Basic Program Information

Department Name:

Biology

Division Name:

Biological and Health Sciences

Program Mission(s):

1. Prepare students for a successful career in the biological sciences, including students planning to transfer to a four-year school.
2. Prepare students to be savvy consumers of scientific information, and provide a general education in the life sciences.
3. Provide students with the background knowledge and critical thinking skills required to understand important issues such as environmental science, climate change, evolution, genetics, disease prevention and basic nutrition.
4. Support programs in allied health by providing an education in biological principles including anatomy, physiology, microbiology, nutrition and pharmacology.

Please list all Program Review team members who participated in this Program Review:

Name	Department	Position
Kathleen Duncan	Biology	Faculty
Amy Edwards	Biology	Faculty
Karen Erickson	Biology	Faculty
Carolyn Holcroft	Biology	Faculty
Joanne Lopez	Biology	Faculty
Martin Melia	Biology	Faculty
Lisa Schultheis	Biology	Faculty
Gillian Schultz	Biology	Faculty

Total number of Full Time Faculty:	8
Total number of Part Time Faculty:	~16

Please list all existing Classified positions:
Lab Technician, FT; supports all aspects of department
Lab Technician, PT (40%); supports classes in 5100 (microbiology, Bio 40A, and Bio 1B labs)

List all Programs* covered by this review & check the appropriate column for program type:

Program Name	Certificate of Achievement Program	Associate Degree Program	Pathway Program
Biology		XXXX	
Allied Health Support			XXXX
GE: Natural Sciences, Lifelong Learning			XXXX

Nanoscience			XXXX

*If you have a supporting program or pathway in your area for which you will be making resource requests, please analyze it within this program review (i.e. Integrated Reading and Writing, Math My Way, etc.) You will only need to address those data elements that apply.

Section 1: Data and Trend Analysis

a. Program Data:

Data will be posted on http://foothill.edu/staff/irs/programplans/programreviewdata.php for all measures except non-transcriptable completion. You must manually copy data in the boxes below for every degree or certificate of achievement covered by this program review.

Transcriptable Programs	2010-2011	2011-2012	2012-2013	% Change
A.S. Biological Sciences	11	15	5	-67%

Please provide any non-transcriptable completion data you have available. Institutional Research does not track this data; you are responsible for tracking this data.

Non-Transcriptable Program	2010-2011	2011-2012	2012-2013	% Change
N/A	-	-	-	-

b. Department Level Data:

	2010-2011	2011-2012	2012-2013	% Change
Enrollment	4,364	4,585	4,407	-3.8%
Productivity (College Goal 2013-14: 535)	656	651	608	-6.6%
Success	80%	79%	78%	-1%
Full-time FTEF	5.9	6.7	6.9	+3%
Part-time FTEF	8.3	8.2	8.9	+8.5%

c. Associate Degree Transfer (ADT)

There is a fall 2014 legislated deadline for approval of ADTs (AA-T/AS/T degrees). **If there is a Transfer Model Curriculum (TMC) available in your program, you are *required* to offer an approved AA-T/AS-T.** Indicate the status of your program's ADT:

Check one	Associate Degree Transfer Status
	State Approved
	Submitted to CCCC
	Submitted to Office of Instruction
	In Progress with Articulation
	Planning Stage with Department
XXXX	**Not Applicable**

If you are required to offer an approved ADT and it has not been state-approved, please comment on the program's progress/anticipated approval date.

The Biology TMC has not been completed yet.

Using the prompts and the data from the tables above, provide a short, concise narrative analysis for each of the following indicators. If additional data is cited (beyond program review data sheet), please indicate your data source(s).

d. Enrollment trends: Over the last three years, is the enrollment in your program holding steady, or is there a noticeable increase or decline? Please comment on the data and analyze the trends.

Program Review Data 12-13: Biology data over the last three years

- Although enrollment declined 3.8% for 2012 -2013 compared to the prior year (2011 – 2012), enrollment showed a *2% increase in average enrollment over the last three years. Based on this data enrollment has increased slightly over the last three years.
  - 1st Year Enrollment 2010 – 2011; 4,364
  - 2nd Year Enrollment 2011 - 2012; 4,585
  - 3rd Year Enrollment 2012 - 2013; 4,407
  - 3 Year Average Enrollment; 4,452

- *Percent increase over the last three years calculated as follows; (3 Year Average minus 1st Year) divided by 3 Year Average

e. Student Demographics: Please comment on the enrollment data, comparing the program-level data with the college-level data. Discuss any noticeable differences in areas such as ethnicity, gender, age and highest degree.

Program Review Data 12-13; Compare Biology Department with Foothill College overall data:

Ethnicity;

- Asian (7%), Filipino (5.5%) higher in biology compared to campus.
- Caucasian (4.6%) lower in biology compared to campus. All others within 2% of campus.

Gender;

- 12.8% more females compared to campus, common for allied health programs.

Age;

- 20% more students in age range (20-39) compared to campus.
- Fewer student in age range (19 or less) and (40+) compared to campus.

Highest degree;

- 9% more students with a 'BA/BS+ degree' compared to campus, common for allied health courses.
- 1% more students with an 'AA/AS degree' compared to campus.
- Fewer number of students with a 'HS/Special Admit' (2%) or 'All other' (8%) compared to campus

f. Productivity: Although the college productivity goal is 535, there are many factors that affect productivity, i.e. seat count/facilities/accreditation restrictions. Please evaluate and discuss the productivity trends in *your program*, relative to the college goal and any additional factors that impact productivity. If your productivity is experiencing a declining trend, please address strategies that your program could adopt to increase productivity.

Program Review Data 12-13; Compare Biology data over the last three years

- Although productivity declined 6.6% for 2012 -2013 compared to the prior year (2011 – 2012), the productivity showed a <u>*2.7% decline in average productivity over three years</u>.
- Based on this data productivity has declined slightly over the last three years.
  - 1st Year Productivity 2010 – 2011; 656
  - 2nd Year Productivity 2011 – 2012; 651
  - 3rd Year Productivity 2012 – 2013; 608
  - 3 Year Average Productivity; 638

- Although the number of sections offered increased 1.3% for 2012 -2013 compared to the prior year (2011 – 2012), the number of sections showed a <u>*3.9% increase in average number of sections over the last three years.</u>
- Based on this data the number of class sections offered has increased slightly over the last three years.
  - Number of course sections 2010 – 2011; 147
  - Number of course sections 2011– 2012; 154
  - Number of course sections 2012– 2013; 156
  - 3 Year Average Number of course sections; 152

  - *Percent increase over the last three years calculated as follows; (3 Year Average minus 1st Year) divided by 3 Year Average

<u>Evaluation of Productivity</u>;

- Last year (2012-2013) the biology department productivity was 608, which was 73 points above the campus productivity goal of 535.
- Our 3-year average for productivity is 103 points above the campus productivity goal of 535.
- The trend for the department is lower productivity as the number of sections being taught increases.

Section 2: Student Equity and Institutional Standards

As part of an accreditation requirement, the college has established institution-set standards across specific indicators that are annual targets to be met and exceeded. Please comment on how these indicators compare at your program level and at the college level. (For a complete description of the institutional standard, please see the instructional cover sheet)

a. Institutional Standard for Course Completion Rate: 55%

Please comment on your program's course success data, including any differences in completion rates by student demographics as well as efforts to address these differences.

OVERALL COURSE SUCCESS

Our overall **completion (course success) rate** was 78% in 2012-2013. (This includes face-to-face, hybrid, and online.) This is very slightly down from 79% in '11-'12 and 80% in '10-'11. Although only a very short-term trend at this point, we are mindful of the decrease and will continue to watch our success rates carefully. We are very close to the overall college success rate for all students, which was 80% last year.

Upon review of the data, we do not note any significant or concerning differences in success rates disaggregated by gender or age, either within the program or as compared to the college as a whole.

The following graph depicts our overall course success rates disaggregated by ethnicity:

Some observations:

- We are very close to, or higher than, college-wide success rates for each group.
- Our highest success rates were for Native American students (n=22) and lowest were for African American students (67%, n=169) and Latino/a students (68%, n=854).

ONLINE COURSES

The majority of our courses were offered face-to-face but we did offer two online classes: Bio 8 and Bio 45. The data show a small decline in success over time: in 2012-2013 the total rate was 73%, down from a consistent 78% in both '10-'11 and '11-'12. As with the slight decrease in overall success, we are conscious of this decrease. We remain encouraged that it was slightly higher than the overall college online course success rate of 69%.

The following graph depicts our online course success rates disaggregated by ethnicity:

ONLINE COURSES continued

Some observations about the disaggregated data for online success:

- We exceeded the college success rates for all groups with the exceptions of Filipino and Latino/a students.
- Our highest success rates were for white students (83%, n=84) and Asian students (80%, n=59)
- Our lowest success rate was for Latino/a students (52%, n=42).

OVERALL CONCLUSIONS

We are pleased that our success rates (all modalities) are higher than the minimum college institutional standard. However, we are concerned that African American and Latino/a students have lower success rates in our classes than do other ethnicities. We're uncertain about specific approaches to increasing success for these groups of students and would welcome professional development opportunities to learn more and form strategies to try going forward. One idea we have is to develop a way to identify at-risk students as early as possible and direct them to appropriate resources such as counseling or supplemental instruction.

b. Institutional Standard for Degree Completion Number: 450

Has the number of students completing degrees in your program held steady or increased/declined in the last three years? Please comment on the data, analyze the trends, including any differences in completion rates by student demographics.

- The number of students earning the A.S. in Biology decreased last year. We awarded 11 degrees in 2010-2011, 15 in '11-'12, and only five in '12-'13. Possible source(s) of this decline might include:
    - Our very slight decline in enrollment in biology courses last year (12-13)
    - A decrease in the number of student enrollment/success/retention through the major's sequence. As shown in the graph below, there were more students enrolling in 1A and 1B than in '12-'13 than in the two previous years, but fewer persisted to enroll in 1C (and thus finish the majors sequence required for degree completion).
        - Of those that did persist to 1C, however, we see that over 90% of them successfully completed it, suggesting that if we can get students to 1C they are likely to be successful; targeted efforts to retain students from 1A to 1B and from 1B to 1C can only help increase the likelihood of A.S. degree completion.
        - Faculty do acknowledge the noticeable decrease in Bio 1A success rates from 2010 to 2013. Though there are likely to be multiple reasons for this, perhaps the most obvious has been a distinct change in pedagogy during this time. Instructors are incorporating much more written work both in and out of class, mandatory lecture attendance, and there is an increased expectation that students come to class prepared. We are also moving away from multiple-choice and memorization assessments, to written assessments requiring synthesis of concepts and application to new situations. As documented in our SLO reflections, 1A faculty are frustrated that many students are unwilling to come to class and/or complete assignments. Increasingly, they simply do not turn assignments in at all (particularly if it requires work outside of class). We will continue to track success in 1A through the SLOAC process and make adjustments as appropriate.

- It would be interesting to survey students in 1C to determine whether they plan to apply for the A.S. degree or simply transfer without one. Increased use of the DegreeWorks software may help us identify students eligible (or close to eligible) and make sure they realize the degree is an option.

- We anticipate that our degree completion rates will increase significantly once we are able to implement the Associate's Degree for Transfer in Biology (TMC yet to be finalized).

- Of the five degrees awarded in '12-'13, four were to Asian students and one was to a white student. No degrees were earned by targeted populations.

c. Institutional Standard for Certificate Completion Number (Transcriptable): 325
Has the number of students completing certificates in your program held steady, or increased/declines in the last three years? Please comment on the data, analyze the trends, including any differences in completion rates by student demographics.

We do not offer any certificates in biology.

d. Institutional Standard for Transfer to four-year colleges/universities: 775

Based on the transfer data provided, what role does your program play in the overall transfer rates? Please comment on any notable trends or data elements related to your program's role in transfer.

We were unable to locate any data regarding biology major transfer numbers to UCs. However, per Bernie Day, our articulation officer, we know that in 2012-2013 the numbers of CSU transfers were:

- Animal science - 1
- Biochemistry – 6
- Biology – 1
- Cell and Molecular Biology – 1
- Environmental Biology – 1
- Microbiology – 3
- Molecular Biology – 2

*Note that we did not include figures for nutrition, food science, nursing, health, and other biology-related majors

From these data, if we assume only these 15 transfers all came from our Foothill Biology program, and we know that in 12-13 Foothill College officially transferred 349 students to the CSU system (http://www.calstate.edu/as/CCCT/2012-13/campus12-13.shtml) then **by discipline only**, we're responsible for about 4% of overall transfers.

Data (per Bernie Day) also show that we support student transfer to CSUs for many other majors. For example, Bio 10, alone, is a lower division course for CSU majors in Animal Science, Anthropology, Athletic Training, Cognitive Studies, Computer Science, Economics, Electrical Engineering, Environmental Resource Management, Gender, Ethnicity, and Multicultural Studies, Geology, Gerontology, Health Science, Human Development, Kinesiology, Landscape Architecture, Liberal Studies, Physics, Psychology, Public Health, Social Work, Speech Pathology, Urban Studies, and Wine and Viticulture.

It is also important to consider general education coursework as transfer students are expected to finish either the IGETC or CSU-Breadth general ed pattern. The biology department offers many classes from which students may choose to complete their desired pattern. Those that will count for either pattern include Bio 1A, 1B, 1C, 1D, 9, 9L, 10, 12, 13, 14, 15, 23, 40A, 40B, 40C, 41, and 45. Bio 8 counts towards the CSU-Breadth pattern.

Section 3: Core Mission and Support

The College's Core Missions are reflected below. Please respond to each mission using the prompts below.

a. Basic Skills: (English, ESLL and Math): For more information about the Core Mission of Basic Skills, see the Basic Skills Workgroup website: http://foothill.edu/president/basicskills.php
If your program is categorized as a basic skills program, please discuss current outcomes or initiatives related to this core mission and analyze student success through the core mission pathway.

Biology isn't categorized as a basic skills program.

If your program is NOT categorized primarily as a basic skills program, comment about how your program/classes supports Foothill's basic skills mission and students.

Although not a "basic skills" program per se, we do offer courses that will support basic skills students. For example, we offer many general education courses that do not have English or mathematics prerequisites, so basic skills students can enroll in these and progress toward their degree or certificate goals even while they complete their basic skills coursework. These GE courses also offer opportunities to build skills in reading, writing and basic math and we strive to continually reinforce the importance of these abilities.

b. Transfer: For more information about the Core Mission of Transfer, see the Transfer Workgroup website: http://foothill.edu/president/transfer.php
If your program is classified as a transfer program, please discuss current outcomes or initiatives related to this core mission and analyze student success through the core mission pathway.

We are currently awaiting the final version of the Transfer Model Curriculum for Biology and plan to develop a TMC-aligned AS-T in biology as soon as possible. When the TMC becomes available we'll be able to compare it to our local AS degree and make an informed decision about whether or not to keep the local degree. We do not offer a certificate of achievement in biology.

As noted earlier, although enrollment is up in the first course of the major's series, Bio 1A, the number of students persisting to 1C is down. Those that do make it to 1C have a high rate of success (>90% in '12-'13). Efforts to increase success in 1A and 1B, and to retain students through the sequence, could help to increase our transfer rates (as well as our A.S. in Biology completion rates overall). It is also important to note that a significant number of students do not need to complete the entire sequence to transfer. E.g. many chemistry and biochemistry majors need 1A but not 1B or 1C.

If your program is NOT categorized primarily as a transfer program, please comment about how your program/classes support Foothill's transfer mission and students.

N/A – we *are* a transfer program

c. Workforce: For more information about the Core Mission of Workforce, see the Workforce Workgroup website: http://www.foothill.edu/president/workforce.php
If your program is classified as a workforce program, please discuss current outcomes or initiatives related to this core mission and analyze student success through the core mission pathway.

N/A – we are not primarily workforce

If your program is NOT categorized as a workforce program, please comment about how your program/classes support Foothill's workforce mission and students.

Although not a "traditional" workforce program, the biology department offers many classes (Biol 40 ABC, 41, 45, 58) in support of allied health (AH) programs at Foothill and at other colleges throughout California and the United States. AH support classes in our department represent 38% of enrollment (2,601 enrolled students compared with a total enrollment of 4,407 students). From an informal survey conducted by the Dean (Fall '13) concerning our Anatomy &Physiology classes (Bio 40ABC), data showed; (1) nearly 100% were taking Anatomy &Physiology classes to fulfill prerequisites for an AH program and (2) 20% were planning to apply to Foothill programs (80% taking classes at Foothill to gain entry into AH programs at other colleges.

Biol10 is, in addition to a GE course, also a prerequisite for some of these programs. To support students in their pathway to and through these programs, the biology department schedules each AH support class every quarter at a variety of days/times, works with the allied health directors when making any curriculum updates or changes, secure tutors for classes, and communicates with counselors as needed. Also, starting in Spring quarter of 2014, we will be teaching Microbiology courses in the newly-remodeled 5100 building; contingent on the funding for lab tech hours, we will be able to teach double the number of Microbiology courses which should further increase enrollment and support for the AH programs.

Section 4: Learning Outcomes Assessment Summary

a. Attach 2012-2013 Course-Level – Four Column Report for CL-SLO Assessment from TracDat, please contact the Office of Instruction to assist you with this step if needed.

b. Attach 2012-2013 Program Level – Four Column Report for PL-SLO Assessment from TracDat, please contact the Office of Instruction to assist you with this step if needed.

Section 5: SLO Assessment and Reflection

Based on your assessment data and reflections, please respond to the following prompts.

a. What curricular, pedagogical or other changes have you made as a result of your CL-SLO assessments?

General observations: Several instructors noted the importance of providing students with multiple opportunities to reinforce and practice skills. Some instructors are attempting to employ the PSME center more effectively. Instructors indicated the utility of in-class activities. Instructor variation in content coverage appeared to have an effect in sequential courses.

Specific **resource requests** that were mentioned included a GPS locator, dissecting microscopes, and field guides.

Specific Changes implemented or suggested (based on the 39 page Unit Course Assessment Report for 2012-2013):

Bio 12: add sequential homework sets with additional genetic problems; require students to review graded homework with a PSME tutor. Connect homework assignments to PSME workshop on the topic.

Bio 14: developing assignments so that students come to conclusions themselves based upon presented evidence, rather than being told; moving toward more inquiry-based lab activities

Bio 15: provide more explicit instructions for field observations; need ability to permanently mark visited sites, a GPS locator would be useful

Bio 1A: Indicated frustration with quality of student work and inability to follow instructions regardless of instructor effort

Bio 1B: Students show improvement through quarter on research projects. Need to ensure availability of appropriate supplies and consumable materials

Bio 1C: Better dissecting scopes required for lab; More field guides/computer resources required to aid students with species identification

Bio 40A: More time is required for students to engage more reflectively with material and with less of a rote memory response. Time is required for both the students and instructors.

Bio 40B: Targets met

Bio 40C: Instructor reflected on effects of different instructors covering topics in different levels of detail in a sequential series of courses

Bio 41: instructor reflected on the use of in class activities that appear to have improved student performance on selected exam questions.

Bio 45: Targets met. No changes planned.

Bio 54H: Targets met. Instructors noted importance of providing students multiple opportunities to practice skills rather than single final paper as an assessment.

Bio 58: Targets met

Bio 8: Requiring attendance and preparation for classes is increasing engagement. Providing multiple opportunities for students to reinforce skills seems highly effective.

Bio 9: Instructor changed a key assignment to one that would have a longer lasting impact on student behaviors affecting the environment.

b. How do the objectives and outcomes in your courses relate to the program-level student learning outcomes and to the college mission?

The biology program-level outcomes are a direct reflection of course-level outcomes from the core majors series. The scientific method and evolution (see program outcomes in "c") are key themes that tie the core courses together; they are key outcomes expected by any institution to which students might transfer.

c. How has assessment of program-level student learning outcomes led to certificate/degree program improvements? Have you made any changes to your program based on the findings?

The Biology A.S. degree program outcomes are:

- Upon successful completion of the Biology majors sequence, students can/will be able to use the scientific method to formulate questions, design experiments to test hypotheses, interpret experimental results to draw conclusions, communicate results both orally and in writing, and critically evaluate the use of the scientific method from published sources; and
- Upon successful completion of the Biology majors sequence, students will be able to apply evolutionary theory at the molecular, cellular, organismal and population levels to explain the unity and diversity of life.

At this point our focus has been on assessing the outcome addressing the scientific method. Students engage in research projects in each of the core classes in the majors series (Bio 1A, 1B, and 1C). Our expectation is that performance improves as students progress through the series. In general students meet targets in each class, but given the different types of research involved in each class project, it is difficult to gage whether performance *improves*. We have not yet made any changes to the program based on these findings.

The faculty teaching the majors courses have many conversations about the entirety of the biology program. They work together on the PL-SLOs, talk about how students perform, what we can do differently to increase student success. Collaboration is frequent but largely informal.

d. If your program has other outcomes assessments at the program level, comment on the findings.

We don't have any additional outcomes assessments at the program level

e. What do faculty in your program do to ensure that meaningful dialogue takes place in both shaping and evaluating/assessing your program's student learning outcomes?

Faculty who teach a particular class discuss and review course level student learning outcomes on a periodic basis. While one faculty "owns" each course in TracDat and is tasked with documenting the SLOAC for it, ALL faculty who teach even a section of that course participate in the assessment, reflection and planning. Part-time faculty are invited and encouraged to help, as well. In some cases the collaboration is face-to-face while in others it takes place asynchronously over email.

At the program level, full-time faculty involved in the majors classes collaborated to develop the assessments. We have only been through the program-level assessment cycle once and this has led to discussions about how to improve the assessments. One challenge in designing assessments is to have them occur all along the course series in a way that the assessments more accurately measure progression rather than isolated snapshots. To achieve this it is important that instructors from all courses are given the opportunity to participate in/review the assessments/reflections at each level (A, B and C) rather than in isolation.

Section 6: Program Goals and Rationale

Program goals address broad issues and concerns that incorporate some sort of measurable action and connect to Foothill's core missions, Educational & Strategic Master Plan (ESMP), the division plan, and SLOs. Goals are not resource requests.

List Previous Program Goals from last academic year: check the appropriate status box & provide explanation in the comment box.

Goal/Outcome (This is NOT a resource request)	Completed? (Y/N)	In Progress? (Y/N)	Comment on Status
1. Program Goal: complete AS-Transfer degree in Biology	No	No	The TMC has not been completed yet. We are anticipating that it will be released this academic year and are ready to begin working on our ADT as soon as it is finalized.
2. Program Goal: design capstone course for majors	No	No	Lack of time (as a result of load issues) and funding has stymied the development of a capstone course for majors. We are also concerned that the Associate Degree for Transfer may not include such a course.
3. Program Goal: increase involvement with PSME Division/STEM	Ongoing	Yes	We are continuing to work on increasing involvement. For example, we collaborated on a

			workshop for the PSME Center about the scientific method, and several instructors have held office hours in the Center. Although we began collaborating on two courses, biology faculty ultimately left the collaboration due to a lack of time to participate. Given additional time, we would welcome collaboration on development of more interdisciplinary courses.
4. GE Goal: develop Honors course/increase involvement with Honors Program	Ongoing	Yes	Lack of time and funding has hindered any significant progress beyond dialog in department meetings
5. General: develop interdisciplinary courses with other departments on campus	No	No	Lack of time and funding has stymied work on this goal
6. General: maintain course offerings, scheduling diversity, and quality of instruction	Ongoing	Yes	We have continued to offer a variety of courses with good diversity of times and days available. We also continue to hold ourselves to the highest quality of instruction.
7. General: address faculty teaching workload to allow time to accomplish other important departmental activities	Ongoing	Yes	The load issue is currently under discussion and review by the district
8. General: build a community of biology learners	No	No	Lack of time and money has prevented movement on this goal
9. General: develop service learning opportunities for biology students	Ongoing	Yes	We are currently working on a grant for the CHORI Summer Student Research Program that would allow us to develop more service learning opportunities for biology students. Together with faculty from Dental Hygiene, the department has successfully sponsored two years of international service learning through the Foothill College Medical and Dental Global Brigades Club. With the commitment of interested faculty in our department and division, we expect this activity to

			continue. In 2014, participating students will have the option to enroll in AHS 55.
10: General: completely outfitting new micro lab with proper equipment/increased lab tech hours/new FT faculty	On going	Yes	The new micro lab is still under construction and the microscope have been purchased but much of the other equipment is in the process of being acquired. We have been approved for a new full time faculty, however, they will predominantly teach anatomy and physiology rather than microbiology so this need is still outstanding. We have not received approval to increase lab tech hours.
11: General: Transform existing pedagogical approach to teaching majors and non-majors classes to a more active learning, project based learning pedagogy, including having students address a hypothesis, gather data and analyze the results to draw proper conclusions. This would work well in the context of the natural features available on and near our campus.	ongoing	yes	Only minimal progress has been made on this goal for several reasons: 1. Every time the department identifies a suitable, well-established ecosystem research site on campus to develop hands-on project based learning curriculum, we communicate this to the buildings and grounds committee, but during the construction process they are built upon making them unsuitable for our helping students learn about established ecosystems. We do recognize that several alternative locations have been offered by our Dean in consultation with the Horticulture department and we would like to develop these locations as part of our efforts to introduce project based learning, but these locations are not the same thing as already established ecosystems. There is a huge difference in the way a mature ecosystem functions relative to the way a new ecosystem works. "New areas" will be great for projects such as

			restoration experiments (relatively easy and straightforward if we keep them simple) and to observe and quantify successional processes (changes in an ecosystem over time). However, Foothill College has a unique location at the base of the Santa Cruz Mountains with a small amount of natural spaces left that most other urban community colleges lack, and this is WHY these few locations are so critical. In order to accomplish this goal and to avoid these kinds of problems in the future, the biology department proposes that there be a meeting between us, our dean, our vice president, the Director of Facilities & Special Projects and the President. The biology department would come with a list of suitable sites on campus to use in our projects and we could all agree on specific sites to be protected and used. We would also like to point out that the cost to the school would be minimal (the designation of some protect sites and appropriate fencing) but the benefits are huge for our students. 2. Development of project-based learning opportunities requires funding for equipment and site development as well as for the development of course curriculum. The recently awarded Living Labs grant provides small stipends for faculty writing modules that highlight campus sustainability features, but does not include funding to further develop

			these features (e.g. with educational signage) 3. The pond in front of the division office as it is now designed is unsuitable for biology research and requires work and funding

New Goals: Goals can be multi-year (in Section 7 you will detail resources needed)

Goal/Outcome (This is NOT a resource request)	Timeline (long/short-term)	How will this goal improve student success or respond to other key college initiatives?	How will progress toward this goal be measured?
1. Increase the number of underrepresented students earning the A.S. degree in biology	Short and long term	This ties directly to the CCC mission of transfer, as well as the goal to address equity issues	Completion data collected each year
2. Increase student success in our courses, particularly for targeted populations.	Short and long term	Ties explicitly to student success and equity	Completion data collected each year
2. a. Develop a way to identify students at risk of failing early in the quarter (particularly in majors sequence) and refer them to appropriate resource(s)	Short and long term	This ties directly to student success and equity issues – early intervention has been shown to increase retention	Documentation (department meetings minutes)
2. b. Develop active learning supplemental instruction opportunities over and above traditional "tutoring"	Short and long term	This ties directly to student success and equity issues. We are mindful that traditional tutoring approaches may not be the most effective for all students, especially those in the disadvantaged groups	Document opportunities developed and subsequently offered through PSME center or other means
3. Increase the number of online offerings	Short term/long term	Increased options for online bio courses may allow some students to complete degree(s) at Foothill that would otherwise not have been able to.	College data already collected

Section 7: Program Resources and Support

Using the tables below, summarize your program's unfunded resource requests. Refer to the Operations Planning Committee website: http://foothill.edu/president/operations.php for current guiding principles, rubrics and resource allocation information.

Full Time Faculty and/or Staff Positions

Position	$ Amount	Related Goal from Table in section 6 and how this resource request supports this goal.	Was position previously approved in last 3 years? (y/n)
FT Lab technician	Salary unknown	Goal 10 With the potential to double the sections of microbiology, we need increased lab technician support to do the required preparations for both classrooms. We currently have a single technician in the 5100 building that works only 16 hours a week. With this short amount of time, the technician is just able to complete the necessary preparations for one lab room (6 sections max) of microbiology courses. A full time person would be absolutely crucial to being able to fully use our newly remodeled space in the 5100 building.	No
FT Faculty/Microbiology	Approx $100,000	Goal 10: With the building of an entirely new microbiology lab, we need a new faculty member to cover the additional courses. Students would benefit from a full time faculty member teaching this rigorous, highly impacted course.	No

Unbudgeted Reassigned Time (calculate by % reassign time x salary/benefits of FT)

Has the program received college funding for reassign time in the last three years? (y/n)	**If yes, indicate percent of time.**
Has the program used division or department B-budget to fund reassign time? (y/n)	no

Indicate duties covered by requested reassign time:

Responsibility	**Estimated $**	**Related Goal from Table in section 6 and how this resource request supports this goal.**	**Est hours per month**	**% Time**

Department Chair **15% Release Time Activities** Point person for community, students, state, Dean, staff, PT faculty Arranging p/t interviews as needed Department meetings - agenda, facilitate, minutes Schedule - coordinate with Dean, solve logistical problems **20% Release time** Activities from above and Part-time faculty orientation (safety, equipment, general campus and department info) Interdisciplinary collaboration - Coordinating with PSME center for workshops etc. Service learning opportunities: contact person and coordinate Curriculum development - contact person and coordination Coordinating how to addressing equity and student success issues	~ $20,000 to $25,000 (amount would depend on the salary of the particular faculty who serves)	All of our goals are aided by the return of funding for our department chair. This position is vital for the continued functioning and growth of the biology department. Without it, we do not have a designated person to handle the design of new courses or programs (including the capstone course in Biology, Biology Honors Course, and interdisciplinary courses, and project-based learning). Also, one of our goals is the increased involvement with other departments on campus. This is something that the Department Chair could help facilitate through meetings with the other STEM departments, but something that individual faculty members do not have time to do. In addition, help with set-up and running of the open lab space that is crucial for other goals would fall on the Department Chair. Without the return of this position, many of our goals are in jeopardy of not being met.	25% reassignment

One Time B Budget Augmentation

Description	$ Amount	Related Goal from Table in section 6 and how this	Previously funded in last 3 years?

		resource request supports this goal.	**(y/n)**

Ongoing B Budget Augmentation

Description	**$ Amount**	**Related Goal from Table in section 6 and how this resource request supports this goal.**	**Previously funded in last 3 years? (y/n)**
114000141021040100 (Biology)	$20,000/year minimum	Goals 5, 6, 11 We need this increase in ongoing funds to support our classes in the department. Loss of purchasing power in recent years has impacted our ability to provide students with adequate reagents or to update lab activities that require additional supplies and reagents. Lab materials also suffer from normal wear and tear and occasionally need replacing (e.g. models, slides). We need this augmentation to continue to offer the high level of instruction we currently do to Biology students. Without an increase in our B budget, we will be unable to offer additional sections of existing courses or to develop new courses. Goal 10	No

		We also need more money to run the added courses that will be taught when the 5100 building is completed and we have new space for an entire second Microbiology laboratory. Running any biology course requires many materials for the laboratory section that are just not supported by our current B Budget allocation.	
Supplies required for the new microbiology labs that can now be offered in 5100 beginning in Spring 2014	$5,500 - $11,000 depending on number of classes offered	General: maintain course offerings, scheduling diversity, and quality of instruction Additional resources are required to purchase lab supplies for the new sections of micro that can be offered with the remodel of 5100	NA

Facilities and Equipment

Facilities/Equipment Description	**$ Amount**	**Related Goal from Table in section 6 and how this resource request supports this goal.**	**Previously funded in last 3 years? (y/n)**
Models, slides, texts, etc. for student use in PSME Center	$5,000	<u>Goal 4 and New Goal 2b.</u> To make full and effective use of the PSME center requires that we provide models, slides and texts that students can	No

		access while working with tutors or while attending focused workshops.	
Tools and instruments for measuring environmental variables. (GPS system, soil chemistry kits, water chemistry meter, heat sensor, electrical usage meter, game cameras, digital camera for dissecting microscope)	$5,000-$10,000 (amount would depend upon quality of equipment purchased)	Goals 6 and 11 New equipment is needed to effectively teach some of the new labs/curriculum in ecology/environmental courses.	No
Microscopes -dissecting (N=16) -compound light (N=33)	$1700-$2500 each (total amount depends on number purchased)	Goal 6 Each laboratory classroom needs a complete set of functioning microscopes. We have never had a complete set and wish to augment what we do have with newer models. The department realizes the quantity of microscopes requested is great and the likelihood of receiving funding for all at once is slim. Therefore, the department has decided that if lesser sums of money are awarded for microscopes, half will be spent on dissecting and half on compound, buying as many as possible, until the full complement of new scopes is realized.	No.. It is important to realize that different types of microscopes have different functions. The recently purchased microscopes for increasing Bio 41 (microbiology) offerings have a special (expensive) oil immersion lens that allows for observation at up to 1000x magnification. It is not appropriate to utilize the same microscopes for different classes in different classrooms because 1) Microscopes are delicate scientific instruments that are extremely easily damaged if moved between classrooms, and, 2) Most of our other classes do not need this additional power and use compound light microscopes without the specialized oil immersion lens. The dissecting

			microscopes are needed for use observing macroscopic objects such as insects and flowers, and dissecting small animals such as earthworms and crayfish.
Outdoor classrooms - development of several campus locations for use as outdoor classrooms. These areas would include the open area bounded by the lower campus Biology building and the new counseling and records and admissions building for an evolutionary plant garden. Other areas include the creek and its adjacent banks running through the lower campus, the drainage creek running in front of the new lower campus buildings, the native plant garden as well as several other locations.	$1,000,000 (looking for foundation or grant funding for this)	Goal 11 Project based learning is a good way to enhance student knowledge of concepts and processes in biology as well as deepen their understanding of the scientific method. It will enhance student retention and success and, if done properly, could lead to greater enrollment as the 'word' gets out among students about how we have a dynamic and interesting approach to teaching biology.	No

Section 8: Program Review Summary

Address the concerns or recommendations that were made in prior program review cycles, including any feedback from Dean/VP, Program Review Committee, etc.

Recommendation	Comments
1. The biology department needs space for a dedicated learning center on the lower campus that would serve students by offering instructional support curriculum.	• Biology faculty feel somewhat ambivalent about this. Having a dedicated space for biology learning on lower campus would certainly be beneficial. However, we have not given up trying to collaborate with the PSME Center to meet biology student needs rather than setting up an entirely separate biology facility. For this reason, we would prioritize other outstanding needs more highly than this one.
2. There is also a need for full-time biology	• We were approved to hire an anatomy and

or microbiology instructor and a full-time laboratory technician to allow for growth in the number of sections offered.	physiology instructor this year, but still have need of another microbiology instructor. This is documented in this current program review. • We are still in need of a full-time lab tech to support growth
3. A department chair would be a valuable asset to the organization and growth of the biology department.	• This year we are using a stipend to pay for completion of some of the department chair responsibilities. Going forward, however, we maintain that a department chair would be far more effective were they given reassigned time. The stipend allows only triage work to be completed, no time for growth or innovation beyond barely keeping the ship afloat.
4. A need is also identified for microscopes to support the newly renovated upper campus 5100 biology building.	• We received funding to purchase microscopes for the newly renovated microbiology lab space in the 5100 building. • We still have need of dissecting and compound microscopes for the majors classes, as documented above
5. Facilities will remain the most limiting factor for the program. Even with the renovation of building 5100, the program will need to explore teaching in some nontraditional times. Demand by students appears to be high enough to teach earlier or later on weekdays and on weekends. Classes and labs should be offered ASAP to begin to serve more students and find out what nontraditional times work best for students.	• When scheduling in additional time slots, we must take into consideration the time it takes for instructors to set up and break down their labs, and the time required to set up lab practical examinations. We must also consider the impact of scheduling labs from different classes into the same lab space, which requires far more set up/break down than scheduling multiple sections of the same lab. What may appear "on paper" to be an available time slot for an additional lab may, in fact, be untenable depending on the specific combinations of classes. (This may be the reason that De Anza opted to only offer one majors class per quarter rather than the diverse scheduling options we provide). • Lecture classes are paired with lab classes so it is unfeasible to schedule labs during lecture time (as we have been asked to do in the past) • We simply have not seen a documented need for increasing our GE classes at nontraditional times. In the past when we have offered GE classes at 8 a.m., enrollment and retention has been lower. We assert that filling our night GE classes, which have also suffered from declining enrollment, is a higher priority than adding more early morning classes. When we offer too many sections we risk low enrollment and cancellation of both (morning and evening) sections rather than offering just the evening section and having it fill.

	• Given the appropriate time and resources, we are interested in developing high quality online sections for some of our GE classes that do not require labs. This would negate the logistical problem of space limitations.
6. There is an immediate need to hire more part-time faculty. These will help increase the course offerings by the department especially during the nontraditional times	• We continue to hire new part time faculty to meet whichever demand(s) is/are most pressing each quarter. This significantly adds to our workload with hiring, training, and coordinating part-time faculty. We often have to hire new part-time faculty every quarter for some classes.

a. After reviewing the data, what would you like to highlight about your program?

- High quality classes, diverse offerings, excellent preparation for transfer and entry into allied health fields.
- A genuine desire to increase success in targeted groups, but a need and desire to determine the best course(s) of action to do so
- A desire to foster campus community through interdisciplinary courses, honors courses, cooperation with PSME, participation in campus wide sustainability community, and an increased physical connection to our natural outdoor resources.
- Our faculty have tremendous passion and a multitude of ideas for trying new approaches for increasing student success. We are hampered primarily by time; maintaining excellent teaching and learning in our current offerings allows only very limited time and energy to progress towards new goals. This is particularly striking in comparison with faculty from other departments in our college and division.

Section 9: Feedback and Follow Up

This section is for the Dean to provide feedback.

a. Strengths and successes of the program as evidenced by the data and analysis:

The major strength of the Biology Department is their full time faculty's commitment to excellence in teaching. The Department has shown an overall growth in enrollment of 2% over the last 3 years and productivity is consistently well above the college target of 535.

Progress was made this year towards integrating Biology into the STEM efforts at Foothill and this will continue to grow and expand. The Biology faculty has begun utilizing the PSME tutoring center and set up permanent A&P models for use by students and collaborated on a workshop about the scientific method which was held at PSME center.

Finally, in last years BHS Administrative Review, I described below what I felt was my biggest challenge as the new Dean of BHS.

"Inequitable load distribution is a constant topic of discontent (in BIO) with no easy resolution resulting in frustration and fatigue. It is a volatile topic which often hijacks and trumps all other discussions. Because of the amount of time the faculty must spend in classrooms to meet their contract obligations, they are unwilling to volunteer for other campus responsibilities thereby negatively impacting the highly prized vision of "shared governance" at Foothill College."

Most of the Biology faculty have come to some resolve with this issue. With the commitment of the Administration and FA to come to an equitable reworking of the load distribution at the district level, the faculty have been much more enthusiastic about participating in the larger Foothill community and appear to be happier and more settled. The frustration is still there, but it has moved to a place where it can be managed and does not preclude other meaningful activities.

This is a very big accomplishment which should be acknowledged by the faculty.

b. Areas of concern, if any:

As the college focuses on equity and enhancing the success of targeted populations, the Biology faculty must develop strategies to enhance the success rates of their African American and Latino/a students. The key will be to identify students who are struggling earlier and have strategies in place that can be quickly implemented. However, as repeatedly stated in this program review, time constraints are a major roadblock to the development and implementation of any innovative strategies by the Biology faculty.

This is, of course, not unique to the Biology Department, but is an area of concern for the entire college.

c. Recommendations for improvement:

none

d. Recommended next steps:

_X__ Proceed as planned on program review schedule
___ Further review/Out of cycle in-depth review

Upon completion of section 9, the Program Review should be returned to department faculty and staff for review, then submitted to the Office of Instruction and Institutional Research for public posting. See timeline on Program Review Cover Sheet.

Unit Assessment Report - Four Column

Foothill College

Program (BHS-BIOL) - Biological Sciences AS

Mission Statement: A. Prepare students for a successful career in the biological sciences, including students planning to transfer to a four-year school.
B. Prepare students to be savvy consumers of scientific information, and provide a general education in the life sciences.
C. Provide students with the background knowledge and critical thinking skills required to understand important issues such as environmental science, climate change, evolution, disease prevention and basic nutrition.
D. Support programs in allied health by providing an education in biological principles including anatomy, physiology, microbiology, nutrition and pharmacology.

Primary Core Mission: Workforce

Secondary Core Mission: Transfer

PL-SLOs	Means of Assessment & Target / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Program (BHS-BIOL) - Biological Sciences AS - 1 - Upon successful completion of the Biology majors sequence, students can/will be able to use the scientific method to formulate questions, design experiments to test hypotheses, interpret experimental results to draw conclusions, communicate results both orally and in writing, and critically evaluate the use of the scientific method from published sources. **Year PL-SLO implemented:** End of Quarter **SLO Status:** Active	**Assessment Method:** In Biology 1A, students will design and conduct an experiment in groups culminating in a poster presentation. **Assessment Method Type:** Class/Lab Project **Target:** Students can properly phrase a question and a hypothesis, identify necessary experimental controls, depict experimental results in graphical format, and draw a conclusion supported by results.	03/16/2012 - In phrasing a question, students were able to correctly identify the variables (independent vs. dependent) 89% of the time. Students correctly identified necessary controls 60% of the time. Students drew conclusions based on results 66% of the time. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	05/25/2012 - As students in Biol1A are just starting their scientific educational careers, it is reasonable to expect that not all students will fully grasp each component of the scientific method. Throughout the quarter, students are given the opportunity to "practice" identifying and stating each component in their weekly experiments. Students are also given quiz and exam questions that test their ability to identify and state the different steps to the scientific method. By far, the most difficulty comes in distinguishing a result from a conclusion and in identifying an important control. As students progress through the biology program, they should improve in these areas. I don't think any extra resources are necessary, but more time spent on task.
	Assessment Method: In Biology 1B, students will design and conduct an experiment on plant nutrition and		

PL-SLOs	Means of Assessment & Target / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
	orally present their results. **Assessment Method Type:** Class/Lab Project		
	Assessment Method: In Biology 1C, students will conduct an experiment in natural selection and present their findings in a written paper. **Assessment Method Type:** Class/Lab Project **Target:** We expect students should have mastery of the process by the end of the course Biology Majors series.	06/14/2012 - Overall the students did fairly well in demonstrating their understanding of the scientific process and communicating results. While all students passed the assignment, there were a few areas which could use improvement including understanding how to communicate methods and results in a clear manner and how to state hypotheses clearly. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012 **GE/IL-SLO Reflection:** This particular activity in Bio 1C speaks mostly to the Communication and Creative/Analytical thinking IL-SLOs. Students generally did well, but about 40% of the papers had confusing introductions and conclusions which confounded grading a bit. It is hard to tell if this was because students did not bother doing drafts (not required) before submission. I am considering also having anonymous peer review of papers before they are turned into me, using my rubric to see if that improves overall quality of the papers.	06/14/2012 - As approximately 30% of the students did not correctly state the hypothesis, I will have to make sure that I double check them at the start of the experiment to make sure that they really understand what they are doing. A common mistake was to state the null hypothesis without also stating what was expected to change as a result of the experimental procedure. This led them to conclude that their hypothesis was correct (which the data bore out) but often resulted in poor explanations of the experimental results. Also about 95% of the students wrote lengthy overly descriptive explanations of how they conducted the experiments that were in the style of a lab manual description. I may try to provide a couple of simple scientific papers for them to review so that they can see how methods and results should be written. I am considering also having peer review of papers before they are turned into me, using my rubric to see if that improves overall quality of the papers.
Program (BHS-BIOL) - Biological Sciences AS - 2 - Upon successful completion of the biology program, students will be able to apply evolutionary theory at the molecular,	**Assessment Method:** Students will be given a list of questions at the beginning of Biology 1A related to evolutionary theory at different levels of the		

PL-SLOs	Means of Assessment & Target / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
cellular, organismal and population levels to explain the unity and diversity of life. **Year PL-SLO implemented:** End of Quarter **SLO Status:** Active	biological hierarchy. The questions will be mapped to each of the three courses (as to where the basic information will be covered). At the end of Biology 1C, students will be tested on those questions and are expected to show mastery. **Assessment Method Type:** Exam - Course Test/Quiz **Related Documents:** List of Assessment questions on evolution		

Web site = https://foothill.tracdat.com/tracdat/

BIOLOGY 10
SLO 1 - Scientific Process : Explain the scientific method and demonstrate an ability to use this method of study.

LAB ASSESSMENT:
Scientific Method lab - students design, conduct and report on a simple experiment.
Median score = 95%;
96% of students scored above 70%
Online quiz - students identify type of variables and analyze results of two experiments
Students can collaborate & use references; students may repeat quiz (up to three attempts) to raise score.
Median score = 80% (85% for students that completed quiz - 11 students did not take the quiz)
57% of all students scored above 70%
66% of students that completed the quiz scored above 70%
Group Project - students design, conduct and report on an experiment conducted over 3 weeks of the quarter.
Median score = 93%
89% of students scored above 70%

LECTURE ASSESSMENT:
Online quiz - covers terms and steps in the scientific method
Students can collaborate & use references; students may repeat quiz (up to three attempts) to raise score.
Median score = 100%
89% of all students scored above 70%
Online quiz - identify type of variables and analyze results of two experiments
Students can collaborate & use references; students may repeat quiz (up to three attempts) to raise score.
Median score = 85%
80% of all students scored above 70%
Exam questions on first midterm - identifying type of variables and analyzing results of an experiment
Median score = 70%
59% of students scored above 70%
Exam questions on second midterm
Median score = 64%
45% of students scored above 70%

REFLECTION
Consistently students do well when working collaboratively.
Individual work is far less successful, suggesting that too many students are not actively participating in the collaborative group work.
Plan: design some workshops for the PSME center and require students scoring below 80% on lab quizzes to attend workshops and/or work individually with a tutor or the instructor before midterm exams.

BIOLOGY 10
SLO 2 - Disease Prevention : Describe the risk factors and methods of prevention for cardiovascular disease and cancer.

LAB ASSESSMENT:
Online nutrition lab - students evaluate foods for complete protein, RDI analysis and disease prevention
Students can collaborate and use references; students may not repeat lab to improve score.
Median score = 86%;
86% of students scored above 70%
16% of students did not complete lab.

LECTURE ASSESSMENT:
Online quiz on disease prevention
Students can collaborate & use references; students may repeat quiz (up to three attempts) to raise score.
Median score = 93% (95% for students that completed quiz - 11 students did not take the quiz)
75% of all students scored above 70%
88% of students that completed the quiz scored above 70%
15% of students did not take the quiz
Second midterm - 42 questions regarding nutrition and disease prevention
Median % of correct responses for these questions = 69%
Final exam - 21 questions
Median % of correct responses for these questions = 90%

REFLECTION
Exceeded goal.
Students did well when working collaboratively and were far less successful working individually.
Followup exercises after the second midterm addressed the problem, resulting in a
31% increase in correct responses on the final exam.

BIOLOGY 1D
Molecular Biology

SLO 1 - Structure and function Explain the relationship between structure and function as observed in key enzymes used in DNA replication, transcription and translation.

ASSESSMENT:
ONLINE QUIZ covering structure and function of molecules.
Students can collaborate & use references; students may repeat quiz (up to three attempts) to raise score.
Mean score = 74%; median score = 99%.
92% of students scored above 80%.

MIDTERM
Mean = 81% of students correctly answered questions on this topic.

FINAL
Mean = 78% of students correctly answered questions on this topic.

REFLECTION
Exceeded target.
The format of course works very well.
The combination of a small class size and highly motivated students makes this course consistently highly successful.

SLO 2 - Scientific Process Demonstrate an understanding of how experimental evidence is used to draw conclusions regarding the structure and function of important genetic molecules.

ASSESSMENT:
ONLINE QUIZ on classic experiments.
Students can collaborate & use references; students may repeat quiz (up to three attempts) to raise score.
Mean score = 96%; median score = 100%.
92% of students scored above 80%

MIDTERM
Mean = 78% of students correctly answered questions on this topic.

FINAL
Mean = 78% of students correctly answered questions on this topic.

REFLECTION
The format of course works very well.
No changes planned at this time.
The combination of a small class size and highly motivated students makes this course consistently highly successful.