



## **PROGRAM REVIEW**

### **Biological Sciences**

**April 27, 2010**

**Douglas Hirzel, Chair of Review Committee**

**Review Committee:**

**Dani Behonick**

**Carol Rhodes**

**Nathan Staples**

**With input from Adjunct Faculty:**

**Gary Ciambone**

**Sara Cooper**

**Jenny Fichmann**

**Myles Kelley**

**Jenna Patton**

**James Smiley**

**Barry Thomson**

**Nicamer Tolentino**

# BIOLOGICAL SCIENCES

## CAÑADA COLLEGE

### COMPREHENSIVE PROGRAM REVIEW EXECUTIVE SUMMARY

#### **Short Summary of Findings**

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Overall, enrollments in Biology and in Health Science courses have increased significantly (31% and 62%, respectively) between 2005 and 2009, concurrent with an increase in number of sections offered. Much of this demand may be attributed to the surge in applicants to nursing and other allied health career programs, as well as an increase in students majoring in biology. The overall trends in retention and success over this time period have been very positive and consistent.

Curriculum in nearly all biology courses has been updated, subsequent to hiring of four new faculty since 2001. The two core courses for Biology majors have been updated significantly in the last four years, and are articulated with several CSUs and UCs. We also have created an A.S. degree in Health Sciences that is articulated with local CSUs. One example of a new course is HSCI 115, "Introduction to Health Care and the Health Professions", that articulates with CSU East Bay to satisfy lower division coursework for students wanting to complete a bachelor's degree in health science; this degree is available through the University Center. The course is an excellent introduction for all prospective allied health students and has been offered at local high schools through articulation agreements or concurrent enrollment.

Since 2004, vast improvements have been made to the biology labs and equipment, many funded by Measure C Bond money. All of the labs have been renovated to facilitate more efficient teaching, student bench work, and student interactions, as well as now being handicapped accessible. New equipment has been added that allows students to practice current lab techniques and data analysis.

#### **Three Strengths of the Program**

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1. The Biological Sciences Program provides training for students pursuing high-growth, high-demand careers in the biological and health sciences. We are aware and responsive to changes in our field and help students develop current skills and competencies with both discipline-specific technologies and teaching/learning technologies. Examples of curriculum revisions from 2001 to 2009 are described in detail in the full Review document. These curriculum changes include creation of custom lab manuals, hybrid courses, and addition of new lab and lecture courses. New and revised curricula let us make maximum use of renovated labs and new equipment.
2. The Biological Sciences Program creates clear academic pathways for students to reach their academic and career goals. The new web site [Gointohealthcare.org](http://Gointohealthcare.org) informs students about various career options in health science and the pathways to train for each career and to move from one position to another. For transfer students, our courses and programs articulate well with CSU and UC programs. For example, one new course, HSCI 115, connects Cañada with CSU East Bay directly through the University Center and has been offered at local high schools through articulation agreements or concurrent enrollment.
3. The Biological Sciences Program contributes to basic health literacy of our students, so that they not only understand how human bodies work, but also become empowered to advocate for their own health and health care needs. It equips them as thinkers and lifelong learners, able to approach health and science in a scholarly and informed manner. This extends from reading a newspaper article on a current health issue and being able to formulate an educated opinion on the topic, to a more rigorous health science career that involves life-and-death decision making on a daily basis. In this way, the Program strives to serve a range of students, from the general education student who will utilize his/her skills primarily as a health patient, to the science major who may go on to a career as a health care provider.

#### **Five Suggestions for Improvement**

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1. Develop Honors Program biology courses/sections to enhance independent and advanced-level learning and provide research experience for highly-motivated and talented students.
2. Expand General Education course offerings in Biology and Health Science to include possible classes such as Environmental Science, Microscopy, Biotechnology, and Women's Health.
3. Maintain enrollments and improve student success in Biology and Health Science courses.
4. Continue to update our laboratories and classrooms with current computer technologies and up-to-date scientific equipment.

5. Expand program offerings to reflect the changing needs of the medical field and prepare our students for new career opportunities, such as possibly developing an Electrocardiogram Technician certification program.

#### **Four Fiscal Needs**

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1. Increase the funding of the part time Laboratory Technician from 49% to 50%. Increase to fulltime during the next six years.
2. Fund equipment needs and increase supply budget.
3. Additional large lecture rooms and additional laboratory space.
4. Hire one additional full time faculty within the next six years.

## Cañada College Comprehensive Program Review Self-Study Document

In preparing this Program Review, keep the college mission in mind as a reminder that Program Review is to ensure that all programs are aligned with the institutional mission.

**Cañada College's Mission:** It is the mission of Cañada College to ensure that students from diverse backgrounds achieve their educational goals by providing quality instruction in transfer and general education courses, professional/technical programs, basic skills and activities that foster students' personal development and academic success. Cañada College accepts responsibility for serving the community's diverse needs for lifelong enrichment and highly values close teacher to student teaching and learning relationships, support services and a co-curricular environment that contributes to personal growth and success for students.

**PROGRAM NAME: Biological Sciences (Departments of Biological Sciences and Health Sciences)**

### PART A: Overview of Program

#### 1. If the program has completed a previous self-study, evaluate the progress made toward previous goals.

A comprehensive self-study was conducted in 2001, before the retirement of two full-time (Ella Turner-Gray, Paul Welles) and one part-time faculty (Sally McGill – shared 50% with the P.E. department) in 2003 and 2004, and subsequent hiring of three new tenure-track Biological Sciences faculty in 2004, 2005, and 2009. In this review, four significant goals were listed as follows:

##### **Program Goals, 2001:**

1. Improve enrollments in biology and health science courses.
2. Expand and update the offerings for biology majors.
3. Facilitate the transfer of biology majors to CSU and UC.
4. Equip biology labs with up-to-date equipment.

Progress towards the above goals has been very good in all four categories, and is ongoing for goal #2. Overall, enrollments in Biology courses have increased significantly between 2005 and 2009. The overall trends in retention and success over this time period have been very positive and consistent. Section offerings were increased from 46 to 69 (a 50% increase), permitting an enrollment increase from 1,379 to 1,800 - a 31% increase. Similarly, Health Science course section offerings were increased from 19 to 33 (a 74% increase) between 2005 and 2009, and enrollments in Health Sciences courses increased from 482 to 781 (a 62% increase) in the same time period. Both departments are thriving, and courses are in very high demand with full waitlists every semester. Much of this demand may be attributed to the surge in applicants to nursing and other allied health career programs, but we have also seen a significant increase in students majoring in biology. The two core courses for Biology majors have been updated significantly in the last four years, articulated with several CSUs and UCs, and Organic Chemistry has been added to the Science and Technology Division course offerings. All core courses required for Biological Science majors are now offered on our campus. This is a significant improvement for our program. We also have created an A.S. degree in Health Sciences that is articulated with local CSUs.

Since 2004, vast improvements have been made to the biology labs and equipment, many funded by Measure C Bond money. All of the labs have been renovated to facilitate more efficient teaching, student bench work, and student interactions. New cabinetry, in-class fume hoods, new and more convenient microscope cabinets, more counter space, and industry grade cadaver storage have all been updated or added. Lab safety equipment, internet interfaces, power outlets, sinks, gas sources, and vacuum pump outlets are now all handicapped-accessible. Additionally, laboratory classrooms are now equipped with large white-board areas, 17 wireless student laptop computers in each room, a projection screen, a projector, and interfaces for instructor computers and audio/visual equipment. New skeletons and models for Anatomy labs, new physiological monitoring systems and software for Physiology, and new pH and metabolic gas recording equipment for nonmajors general biology have brought technology to the forefront of our educational experiences. Finally, the Microbiology and Cell/Molecular biology lab has received several new microcentrifuges, a refrigerated ultraspeed centrifuge, 6 UV spectrophotometers, 32 new state-of-the-art student microscopes, 16 dissecting scopes, 4 complete acrylamide gel apparatuses, large cellular and molecular models, 3 mini thermocyclers for PCR, two digital microscope cameras, digital document cameras, and several new incubators and vacuum pumps. In sum, our facilities have been transformed from 35 year old antiques to state-of-the-art. We are proud of the results and grateful to the taxpayers of San Mateo County.

**2. State the goals and focus of this program and explain how the program contributes to the mission, comprehensive academic offerings, and priorities of the College and District.**

The Biological Sciences Program intends to provide students with a pathway for transfer to four-year institutions and to help them successfully complete B.S. degrees. The Program endeavors to provide current and rigorous curriculum to prepare and train students to be successful in upper division and professional school courses in the fields of Physiology, Genetics, Cell Biology, Biotechnology, Ecology, Microbiology, Nutrition, Zoology, and Health Sciences. Second, the Program also provides rigorous education to prepare students for entry into Career Technical Education programs in Nursing, Radiologic Technology, Surgical Technology, Respiratory Therapy, Physical Therapy, Occupational Therapy, and Physician Assistant. And third, the Program aims to provide non-majors an opportunity to gain a more complete understanding of themselves and their environment through the incorporation of the biological sciences into their education. In all three cases our students can leave Cañada well-prepared to pursue further education and training and/or having become well-informed citizens better able to make scientifically valid choices in their own lives and in their community and nation.

Our Program is currently working toward the following Goals:

1. Develop Honors Program biology courses/sections to enhance independent and advanced-level learning and provide research experience for highly-motivated and talented students.
2. Expand General Education course offerings in Biology and Health Science to include possible classes such as Environmental Science, Microscopy, Biotechnology, and Women's Health.
3. Maintain enrollments and improve student success in Biology and Health Science courses.
4. Continue to update our laboratories and classrooms with current computer technologies and up-to-date scientific equipment.
5. Expand program offerings to reflect the changing needs of the medical field and prepare our students for new career opportunities, such as possibly developing an Electrocardiogram Technician certification program.

Our Program maintains the following Focus:

1. Provide a clear lower division pathway for transfer to universities and professional programs.
2. Provide current and rigorous core transfer courses for students majoring in the biological sciences and health sciences.
3. Provide relevant courses to satisfy prerequisites for entry into allied health CTE programs.
4. Provide accessible, informative and interesting general education courses for non-science majors.
5. Help students become effective and independent learners, with well-developed skills in critical thinking, literature research, writing, and use of computer and laboratory technologies.
6. Provide information and insight into careers in the biological, environmental, and health sciences for college students and, through outreach activities, for high school students.
7. Foster in students the development of a sense of wonder, appreciation, proper understanding and interpretation, responsibility, and concern for the natural world.
8. Maintain an active liaison with biological science programs in the California State University and University of California systems, as well as private colleges and universities.

Contributions of the Biological Sciences Program to the Mission, Comprehensive academic offerings, and priorities of Canada College and the SMCC District:

1. The Biological Sciences Program contributes to the mission and priorities of the College and District by providing training for students pursuing high-growth, high-demand careers in the biological and health sciences. The Program and its staff put the needs of the students first, "providing a personal, caring atmosphere," and do our best to foster student learning and continued success in their educations and careers. We are aware and responsive to changes in our field and help students develop current skills and competencies with both discipline-specific technologies and teaching/learning technologies. We endeavor to promote development of our students into competent life-long learners and professionals. We provide educational and personal enrichment opportunities for students from the ages of 14 to over 60. We seek to help our students be successful in newly expanding career fields, such as biotechnology and environmental sciences. We are inclusive of students from all social, ethnic, and economic walks of life, as reflected in our very diverse student demographic. Finally, in all of our interactions with our students, we share our deep enthusiasm and passion for our disciplines and for learning by acting as caring mentors and partners in their education, reflecting the college's "high priority on supportive faculty/staff/student teaching and learning relationships."

2. The Biological Sciences Program promotes the college's mission to "[encourage] a passion for life-long learning" by sharing with our students our enthusiasm for learning about the living world. To do so, we offer many courses in the various sub-disciplines of the life and health sciences. These courses focus on aspects of life from the makeup of human molecules, cells, tissues and organs, to the great impact that we and the immense variety of other living creatures on this planet have on ourselves, each other, and the surrounding environment of the world that we all inhabit. These many courses offer topics of interest to a great variety of students, from the new student trying to fulfill general education requirements, to students looking to make a great difference in human society or the environment through a career in medicine or scientific research. Examples of our curriculum development successes and future plans are presented below in Part B of this report.

3. It is imperative that all members of society have at least basic health literacy. To understand our own bodies and how they work is to understand ourselves more completely as human beings. To help our students achieve this understanding and to empower them to advocate for their own health and well-being is a truly powerful goal. The Biological Sciences Program, at its most basic level, looks to meet the college's need to "be an innovative college by responding to the changing needs of students ... [and] community ..." It looks not to simply feed students facts about the human body, but rather to equip them as thinkers and lifelong learners, able to approach health and science in a scholarly and informed manner. This may be as simple as reading a newspaper article on a current health issue and being able to formulate an educated opinion on the topic, or as complex as stepping into a rigorous health science career that involves life and death decision making on a daily basis. In this way, the Program strives to serve a range of students, from the non-science major general education student who will utilize his/her/zir skills primarily as a health patient, to the science major who may go on to a career as a health care provider.

**3. If the student population has changed, state how the program is addressing these changes. Document the demographic trends.**

Within the Biology Department, a few changes have occurred in our student ethnic and age demographics since 2004/2005. The major noticeable change in student ethnicity data is a decline in students designating themselves as "Caucasian" (from 43% to 34%) or "Asian or Pacific Islander" (from 27% to 24%), and a significant rise in students designating themselves as "other" (6% to 14%). Similarly, we observe slight declines in Health Sciences students designating themselves as "Caucasian" (from 28% to 26%) or "Asian or Pacific Islander" (from 27% to 24%), and a significant rise in students designating themselves as "other" (4% to 10%). These changes may be attributable to the high diversity of the Bay Area demographic, such that peoples from many cultures and ethnicities are mixed within families and communities, causing students to identify less with any one particular ethnic classification. This has had little impact on how we teach our courses, as it may be more of a reporting trend than an actual change in demographics. In addition, both departments have seen slight rises in the Hispanic demographic, a trend that is consistent with the local citizen population as well. The clear diversity of the student population enrolled in our courses emphasizes to us our great reliance on effective ESL education for students who have recently immigrated into the United States, or who were raised in bilingual households.

With regards to student gender and age demographics, female students and male students in Biology have maintained their relative percentages very consistently through the years, staying very near 70% female and 28% male. In health sciences, male students are gradually growing from 16% in 2005, to 25% in 2009. This is consistent with our personal observations of increased male student interest in the health sciences. In addition, the consistently high female ratio in Biological and Health Sciences fuels our current plans to develop new courses in women's health, sexual health, and reproductive biology.

The age demographic among Biology students has changed somewhat significantly in two categories: students between 30 and 49 years of age have dropped from 25% in 2005 to 20% in 2009, and even more significantly, students less than 20 years old have risen from 13% to 20%. Similarly, from 2005 to 2009, Health Science students between 30 and 49 years have dropped from 43% to 29%, and students under 20 years old have risen from 9% to 25%! This trend is likely a positive trend towards successful recruiting of more students directly from high school, due to departmental classes being taught at local high schools, and also likely reflects the rise in concurrent enrollment students (from 1% to 5%) who are still in high school. Our department needs to continue its outreach and partnerships with local high schools, and to increase public advertising (websites and developing informational brochures) in order to continue this trend of rising numbers of younger students.

**4. If the program utilizes advisory boards and/or professional organizations, describe their roles.**

Neither advisory boards nor professional organizations are utilized by either department in the Biological Sciences Program.

## **PART B: Curriculum**

### **1. Describe how the courses offered in the program meet the needs of the students and the relevant discipline(s). (This may be answered through narrative or quantitative evaluation).**

Our course offerings provide pathways for students pursuing a variety of educational goals: general education, transfer, and career technical education.

#### *General Education:*

The following courses in our program solely meet GE requirements and are transferrable GE credit to CSU: BIOL100 Introduction to the Life Sciences, HSCI 104 Nutrition and Physical Fitness, HSCI 105 Communicable Diseases, HSCI 108 Women's Health Issues, HSCI 665 Special Topics in Health Science. Additionally BIOL 130/132 are appropriate for non-majors, but these, like others of our courses also satisfy CTE and Transfer requirements and are listed in those sections respectively.

#### *Career Technical Education:*

We offer courses in First Aid and CPR (HSCI 430, 432) that are required by a variety of employment opportunities. We also offer a training program in Phlebotomy (blood drawing) that prepares students to take the state and national licensing exam. We also offer more extensive education to prepare students for entry into the SMCC District's various allied health certification programs such as Surgical Technology, Radiologic Technology and Nursing (both the A.S. and B.S. degree programs). The pathway for Rad Tech can be completed in one calendar year; the pathway for nursing can be completed in two years.

#### *Transfer:*

Students planning on majoring in Biological Sciences at a 4-year institution can take two core courses: BIOL 225 Biology of Organisms, BIOL 230 Cell and Molecular Biology. They may also choose from 7 selective courses in biology: BIOL 103 Native Plants and Wildflowers, BIOL 130/132 Human Biology/Lab, BIOL 240 General Microbiology, BIOL 250 Human Anatomy, BIOL 260 Human Physiology, BIOL 310 Nutrition. There is a recommended pathway of courses that will allow students to fulfill their A.S. degree within two years.

We recently created an A.S. degree in Health Sciences that draws upon courses in both health science and biology. Students choosing to major and transfer in Health Sciences can take the following core courses: BIOL 110 Principles of Biology, BIOL 130/132 Human Biology/Lab, BIOL 240 General Microbiology, BIOL 250 Human Anatomy, BIOL 260 Human Physiology. Additionally students can choose from seven selective courses that draw heavily from health sciences: BIOL 310 Nutrition, HSCI 100 General Health Science, HSCI 115 Introduction to Health Care and the Health Professions, HSCI 430 First Aid, HSCI 432 CPR: Adult, Child, Infant, HSCI 480 Phlebotomy, HSCI 481 Phlebotomy Externship.

The design of the A.S. degree in Health Sciences illustrates the integrated nature of our biology and health sciences departments. We modeled the major's requirements after those for an A.S. degree at Skyline College and after the lower division requirements for health science majors CSU East Bay. These requirements are heavily based on courses from the biology department but include selectives of most courses within the health science department.

## 2. State how the program has remained current in the discipline(s).

Virtually all of the curriculum in the biology and health science departments has undergone significant revision since our last program review. All of the full-time tenured faculty who were present at our last program review in 2001 have since retired. We now have four new full-time faculty in the biology and health science departments. Each instructor has been updating and revising his/her respective courses bringing them up-to-date in content and pedagogy. While the changes are too numerous to report, a few highlights are worth mentioning.

- New custom lab manuals have been developed by instructors for BIOL 110, 132, 225, 230, 240, and 260. These contain updated labs that involve current technology and topics and utilize student inquiry in their pedagogy.
- Nathan Staples has extensively revised BIOL 230, Introduction to Cell Biology. It is now Cell and Molecular Biology and is 5 units instead of 4 units. This brings the course into compliance with the proposed CSU LDTP requirements and aligns with Skyline College's 5 unit course.
- Our department was the first in the district to offer BIOL 260 in a hybrid manner. The six weekly hours of lab have been modified to allow students to complete 3 hours/wk online and 3 hours/wk on campus.
- Our department was again the first in the district to create a laboratory course to accompany BIOL 130. Carol Rhodes created BIOL 132, a new 1 unit laboratory course that brings BIOL 130 into compliance with the proposed CSU LDTP requirements. It also creates more opportunity for students to obtain laboratory credit to satisfy CSU GE requirements.
- Doug Hirzel and Jenna Patton have created a new course, HSCI 115 entitled "Introduction to Health Care and the Health Professions." This course articulates with CSU East Bay to satisfy lower division coursework for students wanting to complete a bachelor's degree in health science; this degree is available through the University Center. The course is an excellent introduction for all prospective allied health students and has been offered at local high schools through articulation agreements or concurrent enrollment.
- In a cooperative venture with the mathematics department, Ray Lapuz has developed a new 1 unit online course MATH 880 "Basic Math for Health Science." This course was created as a primer to help prospective or current allied health students develop their math skills contextualized to health-related applications.
- Nathan Staples and Carol Rhodes were the primary authors and editors for the new nonmajors courses (offered at Skyline College): BIOL 170 - Principles of Applied Bioscience and BIOL 171 - Laboratory Principles of Applied Bioscience. This work was collegially performed in collaboration with Skyline College for the development of their biotechnology certificate training program.
- In spring 2006 the health science department developed a Certified Phlebotomy Technician training program. It consists of a didactic course (HSCI 480) and a clinical externship (HSCI 481). Upon successful completion students are able to take the state and national certification board exam. To date, the program has passed 5 cohorts of students. Due to limited opportunities for clinical externships, we have had to limit the number of students accepted into the course and the frequency at which it is offered.

In 2007, the Science Division was awarded a \$250,000 CTE grant from the State Chancellor's Office for the strengthening of our Allied Health programs and articulation with secondary education and workforce. Through the grant we were able to develop and implement a series of concurrent enrollment health pathway programs with partner high schools: Woodside High School, Carlmont High School, and East Palo Alto Academy. These "Fast Track" programs offered high school students the opportunity to gain skills for college success, to earn college credit, to gain knowledge of health science and health careers, and to fulfill prerequisite courses for entry into the district's various allied health certificate programs. The grant also funded curriculum development and instructional materials, development of an integrated website for the district's allied health programs, and an allied health open house that brought students from several high schools to campus. More information about the outcomes of this grant can be obtained by reading the final narrative report located at <http://canadacollege.edu/health/CTE/grant.html>.

## 3. All course outlines in this program should be reviewed and, if appropriate, revised every six years. If this has not occurred, please list the courses and present a plan for completing the process.

The majority of our course outlines have been updated within the past two years with four exceptions. The COR for HSCI 108 is the most out of date. The course has not been taught for many years but we are currently working on a replacement 3 unit course with the same name but new course number. Our plan is to have the new course approved at the 4/27/10 curriculum meeting. After it is approved, the 108 course will be deleted. Three other courses have not been updated since 2002. HSCI 665 has not been taught in many years but its COR, along with those of BIOL 240 and 310, will be updated during this calendar year.



Course	Revision date	Course	Revision date
BIOL 100	10/27/09	HSCI 100	04/24/07
BIOL 103	10/27/09	HSCI 104	11/24/09
BIOL 110	12/12/06	HSCI 105	02/23/10
BIOL 130	10/27/09	HSCI 108	No date
BIOL 132	09/09/08	HSCI 115	09/09/08
BIOL 225	10/27/09	HSCI 430	09/09/08
BIOL 230	12/08/09	HSCI 432	09/09/08
BIOL 240	04/17/02	HSCI 480	05/13/08
BIOL 250	01/26/10	HSCI 481	05/13/08
BIOL 260	01/26/10	HSCI 665	03/11/02
BIOL 310	09/20/02		

**4. If external accreditation or certification is required, please state the certifying agency and status of the program.**

The Certified Phlebotomy Technician training program is licensed through Laboratory Field Services of the California Department of Health Services and is in good standing.

**5. Describe how your program is articulated with similar departments within SMCCD, the Sequoia High School District and/or other four year institutions. (Include articulation agreements, common course numbering etc.)**

The biology department has had several meetings with our colleagues at CSM and Skyline regarding aligning our curricula and prerequisites. These meetings have had varied success depending upon the specific course. Our courses have identical course numbers, mostly identical prerequisites, and curricula that is comparable to those of Skyline and CSM. We continue to discuss with our inter-campus colleagues whenever changes are proposed to our course outlines.

As part of the Fast Track program described previously (section B2), during 2007-2009 we have taught BIOL 130, HSCI 100, and HSCI 115 through concurrent enrollment at at various local high schools. Doing so has significantly increased the proportion of students in our program designated as concurrent enrollment and those having no high school degree; concurrent enrollments in Health Sciences increased from 5% to 21% in 2004/5 to 2008/9 respectively. This enrollment trend may not continue into the future as we have been forced to alter our outreach strategy due to objections by faculty unions. We will continue to teach these courses through the concurrent enrollment model at charter high schools (East Palo Alto Academy and possibly Aspire's Phoenix Academy) but have switched to Tech Prep articulation at the unionized high schools within the Sequoia Union High School District – specifically with Woodside High School and Sequoia High School. Through this form of articulation, high school students, upon successful completion of the course at their campus, may petition for college “credit by examination” as long as they have passed a college-approved comprehensive exam. These students will no longer be included in the college's census and will not contribute to future demographic data.

The following tables identifies the status of our articulations with local 4-year institutions. The first table identifies general transferability status. The vast majority of our courses meet specific CSU GE and IGETC requirements. The second table identifies courses with specific campus articulations.

Course	CSU GE	IGETC	UC Transferable	Course	CSU GE	IGETC	UC Transferable
BIOL 100	X	X	X	HSCI 100	X		X
BIOL 103	X			HSCI 104	X		
BIOL 110	X	X	X	HSCI 105	X		
BIOL 130	X	X	X	HSCI 108	X		
BIOL 132	X		X	HSCI 115	X		
BIOL 225	X	X	X	HSCI 430	X		X
BIOL 230	X	X	X	HSCI 432			X

BIOL 240	X	X	X	HSCI 480			
BIOL 250	X	X	X	HSCI 481			
BIOL 260	X	X	X	HSCI 665			
BIOL 310	X		X				

Course	CSUEB	SFSU	SJSU	UCSC	UCD	UCB	Course	CSUEB
BIOL 100	X						HSCI 100	X
BIOL 103							HSCI 104	
BIOL 110	X				X	X	HSCI 105	
BIOL 130	X		X		X	X	HSCI 108	
BIOL 132			X				HSCI 115	X
BIOL 225	X	X	X	X	X	X	HSCI 430	
BIOL 230	X	X	X	X	X	X	HSCI 432	
BIOL 240	X	X	X				HSCI 480	
BIOL 250	X	X	X				HSCI 481	
BIOL 260	X	X	X		X	X	HSCI 665	
BIOL 310		X	X		X			

#### 6. Discuss plans for future curricular development and/or program modification.

During our 2009 Annual Self Study our faculty engaged in a brainstorming session to generate ideas for possible new curricular offerings. One idea under consideration is splitting BIOL 225 (Organismal Biology) into two one-semester courses: Plant Biology and Zoology. This is the practice of some other local colleges and universities. Careful study of the implications of such a substantive change to our transfer curriculum must still be completed. Our faculty have expressed interest in developing courses for the college's new honors program. Jett Chinn is developing a 1-unit honors anatomy section tentatively scheduled to be offered in fall semester 2010. Nathan Staples and Doug Hirzel are considering developing other appropriate honors offerings in the biology department. Discussion also focused on the need to investigate the feasibility and demand for new courses in Environmental Technology or other Ecological or "Green" curriculum. We are also considering developing new GE courses to be offered as alternatives to the BIOL 100 and HSCI 100 standards. These new courses would satisfy the same GE requirements but would be more narrowly focussed on special topics in these disciplines. Women's Health, Sexual Health, Conservation Biology are possible examples of such courses. All of the aforementioned curricular development opportunities, with the exception of Honors Anatomy and Women's Health, are still in the very early stages of discussion and planning.

Through funding provided by our CTE grant, and in consultation with the Regional Health Occupations Resource Center (RHORC), we investigated the possibility of developing a Medical Laboratory Technician (MLT) certification program. MLT is a new career recognized and created by the state of California to address the shortage of Clinical Laboratory Scientists. Unfortunately, since the MLT career is so new, there is currently inadequate buy-in from industry to justify the considerable investment that would be required to create a new training program at Cañada. We will continue to keep an eye on this field in case conditions within industry change in our favor. In the meanwhile, we are considering the possibility of developing an EKG Technician training program that would augment the Phlebotomy program in the Health Sciences department. Many phlebotomists are unable to find full-time work in their field so providing them cross-training in a second skill would improve their employability. Much investigation, including of funding sources, is needed to determine the feasibility of this new program.

#### **PART C: Student Outcomes**

1. Please attach all Bi-Annual State of the Department reports from the past six years.

There is one report for the Biology department from 2009, which is included as a separate document. The Health Science department does not have any previous Bi-Annual reports. This deficiency will be remedied in the future since we now have a full-time faculty to represent this department.

**2. Update any analysis to include a summary of all years. Attach student learning outcomes here.**

Updates are integrated into Parts A and B above. Summary reports of SLOs for Biology and Health Science courses are attached.

**PART D: Faculty and Staff**

**1. List current faculty and staff members in the program, areas of expertise, and how positions contribute to the program success.**

Faculty/Staff Member	Position	Courses / Work Expertise
Danielle Behonick, Ph.D	Assistant Professor, Biology/Health Science	BIOL 130, BIOL 260, HSCI 100
Lisa Bjerknes, MD	Adjunct Professor, Biology	BIOL 260, BIOL 310
Harold Borrero, Ph.D	Adjunct Professor, Health Science	HSCI 430, HSCI 432, HSCI 665
Jett Chinn	Adjunct Professor, Biology	BIOL 240, BIOL 250
Gary Ciambrone, Ph.D	Adjunct Professor, Biology	BIOL 130
Sara Cooper, Ph.D	Adjunct Professor, Biology	BIOL 260
Jenny Fichmann, Ph.D	Adjunct Professor, Biology/Health Science	BIOL 240, 250, HSCI 105, HSCI 108
Angela Gibson	Biology Lab Technician	see below
Douglas Hirzel	Professor, Biology	BIOL 100, BIOL 130, BIOL 250, BIOL 260
Myles Kelley	Adjunct Professor, Biology	BIOL 110, BIOL 130, BIOL 260
Eugenia Lau, RD	Adjunct Professor, Biology	BIOL 310
Diego Nieto	Adjunct Professor, Biology	BIOL 110
Jenna Patton, Ph.D	Adjunct Professor, Biology/Health Science	BIOL 260, HSCI 100, HSCI 115
Carol Rhodes, Ph.D	Professor, Biology	BIOL 130, BIOL 132, BIOL 225
James Smiley, DC	Adjunct Professor, Biology	BIOL 130, BIOL 250
Nathan Staples, Ph.D	Professor, Biology	BIOL 110, BIOL 230, BIOL 240, BIOL 260
Barry Thomson, Ph.D	Adjunct Professor, Biology	BIOL 240
Nicamer Tolentino, MPH	Adjunct Professor, Health Science	HSCI 100
Tamas Torok, Ph.D	Adjunct Professor, Biology	BIOL 240
Justine Walsh, Ph.D	Biology Lab Technician	see below
Paul Welles, Ph.D	Adjunct Professor, Biology	BIOL 110

Professors/Assistant Professors are full-time tenure-track instructors with additional responsibilities including curriculum development and participation in various campus organizations and committees. At various times these positions also include development of new academic and career programs.

Adjunct Professors are part-time instructors. These individuals are often experts in more specific fields. As a group, they encompass a wide range of backgrounds and bring a breadth of expertise to the biology program.

Biology Lab Technicians are responsible for organizing and supporting the laboratory activities for the courses within the biology program. This includes, but is not limited to, maintaining equipment and supplies and preparing materials for the laboratories.

**2. List major professional development activities completed by faculty and staff in this program in the last six years and state what development is needed or proposed by faculty in this program.**

- Summer Research Fellowship at Genencor International, Inc., Palo Alto through the Bay Area Industry Initiatives for Science and Math Educators Program 2006. (Staples)
- Attendance at Cal State Univ Research in Biology conference 2006 including workshop on methods of curriculum development for community college classes. (Rhodes)
- Attendance at Distance Learning conference 2007, specifically targeted to community colleges (organized by CCC@One). (Rhodes)
- Attendance at Human Anatomy and Physiology Society annual conference, San Diego 2007. (Hirzel)
- Attended and escorted students at the Annual National Conference of the American Society of Cell Biologists, San Francisco 2008. (Staples)
- Attendance at Woodrow Wilson Early College Convening 2008 & 2009 as part of program development for Early College courses in biology and health science. (Behonick)

Development needed: Support for faculty to participate in discipline-specific conferences to stay current in their fields and bring new information to their students.

**3. Describe the departmental orientation process for new full-time and adjunct faculty and staff (please include student workers such as tutors and aides).**

There is currently no formal department orientation process in place for new full-time and adjunct faculty members and staff. It is our understanding that CIETL is proposing to create orientation programs for faculty in the near future. In consultation with them, we may create additional processes that are specific for our departments.

**PART E: Facilities, Equipment, Materials and Maintenance**

**1. Discuss the quality and accessibility of the facilities, equipment, equipment maintenance, and materials available to the program. List projected needs.**

As discussed above, the lab facilities have been renovated recently and new equipment was installed at the same time. The housecleaning that the construction required has helped to make the labs run efficiently, and it is wonderful to teach students in these facilities. Some needs remain, both as a result of higher enrollments in sections and more sections offered.

Item	Unit cost	# Units	Total cost (excl. tax S&H)	Justification	Department/Course
microscopes, compound	\$1000	16	\$16,000	We do not have a full set in general biology and older scopes are being slowly retired since replacement parts are not available.	BIO 110, 132, 225, 250
professional maintenance and	\$2000 a year for all our microscopes	service	\$2000	Our microscopes are a huge investment and	BIO 110, 132, 225, 230, 240, 250

upkeep of the microscopes				having them cared for professionally will increase their longevity.	
calibration of our micropipettors	\$2000 for ALL of them	service	\$2000	needs to be done every 2 years and which has never been done	BIO 110, 132, 225, 230, 240, 260
additional consumable supplies	\$2000	various	\$2000	inflation and increased enrollment	BIO 110, 132, 225, 230, 240, 260
animal skulls, various	\$15-75 each	12	\$550	new lab in Organismal Biology; present skulls are incomplete and decomposing	BIO 225
prepared slides of specimens	\$8 each	60 (6 sets of 15 slides)	\$480	replacement of broken slides; new specimens that fit current labs	BIO 225
cellulose acetate gels for electrophoresis	\$200	3 setups	\$600	isozyme lab for population genetics	BIO 225
Biopac hardware upgrade	\$1795	2	\$3590	Upgrade two old analog units to allow for additional lab experiments	BIOL 260
Reaction Timers	\$140	6	\$840	Replacement of broken equipment	BIOL 260
Various bone replicates	\$60	15	\$900	Replacement of missing bones	BIOL 250
Head musculature models	\$260	3	\$780	Current models are insufficient for the number of students	BIOL 250
Arm and shoulder model	\$810	2	\$1620	We do not have a model to show shoulder muscles	BIOL 250
Heart models	\$320	2	\$640	Replacement of old and broken models	BIOL 250
Bronchial tree model	\$410	2	\$820	We do not have such a model	BIOL 250
Functional larynx model	\$180	2	\$360	Replace broken model	BIOL 250
Liver, gall bladder and pancreas model	\$120	2	\$240	We do not have such a model	BIOL 250
Kidney model	\$100	1	\$100	Replace old broken model	BIOL 250
Urinary system model	\$450	1	\$450	We only have one such model	BIOL 250
Female pelvis model	\$490	1	\$490	We do have such a model	BIOL 250

## 2. Describe the use and currency of technology. List projected needs.

Computers are used in multiple lab sessions for many of the biology courses. They are an integral part of Bio 260 Human Physiology, which incorporates virtual labs. The number of computers is adequate, but as they increase in age, consideration must be given to maintenance and replacement.

We were fortunate to acquire (most of) a fluorescent microscope as a donation from a corporate lab. We are still in the process of determining if it requires some additional parts. Cost specifics are unknown at the moment.

**3. If applicable, describe the support the program receives from industry. If the support is not adequate, what is necessary to improve that support?**

In recognition of the college's limited resources, our Laboratory Technicians and Faculty have done an excellent job obtaining donated and free supplies from local biotech companies. However, these sources are erratic and cannot be depended upon to offset reduced state funding.

**PART F: Budget Request**

**1. What faculty positions will be needed in the next six years in order to maintain or build the department?**

We are currently adequately staffed in both the Biological Sciences and Health Science departments. We have been fortunate to hire 4 full-time faculty since the year 2000 replacing 2.5 faculty that have retired since that year. One of these faculty is shared between the Biology and Health Science departments and, to our knowledge, is the first full-time faculty dedicated to health sciences in the college's history.

We will strive to continue the enrollment growth trend that we have experienced over the past six years (see part A1) and predict that, if successful in this endeavor, we will need to hire one additional faculty member some time during the next six years. The recently signed health care reform law will increase the number of people in this country that receive health care. This will put added pressure on the existing healthcare industry to hire more administrative, clinical and support personnel. These jobs will attract the attention of prospective students in our community and we need to ensure that we have adequate faculty to meet this demand. We currently use 15 adjunct faculty and 4 full time faculty to teach about 96 class sections per academic year. That equates to almost 4 adjunct faculty for every fulltimer; adjunct faculty teach two-thirds of all fall/spring sections (56 of 84 sections).

**2. What staff positions will be needed in the next six years in order to maintain or build the department? (Staff, facilities, equipment and/or supplies) will be needed in the next six years?**

At present we need a small increase in classified staff funding. We currently have one full time Laboratory Technician and a second who is at 49%. We would like to increase funding for the second position to 50%; this would allow the Technician to earn employee benefits. Doing so would likely reduce the high turnover rate for this crucial position. It would reduce the burden of training new part-time technicians and would ensure high quality and consistent support services for our faculty and students. Additionally, we foresee that at some time in the next six years we will need to expand this position to fulltime in order to accommodate anticipated enrollment growth.

The biology department has excellent support staff that do an outstanding job supporting burgeoning numbers of lab sections with differing requirements and schedules. Angela and Justine are flexible and work tirelessly to provide high quality laboratory experiences for our students. They accomplish all this with the added burden of insufficient budget. Over the past six years we have observed that increases in the number of lab sections to be offered were not always accompanied by appropriate increases in budget allocation or with full understanding of the impact of added sections on support staff workload. Unfortunately our ability to respond to changes in enrollment with additional staffing will always lag; at times it will be impossible. Consequently, in order to better inform our decision making, we need to develop a staffing model that identifies and quantifies the fiscal and workload impact of adding new laboratory sections to our schedule. Using such a tool will help prevent overloading of our staff as well as help us justify requests for increases in budget and hiring of personnel. Development of a staffing model is a program goal to accomplish in the next 2-3 years.

**3. What equipment will be needed in the next six years in order to maintain or build the department?**

The growth in enrollment and section offerings in our program over the past six years has outpaced the changes in our supplies budget. We need to develop a supplies budget model that identifies the supply costs incurred by each additional lab section for each course. Such a model would greatly inform our decision regarding expanding course offerings by identifying the increased budget allocation needed in order to ensure quality laboratory experiences for our students. We are currently requesting an additional \$2000 per year for increased use of consumable supplies in our lab courses (see item in E1 above). In addition, new lab activities that incorporate current technologies often require supplies and equipment that are not part of previous budgets. In order to offer our students useful and engaging lab sessions, these materials must be added to the operating budget. Example: Population genetics lab, which involves running cellulose acetate gels to determine isozyme polymorphism of local wildflower populations.

#### **4. What facilities will be needed in the next six years in order to maintain or build the department?**

Our current facilities are adequate given our existing schedule offerings. However, our three labs are not adequate to accommodate for significant future enrollment growth. 18-221 (anatomy and physiology lab) is already fully scheduled all day and evening Monday through Saturday. Only one or two additional lab sections might be accommodated on Friday. 16-204 (microbiology and cell biology) is almost fully scheduled, days and evenings, Monday through Thursday. There is time for one additional lab section in the evening. The lab is not occupied on Friday – experiments in these courses require meeting twice per week. 16-212 (general biology, human biology, organismal biology) is the only lab that is currently scheduled below capacity hosting only one or two lab sections per day. This one room is the only capacity we have to accommodate future enrollment growth or new program development. The health sciences Phlebotomy program is currently sharing space with Medical Assisting in building 20.

As we expand and update our laboratory curricula we are already running into space limitations for equipment. The Microbiology/Cell Biology lab has no more floor or counter space for equipment, yet more is needed for expanded student workspace and additional equipment for student use and growth of live cultures. We can easily foresee the need for additional space to house incubators of live cultures, a walk-in cold room and/or incubator room, botanical greenhouse, space for aquaria and microscopy equipment. The need for larger facilities will only be greater if we are able to develop new allied health programs and/or new biology programs such as ecology, sustainability studies, microscopy, or biotechnology.

At present there is a need for additional large lecture rooms on campus with capacities of 60 or more students, especially in the Science Division, where many lecture classes exceed 50 students. There are few rooms on campus with this larger capacity and those that do exist are in high demand. Scheduling conflicts limit their use and, consequently, the size of some classes. This seating limitation was recently made worse after the renovation of building 17, in which classrooms lost seats due to ADA standards.

#### **PART G: Additional Information**

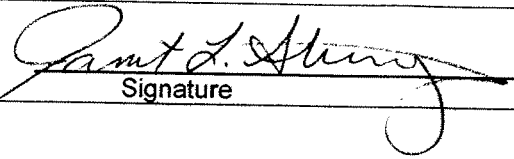
##### **1. Describe any other pertinent information about the program that these questions did not address.**

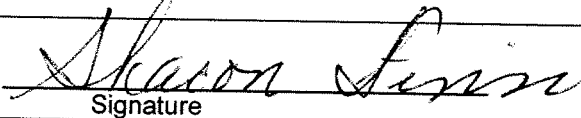
Last year, Carol Rhodes initiated an effort to install a native plant garden, incorporating three ecosystems of chaparral, oak woodland, and grassland in areas adjacent to the Science building. These plantings were to be used for student field work in ecology, use of native plants by indigenous people (Anthropology classes), as well as demonstration gardens for the community. Funding and assistance from the primary collaborator, California Native Garden Foundation, disappeared. Interest in this project was widespread throughout the campus community, and when support becomes available, this project should be revived.

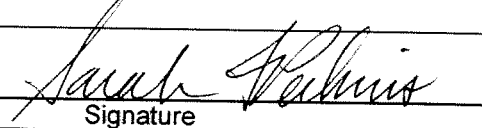
**CAÑADA COLLEGE**  
**PROGRAM REVIEW**  
**INSTITUTIONAL RESPONSE SHEET**

**Program Name:** Biological Sciences

Thank you for your time and effort in preparing this Program Review. Your Executive Summary, with recommendations, has been sent to the Planning/Budget Committee and the Board of Trustees.

<b>#1. Division Dean</b>	 Signature
<b>Comments:</b>	

<b>#2. Curriculum Committee Chair</b>	 Signature
<b>Comments:</b>	

<b>#3. College Vice President</b>	 Signature
<b>Comments:</b>	