questions spread out through four exams	At least 70% answered correctly	Measure 1: 93.9% answered correctly	Measure 1 goal achieved	Measure 1: none
		Measure 2: uncategorized quizzes after almost every lecture	At least 60% answered correctly. (Questions are written to be more challenging than exam questions)	Measure 2: cumulative scores on all quizzes were above 60% although individual quizzes were sometimes lower	Measure 2: attention must be paid to the topics covered in the individual quizzes, information may need review, and questions missed should be rephrased and included in the next quiz or discussed in class	Measure 2: a concept map to reinforce knowledge of the scientific method

GE Learning Goal	Measurable Learning Outcome	Method of Measure.	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Integration of Science All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.	Illustrate how elements of different scientific disciplines are used to obtain information used in microbiology. Predominantly, this involves chemistry when discussing metabolism and molecular biology.	Measure 1: at least 10 questions spread out through four exams	At least 70% answered correctly	70.3% answered correctly	Goal was achieved, but just barely	Additional questions incorporating specific situations utilizing integrated sciences
		Measure 2: uncategorized quizzes after almost every lecture in	At least 60% answered correctly. (Questions are written to be more challenging than exam questions)	cumulative scores on all quizzes were above 60% although individual quizzes were sometimes lower	attention must be paid to the topics covered in the individual quizzes, information may need review, and questions missed should be rephrased and included in the next quiz or discussed in class	Provide additional examples and ask about necessary disciplines for historical or hypothetical investigations
GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Science and Society The study of science provides explanations that have significant impact on society, including technological	In addition to general discussions having to do with the scientific method and scientific history with societal response, the main focus has been on	Measure 1: at least 20 questions spread out through four exams	At least 70% answered correctly	75.6% answered correctly	Goal achieved	None

advancements, improvement of human life, and better understanding of human and other influences on the earth's environment.	applications of microbiology, for example fermentation, and illness.	Measure 2: uncategorized quizzes after almost every lecture	At least 60% answered correctly. (Questions are written to be more challenging than exam questions)	cumulative scores on all quizzes were above 60% although individual quizzes were sometimes lower	attention must be paid to the topics covered in the individual quizzes, information may need review, and questions missed should be rephrased and included in the next quiz or discussed in class	Discuss examples from current events.
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GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	The emphasis here has shifted from interpreting graphs and statistics to discussions of actual experiments, historic or hypothesized, and light analysis of data.	Measure 1: at least 20 questions spread out through four exams	At least 70% answered correctly	75% answered correctly	Goal achieved	Probably reintroduce graphical analysis
		Measure 2: uncategorized quizzes after almost every lecture	At least 60% answered correctly. (Questions are written to be more challenging than exam questions)	cumulative scores on all quizzes were above 60% although individual quizzes were sometimes lower	attention must be paid to the topics covered in the individual quizzes, information may need review, and questions missed should be rephrased and included in the next quiz or discussed in class	Use materials from current periodicals that rely on scientific analyses.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Levels of Organization All life shares an organization that is based on molecules and cells and extends to organisms and ecosystems.	In addition to discussing organization as necessary for living systems, cell structure and the structure of cell components in the relationship to performing life's functions are discussed	Measure 1: at least 20 questions spread out through four exams	At least 70% answered correctly	77.7% answered correctly	Goal achieved	None
		Measure 2: uncategorized quizzes after almost every lecture	At least 60% answered correctly. (Questions are written to be more challenging than exam questions)	cumulative scores on all quizzes were above 60% although individual quizzes were sometimes lower	attention must be paid to the topics covered in the individual quizzes, information may need review, and questions missed should be rephrased and included in the next quiz or discussed in class	Place more of an emphasis on how antimicrobial chemicals and chemotherapeutic agents function by interfering with normal cell functions.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
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Metabolism and homeostasis: Living things obtain and use energy, and maintain homeostasis via organized chemical reactions known as metabolism.	Discuss homeostasis as a characteristic of life. Metabolism in general and catabolism in more depth, including ATP synthesis, are discussed in detail	Measure 1: at least 25 questions spread out through four exams	At least 70% answered correctly	72.4% answered correctly	Goal achieved	None
		Measure 2: quizzes, homework, and signature project (home fermentation and PowerPoint presentation)	Demonstration of working knowledge of subject	Most did well but some didn't turn in homework assignments. Home fermentations typically were excellent.	Most students showed increased knowledge although some appear to lack self-discipline.	Try to come up with more "fun" home projects/homework to increase student involvement in class

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Genetics and evolution: Shared genetic processes and evolution by natural selection are universal features of all life	Evolution is presented as the fundamental concept in biology. After discussing how information in cell is used mutation and DNA repair are considered in light of evolution.	Measure 1: at least 25 questions spread out through four exams	At least 70% answered correctly	75.5% answered correctly	Goal achieved	None
		Measure 2: two concept maps, one on the central dogma and the other on horizontal transfer of genetic material	At least 70% on each concept map	Average grade was above 80%	Goal achieved	Typically some students choose not to participate and construct concept maps. As an alternative I will provide very detailed concept maps with some spaces left blank for the students to fill in themselves. Perhaps this will encourage more students to participate and will provide an accurate concept map which can be used as a study aid.
GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Ecological interactions: All organisms, including humans, interact with their environment and other living organisms.	From micro biomes to soil microbiology, general principles of ecology are presented. The interaction of phenotype within the ecosystem is a recurring theme. In addition common terms for macro ecology are included.	Measure 1: at least 15 questions spread out through four exams	At least 70% answered correctly	75.2% answered correctly	Goal achieved	None

		Measure 2: uncategorized quizzes after almost every lecture him	At least 60% answered correctly. (Questions are written to be more challenging than exam questions)	cumulative scores on all quizzes were above 60% although individual quizzes were sometimes lower	attention must be paid to the topics covered in the individual quizzes, information may need review, and questions missed should be rephrased and included in the next quiz or discussed in class	Use more illustrations of interactions that play upon a student's interests, for example the gut micro biome and nutritional health
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Appendix A

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

Date of Program Review: 2019	Recommendation	Progress Description
Recommendation 1: Assessment	More discussion of what works and does not work.	Assessment is being addressed at bi-weekly department meetings in preparation for the next (this) report. All faculty are being made aware of the program and general education learning outcomes.
	Develop new measures of assessment.	We have begun discussions of new learning outcomes for the program.
	Provide more opportunities for professional development	All faculty, especially new faculty, are encouraged to participate in professional development. Attending conferences in 2020-21 was limited to virtual. However, many faculty participated in online programs, especially in preparation for online/virtual teaching in 2020.
Recommendation 2: Better coordination of content for general education courses.	Despite use of the same text, it is unclear how much coordination occurs among faculty teaching Elementary Public (Micro 1153) and also the Introductory Microbiology (Micro 1113).	Developing Faculty teams for each general education courses to align curriculum and assessments.

	Updating the Public Health Microbiology course to make it stand out in the Microbiology and General Education programs may help to attract more students to Microbiology and the College of Science	MICR 1153 has been rebranded as Sex, Travel, and Food. An OER has been adopted for this course and a standard outline of material/assessments is being developed through and OER grant.
Recommendation 3: Update curriculum	We think the new emphases/concentrations strengthen the curriculum	New emphases in General Microbiology, Industrial Microbiology, Medical Microbiology, and Environmental and Public Health have been formalized.
Recommendation 4: Learning outcomes	We highly recommend that the faculty as a whole take time, either at an annual retreat or on a quarterly/monthly basis, to share course learning outcomes and how faculty strive to assess them.	See #1 above
Recommendation 4: Faculty workload.	We recommend that at least one new faculty line be directed to the Microbiology Department. These new hires should be strategic to areas of expertise that will provide more teaching flexibility for all faculty.	Two new faculty were hired in the Fall of 2020. They are developing active undergraduate research programs. A new hire is expected for Fall of 2022 to replace retiring faculty. That position will be filled to support the medical microbiology emphasis.
Recommendation 5: Program support	Review Team strongly recommends that additional space be dedicated to faculty research laboratories.	Renovations made to room TY 466 and the Equipment room to make more functional spaces.
Recommendation 6: Relationships with External Communities	We encourage the entire faculty to interact with the Advisory Board, which is interested in providing more support and information to the faculty about the skills that students need in the workforce and job opportunities in the region.	The advisory board did not meet in 2020-2021 due to COVID. New meetings will be scheduled in 2022.

Additional narrative: Since the program review we have added two new faculty members. Many of the recommendations need to involve those faculty. The pandemic has made progress toward program review recommendations more difficult.

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	2018-19	2019-20	2020-21
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)			
Full-time Tenured	6	6	4
Full-time Non-Tenured (includes tenure-track)	2	2	4
Part-time and adjunct		1	1
With Master's Degrees			
Full-time Tenured	-	-	-
Full-time Non-Tenured	-	-	-
Part-time and adjunct	2	3	4
With Bachelor's Degrees			
Full-time Tenured	-	-	-
Full-time Non-tenured	-	-	-
Part-time and adjunct	-	-	-
Other			
Full-time Tenured			
Full-time Non-tenured			
Part-time			
Total Headcount Faculty			
Full-time Tenured	6	6	4
Full-time Non-tenured	2	2	4
Part-time	2	4	5

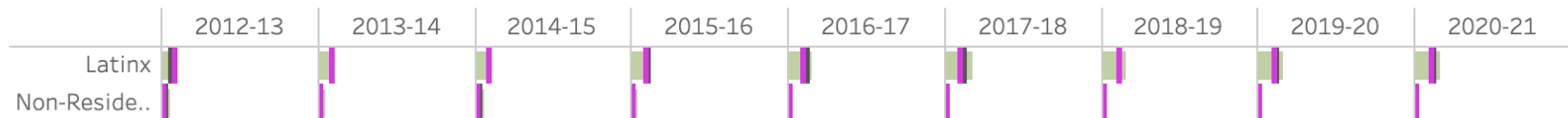
Please respond to the following questions.

- 1) Review and comment on the trend of minority students enrolling in your classes (particularly lower-division, GEN Ed) and in your programs.

Currently, our program is 17% Latinx and 9% “Other.” This is down slightly from a peak in 2017-18, but still below the University and College averages. We currently do not specifically recruit for minority students. However, we now have two bilingual departmental advisors. We are also currently conducting a search for a new faculty member, and we will give priority to diverse candidates.

		Ethnicity Classification									
Overall for Past 10 Academic Years		12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	
70% White	N	41	40	46	53	63	66	60	57	55	
	%	11%	10%	11%	13%	16%	18%	16%	17%	17%	
13% Latinx	N	24	17	24	18	14	8	8	6	5	
	%	6%	4%	6%	4%	4%	2%	2%	2%	2%	
9% Other	N	31	31	40	35	26	28	40	30	30	
	%	8%	8%	9%	8%	7%	7%	11%	9%	9%	
Unknown	N	21	17	18	16	15	11	13	13	12	
	%	5%	4%	4%	4%	4%	3%	3%	4%	4%	
White	N	271	283	299	294	273	261	257	223	224	
	%	70%	73%	70%	71%	70%	70%	68%	68%	69%	

University and College Comparisons



* On 1st June of every year the recent academic year will be updated

- 2) What support (from enrollment services, advising, first-year transition office, access & diversity, etc.) do you need to help you recruit and retain students?

- a. Students are rarely introduced to microbiology during high school, and so, most of our new majors are transfer students or students who switch from a different major. It would be helpful if students interested in science are at least told about the microbiology program during general advising especially if they express an interest in pre-professional studies. Making students aware of our program during early advising if they are interested in science or health fields would be very helpful. We are a great option for pre-med, pre-physician's assistant, pre-dental, and pre-pharmacy students, but sometimes these students are automatically sent to health sciences or zoology. Since some students start their college course work with the intent of attaining an Associate's degree, the students should be advised about the advantages of pursuing as A.S. in biology rather than A.S. in general studies.
 - b. We could use some help advertising our degree program to new students and high school students. This should include an advertisement for A.S. in Biology.
 - c. Proper advising for students interested in science majors (students should be encouraged to take Math 1050 and Chemistry 1200/1210). Additional tutoring support for students in difficult courses (e.g. MICR 2054, Organic Chemistry, Physics, Math). The A. S. in biology also supports taking the appropriate perquisites in Mathematics and Chemistry in order to attain B.S. degree in the College of Science.
- 3) We have invited you to re-think your program assessment. What strategies are you considering? What support or help would you like?
- Strategies:
- a. Revising our program outcomes to be easier to assess and to give more useful assessment information.
 - b. Developing outcome-based assessments for the new outcomes.
 - c. Creating assessment teams, and assessment plans for general education courses.
- Help we need:
- d. Help using assessment tools in Canvas to easily assess outcomes.
 - e. Help designing assessment methods for courses and outcomes.
- 4) Finally, we are supporting our Concurrent Enrollment accreditation process. Does your program offer concurrent enrollment classes? If so, have you been able to submit the information requested from the Concurrent Enrollment office?
- a. We do not offer concurrent enrollment at this time.

Glossary

Student Learning Outcomes/Measurable Learning Outcomes

The terms ‘learning outcome’, ‘learning objective’, ‘learning competency’, and ‘learning goal’ are often used interchangeably. Broadly, these terms reference what we want students to be able to do AFTER they pass a course or graduate from a program. For this document, we will use the word ‘outcomes’. Good learning outcomes are specific (but not too specific), are observable, and are clear. Good learning outcomes focus on skills: knowledge and understanding; transferrable skills; habits of mind; career skills; attitudes and values.

- Should be developed using action words (if you can see it, you can assess it).
- Use compound statements judiciously.
- Use complex statements judiciously.

Curriculum Grid

A chart identifying the key learning outcomes addressed in each of the curriculum’s key elements or learning experiences (Suskie, 2019). A good curriculum:

- Gives students ample, diverse opportunities to achieve core learning outcomes.
- Has appropriate, progressive rigor.
- Concludes with an integrative, synthesizing capstone experience.
- Is focused and simple.
- Uses research-informed strategies to help students learn and succeed.
- Is consistent across venues and modalities.
- Is greater than the sum of its parts.

Target Performance (previously referred to as ‘Threshold’)

The level of performance at which students are doing well enough to succeed in later studies (e.g., next course in sequence or next level of course) or career.

Actual Performance

How students performed on the specific assessment. An average score is less meaningful than a distribution of scores (for example, 72% of students met or exceeded the target performance, 5% of students failed the assessment).

Closing the Loop

The process of following up on changes made to curriculum, pedagogy, materials, etc., to determine if the changes had the desired impact.

Continuous Improvement

An idea with roots in manufacturing, that promotes the ongoing effort to improve. Continuous improvement uses data and evidence to improve student learning and drive student success.

Direct evidence

Evidence based upon actual student work; performance on a test, a presentation, or a research paper, for example. Direct evidence is tangible, visible, and measurable.

Indirect evidence

Evidence that serves as a proxy for student learning. May include student opinion/perception of learning, course grades, measures of satisfaction, participation. Works well as a complement to direct evidence.

HIEE – High Impact Educational Experiences

Promote student learning through curricular and co-curricular activities that are intentionally designed to foster active and integrative student engagement by utilizing multiple impact strategies. Please see <https://weber.edu/weberthrives/HIEE.html>