



Program Review

Merced College

2016-2017

Faculty/Program Manager View

Section I: Program Summary

1. **Name of Program**

Biological Sciences

2. **Degrees, Certificates or Services Associated with this Program**

Biology A.S. and Health Sciences AS

Merced College Mission Statement:

Merced College serves as a gateway to the future, providing accessible, affordable, and relevant education and workforce training for students in our richly diverse region. The college offers programs of study that lead to transfer, associate degrees, and certificates. Merced College provides basic skills and noncredit courses, as well as community education for personal and professional enrichment.

3. **Program Purpose Statement: How does the program contribute to the mission of the college?**

The Biology Program provides the 1st two years of instruction for students seeking to transfer to a 4 year institution and earn their degree in Biology related fields. Additionally, the program serves to provide the pre-requisite courses needed to matriculate to a nursing school. Students can also take classes to satisfy their General Education requirement for a science course with a lab.

4. **Faculty/Staff Involvement**

The dialogue that occurred while planning assessments, evaluating data results, and determining action plans took place

- with others in my program/department during meetings (i.e. cohort, area, department meetings, small groups etc.)
- during on-campus workshops (i.e. flex workshops)
- over email
- with colleagues from outside the district
- with my dean and/or colleagues in my division

Other

No dialogue occurred

List Faculty/Staff involved in the assessment in the table below. To add rows select **Insert Item**.

Name	Participation
Valerie Albano	<input checked="" type="checkbox"/> Program Review Author <input checked="" type="checkbox"/> Discussion Participant <input checked="" type="checkbox"/> Data Contributor
Cary Coburn	<input checked="" type="checkbox"/> Program Review Author <input checked="" type="checkbox"/> Discussion Participant <input checked="" type="checkbox"/> Data Contributor
Karen Crombie	<input type="checkbox"/> Program Review Author <input type="checkbox"/> Discussion Participant <input checked="" type="checkbox"/> Data Contributor
Carl Estrella	<input checked="" type="checkbox"/> Program Review Author <input checked="" type="checkbox"/> Discussion Participant <input checked="" type="checkbox"/> Data Contributor
Megan Igo	<input type="checkbox"/> Program Review Author <input type="checkbox"/> Discussion Participant <input type="checkbox"/> Data Contributor
Susan Keller	<input checked="" type="checkbox"/> Program Review Author <input checked="" type="checkbox"/> Discussion Participant <input checked="" type="checkbox"/> Data Contributor
Ray Latham	<input type="checkbox"/> Program Review Author <input checked="" type="checkbox"/> Discussion Participant <input checked="" type="checkbox"/> Data Contributor
Daryl Lingerfelt	<input checked="" type="checkbox"/> Program Review Author <input checked="" type="checkbox"/> Discussion Participant <input type="checkbox"/> Data Contributor
Mireya Macias	

- Program Review Author
- Discussion Participant
- Data Contributor

Edward Modafferi

- Program Review Author
- Discussion Participant
- Data Contributor

Katherine Schroeder

- Program Review Author
- Discussion Participant
- Data Contributor

Section II: Assessment Summary

5. Please provide a status update of all course SLO assessments.

List the dates of the last two assessment reports, starting with the most recent. (Dates must be within the last five years.)

<i>Course Number</i>	<i>Previous Assessment</i>	<i>Next Planned Assessment</i>	<i>Contact Faculty</i>
Biol 1 Gen Bio	<u>Spring 2016</u>	Select...	Susan Keller
Biol 2 Human Bio	<u>Spring 2016</u>	<u>Spring 2018</u>	Cary Coburn and Mireya Macias
Biol 4A Fundamentals	<u>Fall 2016</u>	<u>Fall 2018</u>	Mireya Macias
Biol 4B Diversity	<u>Fall 2016</u>	<u>Fall 2018</u>	Carl Estrella
Biol 6 Env Sci	<u>Spring 2017</u>	<u>Spring 2019</u>	Cary Coburn and Karen Crombie
Biol 9 Genetics	<u>Fall 2014</u>	<u>Fall 2016</u>	Valerie Albano
Biol 16 Human Anatomy	<u>Fall 2015</u>	Select...	Susan Keller and Ray Latham
Biol 18 Physiology	<u>Fall 2016</u>	<u>Fall 2018</u>	Cary Coburn
Biol 20 Microbio	<u>Fall 2016</u>	<u>Fall 2018</u>	Edward Modafferi
Biol 32 Intro Biotech	<u>Fall 2014</u>	<u>Fall 2016</u>	Valerie Albano
Biol 32L Intro Biotech Lab	<u>Fall 2014</u>	<u>Fall 2016</u>	Valerie Albano
Biol 33 Adv Biotech	<u>Spring 2015</u>	<u>Spring 2017</u>	Valerie Albano

6. Means of Assessment (update any changes):

List the program SLO/SAO in the space below.

Program SLO or SAO 2014-2015

Biology A. Organize, analyze and interpret observations and predictions about the natural world using the scientific method.

Health Science B. Understand and implement the scientific method.

Links to Institutional Learning Outcomes

- Communication
- Computation
- Cognition
- Global and Community Consciousness and Responsibility
- Personal Development and Life-Long Learning

Select means of assessment, or select Other and type in the means of assessment.

- Assessment results of course SLOs linked to each program SLO
- Item analysis of exams, quizzes, problem sets, etc. (items linked to specific outcomes)
- Assignments based on rubrics (essays/reports, projects, performances, presentations, etc.)
- Assignments based on checklists
- Classroom Assessment Techniques (CATS, "clicker" mediated responses, etc.)
- Direct observation of performances, structured practice or drills, "practical" exams, small group work, etc.
- Capstone projects or final summative assessment (final exams, capstone projects, portfolios, etc.)
- Direct assessment of service activities

Other

Benchmark Met

Program SLO or SAO 2014-2015

Biology SLO B. Identify and describe cellular and multicellular processes and structures and relate them to their functions.

Health Sci SLO A. Understand and describe the basic fundamental principles of body structure and function in health and disease and communicate this knowledge in both written and oral form.

Health Sci SLO D. Use critical thinking skills based on a chemical, structural, and functional foundation to gather and critically analyze, describe, and disseminate quantitative and qualitative information.

Links to Institutional Learning Outcomes

- Communication
- Computation
- Cognition
- Global and Community Consciousness and Responsibility
- Personal Development and Life-Long Learning

Select means of assessment, or select Other and type in the means of assessment.

- Assessment results of course SLOs linked to each program SLO
- Item analysis of exams, quizzes, problem sets, etc. (items linked to specific outcomes)
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- Classroom Assessment Techniques (CATS, "clicker" mediated responses, etc.)
- Direct observation of performances, structured practice or drills, "practical" exams, small group work, etc.
- Capstone projects or final summative assessment (final exams, capstone projects, portfolios, etc.)
- Direct assessment of service activities

Other

Benchmark Met

Program SLO or SAO 2014-2015

Biology C. Analyze patterns and mechanisms of genetics from the molecular to the population level.

Links to Institutional Learning Outcomes

- Communication
- Computation
- Cognition
- Global and Community Consciousness and Responsibility
- Personal Development and Life-Long Learning

Select means of assessment, or select Other and type in the means of assessment.

- Assessment results of course SLOs linked to each program SLO
- Item analysis of exams, quizzes, problem sets, etc. (items linked to specific outcomes)
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- Direct assessment of service activities

Other

Benchmark Met

Program SLO or SAO 2014-2015

Biology SLO D. Recognize the ecological relationships between organisms and their environment and the environmental impact of population growth.

HS SLO C. Research, comprehend and analyze etiologic factors; and then communicate the evaluation supported by a documented review of relevant literature.

Links to Institutional Learning Outcomes

- Communication
- Computation
- Cognition
- Global and Community Consciousness and Responsibility
- Personal Development and Life-Long Learning

Select means of assessment, or select Other and type in the means of assessment.

- Assessment results of course SLOs linked to each program SLO
- Item analysis of exams, quizzes, problem sets, etc. (items linked to specific outcomes)
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- Capstone projects or final summative assessment (final exams, capstone projects, portfolios, etc.)
- Direct assessment of service activities

Other

Biology 20 – students created Disease Brochures looking at etiology

Benchmark Met

Program SLO or SAO 2014-2015

Biology E. Explain principles and mechanisms of evolution and recognize the resulting major groups of organisms as they are arranged in currently recognized taxa.

Links to Institutional Learning Outcomes

- Communication
- Computation
- Cognition
- Global and Community Consciousness and Responsibility
- Personal Development and Life-Long Learning

Select means of assessment, or select Other and type in the means of assessment.

- Assessment results of course SLOs linked to each program SLO
- Item analysis of exams, quizzes, problem sets, etc. (items linked to specific outcomes)
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- Capstone projects or final summative assessment (final exams, capstone projects, portfolios, etc.)
- Direct assessment of service activities

Other

Benchmark Met

Program SLO or SAO 2014-2015

Biology F. Develop an awareness of the careers and professions available in the biological sciences and are prepared to transfer to appropriate schools.

Links to Institutional Learning Outcomes

- Communication
- Computation
- Cognition
- Global and Community Consciousness and Responsibility
- Personal Development and Life-Long Learning

Select means of assessment, or select Other and type in the means of assessment.

- Assessment results of course SLOs linked to each program SLO
- Item analysis of exams, quizzes, problem sets, etc. (items linked to specific outcomes)
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- Direct assessment of service activities

Other

New lab in Biology 2 lab manual

Benchmark Met

7. Assessment Data and Results for each PLO/SAO

2015-2016:

1. Sci Method -

Biology 1 – answers to 3 MC questions, 52 students assessed – 92% correct

Biology 2 – answers to 3 MC questions, MC 157 students assessed – 87% correct; LB 37 students – 89% correct

Biology 4A - answers to 3 MC questions , 35 students assessed - 90% correct answers

Biology 4B - written answers to 4 questions on lab exam 1 - 78% correct answers

2. Structure and Function

Biology 1 – answers to 3 Embedded MC questions, 52 students assessed – 85% correct

Biology 2 – answers to 3 Embedded MC questions, MC 157 students assessed – 73% correct; LB 37 students – 83% correct

Biology 4A - answers to 3 Embedded MC question, 35 students assessed - 88% correct answers

Biology 4B - Ten selected questions on lecture exam 3 - 85% correct

Biology 20 – Answers to 5 Embedded MC questions, 73+/-6% correct responses, (374/515) (correct responses 65-78% range for questions).

Matching Section comparisons between classes:

Biology 1: 42 students assessed, 52% correct identifications

Biology 20: 26 students assessed, 66% correct identifications

3. Genetics

Biology 1 Lab Quiz on Cell Division, 296 students assessed, 71% could identify the order to the stages of mitosis. Identifying the events which take during these stages resulted in correct responses ranging between 50-62%.

Biology 4A - answers to 3 Embedded MC questions, , 35 students assessed - 87% correct answers

Biology 9 - Course SLOs were assessed with Embedded test questions,

SLO 1: Mendelian genetics = 33% correct

SLO 2: Genetic structures = 75% correct

SLO 3: Molecular genetics = 75% correct

4. Ecology and Etiology

Biology 2 – answers to 3 Embedded MC questions 157 students assessed – 69% correct

Biology 20 – students created Disease Brochures looking at etiology All students in the sections assessed earned passing grades on this assignment. (Approximately 60 students)

5. Evolution and classification

Biology 1 – answers to 3 Embedded MC questions, 35 students assessed - 46 students assessed – 91% correct

Biology 2 – answers to 3 Embedded MC questions, 35 students assessed - MC 157 students assessed – 68% correct; LB 37 students – 91% correct

Biology 4A- answers to 3 Embedded MC questions, 35 students assessed - 84% correct answers

6. Careers and transfer: Survey of Students in the Pre-Med club attending the SUMMA conference at Stanford University, 92% positive responses.

2016-2017:

1. Sci Method -
2. Structure and Function - Biology 18, 2 of 3 course SLOs met the benchmarks
3. Genetics
4. Ecology and Etiology
5. Evolution and classification
6. Careers and transfer: There is a new lab in the Biology 2 lab manual to start investigating this outcome.

8. **Analysis and Interpretation of Results for each PLO/SAO (include benchmarks)**

2015-2016:

1. Sci Method - Benchmark of 70% correct responses. Students can identify basic principles associated with the scientific method from a list.
2. Structure/Function - Benchmark of 70% correct responses. Students can identify basic structures and functions in organisms, including cells. A comparison was made using matching sections to get more information, and students in Biology 1 could correctly identify more than 50% of the cell parts with their function. Students in the Biology 20 class would be expected to show more mastery of this concept, and they could correctly identify 66% of the cell structures and their functions. Still not up to the benchmark, but showing improvement.
3. Genetics - Benchmark of 70% correct responses.
 - Biology 1: Students were introduced to the idea of cell division, but did not learn the specific details.
 - Biology 4: Students in a majors course performed better at identification.
4. Ecology and Etiology - Benchmark of 70% correct responses.
 - Biology 2 - students were very close to the benchmark
 - Biology 20 - students were exposed to the idea of etiology in the classroom and practiced using their knowledge.
5. Evolution and classification - Benchmark of 70% correct responses.

Students appear to be performing satisfactorily at this outcome which is a major focus in Biology classes.

6. Careers and transfer:

While a survey was given, formal assessment of careers and transfer opportunities in the classroom is being address. New activities have been included in the curriculum for Biology 2 and more will be pursued in the future in order to adequately assess this outcome .

2016-2017:

Many of the Biology courses were not assessed during the last school year. Biology 18 was assessed, and concerns leading to plans for improvement have been discussed by the faculty teaching this course as a result of analyzing the current data.

9. **Do your program outcomes represent learning appropriate to the standards of your discipline or profession? (This may not apply to all service areas.)**

Yes, as evidenced by the articulation agreements with the CSUs and the UCs for Biology related disciplines, in addition to colleges where RN degrees are offered.

10. **Plans for Improvement**

1. Determine if the current program outcomes are sufficiently linked to the current course SLO statements. For example, while most faculty felt they did discuss the program SLO about careers and transfer opportunities, we realized that it was not being formally assessed to measure whether or not students could demonstrate they had learned about these pathways.
2. Map the curriculum. Determine which course SLOs align with the program SLOs so the course assessments can be more easily rolled into the program review.
3. Track how students are doing at achieving outcomes in introductory Biology 1/2/6/9 classes, and compare that with how students are doing in majors courses where they should be able to demonstrate mastery of the concepts.
4. Identify course or other activities related to the Program SLO about "Developing an awareness of careers and transfer pathways". We have also started to discuss if there is some way to incorporate more information on the Science Website.
5. Phase in new microscopes in the Biology Laboratories to replace ones that are wearing out due to continual use by students.

Program Review Data:

To view the relevant data for the following questions select the link below, log into the MC4MePortal, then choose your area.

[Instructional Program Review Data](#) (New datasets for the 2016-2017 cycle will be available over the summer)

11. **Update trends, if any, identified using the 2016-2017 datasets**

- a. student demographics for your program compared to the district?

The majority of students in the program are between the ages 19-29, with almost 50% in the 20-24 age range, compared to the college where 37% are in this age range, indicating a significantly younger student is going through the Biology program. More than half of the students identify as female (~68%) compared to the college where 58% identify as female, which reflects the large number of women going through the Health Sciences program with the goal of earning their AS degree in Registered Nursing.

Similar to the college, the majority of students identify as Hispanic (55%). There are slightly more Asians in the program, at 15% compared to 9% in the college. Students of "unknown" ethnicity appear to be comparable to the college, with both at 0.5%.

b. instructional demographics for your program compared to the district?

Course Completion Rates in Biology are ~ 80-81% compared to 84% for the district. CCR is similar for courses offered at the main campus and the LB campus. The Distance education CCR has been significantly lower ranging from 63-74%, which might be related to the low number of DE courses (1-2 only).

Course Success Rates: These mirror the college over the past 5 years ranging from 62-69%. CSR has been consistently higher for LB compared to the main campus (70% versus 61-68%), and DE continues to be a problem with CSR ranging from 39-53%.

The number of awards for AA degrees has almost doubled (26 to 43) over the past 5 years, and the number of AS degrees increased from 2 to 8.

Staffing: Productivity for the Biology program ranges from 600 to almost 700, and is similar for the main campus and LB. Interestingly, productivity at LB and in the DE courses has been dropping off over the last 5 years. Despite having only 8 faculty at the main campus and 2 at the LB campus, the Full Time Equivalent Faculty (FTEF) numbers have been steadily increasing, and is up to 35 in 2015-16. Looking at the ratio of students to faculty (FTES/FTEF), these numbers are relatively consistent ranging between 18-19, except for the DE component which has been steadily decreasing over the past 5 years.

Classes Filled: These appear to be consistently higher compared to the district (~72% vs. 68% for 2015-16) and are comparable for the main campus and LB. The fill rates of DE courses have been steadily declining over the last 5 years. Average Biology class size has decreased from ~24 to 19, while the district average has only decreased by 1. Likewise, the number of sections being offered has decreased from 144 to 132 for the Biology program. While the number of sections offered at LB has remained the number of sections offered at the Merced campus is dropping off. We expect this to change as new sections of Biology courses are being offered on Fridays and Saturdays.

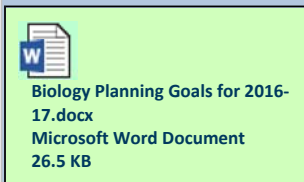
12. Are there any factors influencing the student access to services/programs?

DE appears to be something the program needs to investigate further due to consistently low numbers. Currently the Biology program is limited in how many new sections can be offered due to space/time constraints and availability of lab technicians. Likewise the lack of solid WiFi signals is a problem for instructors that would like to start utilizing new teaching methods that require good WiFi signals in the classroom..

We are also seeing a problem with chairs and desktops in our main lecture rooms in the science building and have already run out of space to offer courses during peak times.

Section III: Planning Summary

Remember to attach your goals sheet(s) in the Attachments section below. Please click here: [An example of a template](#) for an example of a template to use for recording your program goals.



Or for **the LRC, AV, or ITS** click on the link below to add your goals:

14. Have there been any internal/external changes to this program/department which have had a significant impact on the program's goals and/or effectiveness? If so, please explain.

UC Merced has lost their anatomy instructor and this has increased the number of students trying to enroll in Biology 16 in Merced.

Resource Allocation

- Click on the link below to enter your resource allocation requests for the 2016-1017 Cycle. (It will open up an excel spreadsheet)

[Resource Allocation Requests for 2016-2017 Program Review](#)

Resource Allocation 2014-2015

Resource	Learning Outcomes Select all that apply	Reason for Resource Select all that apply	Comments
Identify and purchase needed lab supplies for	Outcomes/Goals All PLOs and Goal 3 Institutional SLOs		Identify and purchase needed lab supplies for Merced and LB campuses to equalize the opportunities for students; See attached resource allocation spreadsheet

Merced and LB campuses to equalize the opportunities for students

- Communication
- Computation
- Cognition
- Global Consciousness
- Personal Development

- Safety
- Compliance
- Maintain Program
- Grow Program

Replacement Microscopes

Outcomes/Goals

All PLOs and Goals 2-4

Institutional SLOs

- Communication
- Computation
- Cognition
- Global Consciousness
- Personal Development

- Safety
- Compliance
- Maintain Program
- Grow Program

Address supply needs with increasing enrollment, replacing microscopes for ones starting to break down from wear and tear, and to allow for additional growth in the future.

Biolog

Outcomes/Goals

PLO A and D; goal3

Institutional SLOs

- Communication
- Computation
- Cognition
- Global Consciousness
- Personal Development

- Safety
- Compliance
- Maintain Program
- Grow Program

This machine will allow students to use a modern device for identifying bacteria based on their biochemistry, and can be used in multiple labs, including for Majors Biology courses, Health Science courses, and also for the Biotechnology program. It will be assessed by seeing if more than 70% of students can correctly identify their unknown bacteria.

Fluorescent Microscope

Outcomes/Goals

i.e. PLO A and B, or Goal 1 and 2

Institutional SLOs

- Communication

Allow students to view structures not evident with regular light microscope, and also view modern uses of microscopy techniques. Assessment will be done by seeing if more than 50% of students can use it correctly.

	<input type="checkbox"/> Computation <input type="checkbox"/> Cognition <input type="checkbox"/> Global Consciousness <input type="checkbox"/> Personal Development	<input type="checkbox"/> Safety <input type="checkbox"/> Compliance <input checked="" type="checkbox"/> Maintain Program <input checked="" type="checkbox"/> Grow Program	
New faculty at LB campus	Outcomes/Goals All PLOs Institutional SLOs <input type="checkbox"/> Communication <input type="checkbox"/> Computation <input type="checkbox"/> Cognition <input type="checkbox"/> Global Consciousness <input type="checkbox"/> Personal Development	<input type="checkbox"/> Safety <input type="checkbox"/> Compliance <input checked="" type="checkbox"/> Maintain Program <input checked="" type="checkbox"/> Grow Program	Numbers indicate more sections could be filled as the LB campus is experiencing additional growth.

13. Were any of your resource allocation requests fulfilled in the last year? YES NO N/A
- If yes, explain why the item was needed, how it affected student success and how you measured student success related to the requested resource.

14. How is your program leveraging other resources? **(update any changes):**
- We are increasing our outreach to local high schools, offering more 2x2 classes, allowing students to earn credit for college courses.

15. List any resources your students would benefit from having in the LRC. (i.e. books, journals, media, etc. **update any changes):**
- Subscription to journal with sources of current information on "science education"

IV. Additional Information:

16. Is there anything else you would like to be considered in the annual planning document? **(update any changes):**

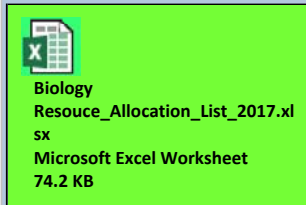
Approval of the AS-T for Biology will allow us to collect more information on the numbers of students who are transferring to 4 year schools who have not filed to receive their degree in Biology.

Some of the classrooms where instruction is offered by the Science cohort have damaged desks or are missing chairs, both of which need to be replaced. (Science-110 and Science-111)

Attachments

Please attach any relevant documents to the program review.

Include items like, current outcomes mapping, rubrics, assessment data, and the previous assessment, if possible.
To attach multiple files select Insert Item.



Section V: Document Evaluation:

Self - Evaluation of Program Review

Please perform a self-evaluation of the completed annual program review using the criteria for proficiency below. The purpose of the self-evaluation is to improve the quality of program review reports.

Criteria for Proficiency in Program Outcomes Assessment

Reviewers: Select the score from the columns that best reflects the content of the report being reviewed

1. Means of Assessment

1 - Description of assessment procedure is vague, incomplete or unclear.

2. Assessment Data and Results

1 - Some results are reported, but incomplete. Not clear how results provide information about student learning on the stated outcome.

3. Analysis and Interpretation of Results

2 - Analyses and interpretation/reflection on the assessment results clearly articulated. Unclear if it was collaborative.

4. Plans for Improvement

2 - Actionable plans for improvement provided, and for the most part appear to be appropriate.

Process Evaluation

Please provide feedback to the Office of Institutional Effectiveness regarding the assessment process:

1. What changes to the review process or template would make program assessment more meaningful or useful to you?

New software

2. What difficulties (if any) did you experience in completing the program review?

Getting feedback from stakeholders

3. What resources (if any) would make the review easier to complete?

Autopopulate the data from course SLOs to linked program SLOs. Also datasets on demographics

4. Do you have further comments or suggestions?

Once complete, submit by choosing one of the options below:

For All other programs:

Select your COHORT from the list below:

Science

MAKE SURE TO SAVE YOUR COMPLETED FORM BEFORE SUBMITTING FOR REVIEW:
