

CALIFORNIA STATE UNIVERSITY, EAST BAY**DESIGNATION CODE: 06-07 CAPR 5 revised****DATE SUBMITTED: October 2, 2007**

TO: The Academic Senate

FROM: The Committee on Academic Planning and Resources (CAPR)

SUBJECT: Five-Year Program Review for Biological Sciences

PURPOSE: For Action by the Academic Senate

ACTION

REQUESTED: Acceptance of the Five-Year Program Review of Biological Sciences and approval of the continuation of the degrees and programs without modification

Executive Summary:

The Department of Biology has done an outstanding job over the past 5 years in-terms of curriculum development, research and professional development, and generation of external funds. CAPR commends the achievements of the program and its contribution to the University's mission.

The future of the program looks promising given the growth of Biotech industries in the Bay Area and in related programs such as Nursing. The program has addressed all the goals in the previous five year review and has a clearly stated plan and set of strategies for improvement during the next five years. The program has identified areas of strength in its curriculum and faculty as well as challenges for the future, such as hiring sufficient tenure track faculty, curriculum revision, and acquiring adequate laboratory space.

The program consists of 12 full time and several part time faculty. It has 426 Bachelor's degree majors (as of fall 2006; 343 as of Fall 2004 when the initial review was submitted), 28 Postbaccalaureate students, and 37 Master's degree students (41 in Fall 2004). This is a substantial increase in majors. FTES has steadily increased as well, from 310.5 in Fall 2000 to 388.5 in Fall 2006.

CAPR RECOMMENDATION FOR CONTINUATION OF THE PROGRAM

CAPR recommends the continuation of the degrees and programs in the Department of Biology without modification.

DATE OF THE PROGRAM'S NEXT ACADEMIC REVIEW

The date of the new Five Year Review of the program is 2009-2010.

CAPR Report

1. BACKGROUND

1.1 Overview description of the program:

The Department of Biological Sciences consists of 12 full time and several part time faculty. It has 426 Bachelor's degree majors (as of fall 2006; 343 as of Fall 2004 when the initial review was submitted), 28 Postbaccalaureate students, and 37 Master's degree students (41 in Fall 2004). This is a substantial increase in majors. FTES has steadily increased as well, from 310.5 in Fall 2000 to 388.5 in Fall 2006. Highlights of the program appear below.

- The Department of Biological Sciences is one of the largest and most dynamic programs within CSUEB, with over 300 FTES and more than 400 declared majors. It has a reputation for providing outstanding instruction and for conducting respected research through intra-campus grant mechanisms, small extramural awards, and through the cornerstone award from the Minority Biomedical Research Support Program, funded through the Institute of General Medical Services of the NIH. Since the early 1990's this program award has annually generated over \$1,000,000 in extramural funding, with significant overhead revenue generated for the campus.
- The department operates a diverse undergraduate program offering a B.A. degree, and six options for areas of specialization for the B.S. degree. The department offers a M.S. program awarding almost exclusively the Plan A University thesis through laboratory and field research. The department also runs a highly successful Biotechnology Certificate Program, and a one-year post-baccalaureate program that trains students for placement as research and development lab technicians within the biotechnology workforce.
- Subdisciplines of biology have become remarkably diverse over the last two decades and the program strives to maintain pace with this change. As a result, the department has recently established options in the B.S. such as Ecology and Conservation Biology, Cell and Molecular Biology, Physiology, Forensic Science, **State-licensed Medical Technology**, while maintaining the general-track degree in Biology. Striking a balance across the general discipline and subdisciplines in areas such as student enrollment, new-faculty hiring, optimal utilization of program space, and budget allocation will be crucial.
- The program has developed a B.S. in Environmental Science jointly with Chemistry, Geology and Geography, which has grown to approximately 30 majors.
- The program contributes significantly to the GE curriculum, and to the Pre-Nursing curriculum that prepares students for application to B.S. nursing programs. With the current doubling in size of the CSUEB nursing program, the Biological Sciences program is committed to responding to that need through increased offerings of its preparatory curriculum--a curriculum that provides significant FTES.
- The faculty have shown excellent productivity in research and professional activities. During the last review period, the program members were awarded 71 grants totaling \$7,257,151, published 35 articles in peer reviewed journals, gave 116 presentations, and participated in professional activities such as serving on grant review panels for NIH, NSF, USDA.

1.2 Overview of the documents submitted to CAPR:

As required, the report to CAPR included:

- A self-study

- A plan for the degree programs for the academic years 2005-2010
- A program assessment plan
- Program statistics that included comparison among other Biology programs within the CSU
- Report of the Outside Reviewer
- Program response to the outside Reviewer's Report
- B.S. and B.A. degree mission statements

2. FIVE-YEAR PROGRAM REVIEW/SELF-STUDY (1999-2005) AND FIVE YEAR PLAN (2005-2010)

2.1 Summary of specific areas of the Self-Study

Summary of last program review and plan. The accomplishments in the program since the last Five Year Review are listed below.

Program achievements

- Revision of the Foundations of Biological Science series to improve relevance and pedagogy: Biol 1301, 1302, 1303 were converted to Biol 1401, 1402, 1403 presenting cell and molecular aspects of living systems prior to consideration of plant and animal biology.
- Development of a uniform enforcement policy for course prerequisites: Most courses are now listed in the schedule with specified prerequisites. Although leading to higher student success rates, this has proven cumbersome in assessing transfer students; they must come to the program to provide proof of equivalency from another institution.
- Instituted program of annual, coordinated advising for all biology majors: With institution of the options, students are now assigned a default advisor, or may choose an "option specialty" advisor on their own.
- Instituted four options within the B.S. degree to accommodate the diverse disciplines of biology and career plans of students to include: ecology and conservation biology, cell and molecular biology, physiology, forensic science, and medical technology.
- Noted steady increase in enrollment, with the most significant increases in non-major service courses that include GE and prerequisites to the Nursing Program.
- Developed Student Learning Outcomes for each program.
- Strengthened community partnerships by alliance with Bay Area biotechnology companies.
- Formed a program Space Assessment Committee to take stock of current space allocation and make recommendations based on current and future research and teaching needs.
- Initiated development of policies and procedures for the Graduate Committee, Graduate Coordinator, and Graduate Program. Since issuance of the Plan A M.S. degree is contingent on the student forming an alliance with an individual faculty research advisor, the program has proposed a plan to issue the Master's degree also by examination.
- Developed a Fourth Year Bridge program to allow foreign students with the B.S. degree from three-year degree programs to prepare for application to graduate programs.
- Maintained relatively small class size for the majors.
- Increased SFR to a systemwide Biology program high of 25.

New course offerings

Severn new courses were instituted during the review period.

Tenure track positions

Four individuals were hired in tenure track positions and two searches were underway at the time of initial submission of the program review.

Program Statistics

The program compares favorably with other programs in the CSU. The program SFR has increased slightly in the review period in the presence of a substantial increase in enrollment, suggesting increasing instructional efficiency. Several graphs were offered to demonstrate the efficiency of the department, budgetary management, and enrollment data.

Assessment

The primary assessment tool used by the program is an exit interview. Descriptive statistics were published for this survey and trends identified. In particular, the program noted that the percentage of students beginning the program in the lower division is great than that for all programs in the university.

A summative and formative assessment pan should be developed and data collected to demonstrate effectiveness of learning through achievement of Student Learning Outcomes and program goals.

2.2 Summary of supporting data

In its review the program noted the increase in number of majors, increase in total FTES and the percentage FTES taught by tenure track faculty, and the increase in SFR. The program noted a decline in the number of degrees conferred and are exploring reasons for this decline, including the influence of the GE Cluster structure. The number of degrees awarded appears to be increasing slightly since this review was initially submitted.

A. Students	Fall Quarter					
	2001	2002	2003	2004	2005	2006
1. Undergraduate	319	308	320	343	370	426
2. Graduate	35	42	41	52	53	65
3. Total Number of Majors	354	350	361	395	423	491
4. FTES Generated	328.1	348.7	393.5	398.5	361.5	388.5
B. Degrees Awarded	College Years					
	00-01	01-02	02-03	03-04	04-05	05-06
1. Undergraduate	83	74	68	49	64	64
2. Graduate	10	11	11	11	6	10
3. Total	93	85	79	60	70	74

	Fall Quarter					
1. Tenured/Track	16.4	12.9	30.5	22.7	22.9	21.0
2. Lecturer	27.5	28.5	26.0	27.6	16.6	22.9
3. SFR By Level (All Faculty)	21.6	21.8	27.5	24.9	20.7	21.5
4. Lower Division	33.7	38.8	40.6	43.9	28.6	39.7
5. Upper Division	16.3	14.9	24.3	19.8	16.9	18.6
6. Graduate	6.4	7.6	7.8	6.4	11.0	5.6
7. Number of Sections Offered	86	77	84	77	83	83
8. Average Section Size	28	25	25	27	23	25

Term Full-time Equivalent Students (FTES)					
	Fall 2001	Fall 2002	Fall 2003	Fall 2004	Fall 2005
Faculty Type					
Lecturer	195.3	259.9	246.3	197.4	98.5
Tenure Track	132.9	88.8	147.2	201.1	263.0
Total	328.1	348.7	393.5	398.5	361.5
Course Level					
Lower	185.9	205.4	208.9	237.3	196.8
Upper	132.3	125.9	166.5	138.1	140.9
Undergraduate	318.2	331.3	375.4	375.5	337.7
Graduate	9.9	17.4	18.1	23.0	23.8
Total	328.1	348.7	393.5	398.5	361.5

3. OUTSIDE REVIEWER'S COMMENTS & THE DEPARTMENT'S RESPONSE

3.1 Outside Reviewer's Report

Dr. John S. Brabson, Professor of Chemistry (Biochemistry) and Department Chair, Chemistry and Physics, Mills College, Oakland, California, submitted a report in April 2005. While not a practicing biologist, Dr. Brabson prefaced his review with a statement of his background in chemistry and biochemistry however stated that he would provide a review that is "mindful of the value of the many...areas of biology. Dr. Brabson wrote comments in several areas, which are summarized below.

- CSUEB Department of Biological Sciences is experiencing the stress of change as the tools of molecular biology make their way into all of biology's subdisciplines. This has led to an organizational pattern in the field of biology based on scale: from the molecular in the cell, to tissue-organ dynamics, to organism, to ecosystem. Coping with this trend will be a challenge within this small program committed to the maintenance of a general biology program.
- Occurring in an era of limited resources, the program will be confronted with other transitions such as new curricular directions, generational transition in the tenured faculty, and changes in student expectations.
- During conversations with faculty and students a tension was noted, perhaps drawn along professional lines such as a "molecular" bent vs. an "organismal" background. While this may be the case, it is also possible that other issues underlie the perceived tension noted by Dr. Brabson, and suggestions to address this were provided.
- In the coming five years, the program should be aware of several challenges such as allocation of laboratory and research space, funding for professional travel and equipment, and support for new faculty. Attention to these challenges will increase the strength of the program.
- Address the following objectives in the next five years:
 - Enforce course prerequisites and curriculum sequences
 - Provide a compelling rationale for students to pursue the general B.S. or the B.A. as well as recruiting for options

- Allocate new faculty tenure track position in correlation with program objectives and new options
- Continue recruitment activities to expand enrollment
- Provide assessment data beyond exit interview descriptive data
- Encourage faculty development possibly by instituting a considering a "career path." The demands on faculty time are great; the demand for active research is great. Assistance in balancing teaching and professional activity is crucial.
- Establish a specific plan to meet the objective of strengthening partnerships with other organizations
- Encourage senior administration must respond to needs of equipment of increasing age, and demand for instrumentation that supports new technology.
- Complete an assessment of space usage and projected space needs soon. The shift from teaching-only to teaching/research faculty is placing increased competition for space within the college, and in programs with increasing enrollments this will be an ongoing problem. There is extensive distance between various program spaces. This likely exacerbates the sense of lack of cohesion reported by some program members. If the opportunity arises to make large-scale shifts in space allocation, significant benefits to program unity might be gained.
- Undertake appropriate assessment of staff job descriptions relative to current changes in course curriculum and faculty profile, in preparation for any turnover

3.1 Response to the Outside Reviewer's Report

The program's response to the Outside Reviewer's report was submitted to CAPR one year late due to disagreement with several elements of the report and change in department chair. Dr. Symmons was replaced by Dr. Gailey, who was then saddled with resolving the disagreement with the Outside Reviewer's report. Separate response letters were presented to CAPR, ostensibly representing the two "factions" among Biology faculty. The two most junior faculty, hired within the last two years, abstained from signing either response document. Ironically, the major issues in both letters showed significant overlap. Of significance, the signature "factions" did not follow the "molecular vs. organismal" split that Dr. Brabson might have predicted. Both responses also suggest that despite the presence of tension, the program faculty are committed to continuing a quality program. The current chair described plans to improve the relationship among the program faculty.

Both responses express gratitude to Dr. Brabson for several positive suggestions however disagree with many points, as follows.

- Although Dr. Brabson identified divisiveness and a lack of general harmony as a central theme in the program, he incorrectly pointed to the source of division as "cell/molecular vs. organismal" ideology. Although most members of the program would likely cite personnel issues as an impediment to the program's realization of some of its goal, it is also likely that most would not view these personnel issues as breaking down neatly within these larger biological divisions.
- The Program agrees with Brabson that it will be wise to resolve its "near-term staffing direction." This currently includes searches being conducted in the teaching disciplines of genetics and microbiology, areas of need identified in the 2000-05 plan, alongside physiology. The next tenure-track search will be for a physiology position, also agreed upon

by the program, hopefully in AY 2006-2007. The program has yet to discuss future hires beyond these, but Dr. Brabson did recommend that faculty allocations be tied to the program objectives with the new options programs.

- The program is in its first year of significant program change in offering students several option plans within the B.S. degree, and agrees it must prepare Student Learning Outcomes and carry out timely assessment of these options
- The program agrees that it should assess space and space needs, but disagrees one of Dr. Brabson's suggestions for acquiring additional space (using the space that currently houses the Vertebrate Museum Collection differently). The program has formulated a Space Assessment Committee and has as its near-term goal the creation of a document that assesses the use of assigned space and projects future need of space based on the dynamics of faculty planning. If the program is to realize two of its most important objectives, those of expanding student enrollment and encouraging faculty development, the ability to accommodate more students and greater faculty research potential will rely heavily on having adequate space to fulfill these objectives.
- The program also agrees with Dr. Brabson's assessment of the age of its equipment and the need to replace several pieces. The program has discussed instituting fees for courses with laboratory sections and field trips that will be dedicated to equipment replacement.
- The minority faction of the faculty expressed the desire for a different manner of representation in program votes; this is a difficult proposal in light of the faculty constitution which states that issues shall be voted on by faculty with a majority rule.

4. PROGRAM'S FIVE-YEAR STRATEGIC PLAN (2005-2009)

4.1 Overview

The **Five-Year Plan for 2006-2011** includes a list of overall strategies for improvement and specific goals in five areas: curriculum, students, faculty, resources and others.

Overall strategies for improvement

The program identified 15 strategies for improvement. Briefly summarized, they are

- Reduce wait lists
- Convene a department retreat
- Fund field trips and lab courses at higher rate
- Allow assigned time for new faculty
- Determine methods to assess Student Learning Outcomes
- Redefine SLOs to align with major options
- Write department standards for RPT
- Provide transparent budget information to faculty
- Examine introductory course sequence
- Discuss impact of GE Clusters
- Examine ability to cover Single Subject standards in introductory Biology course
- Discuss plan for lab fees
- Find alternative to budget rollover to sustain funding needs off department
- Reconsider status of Biological Field Station
- Investigate mandatory advising for majors

Curriculum

- Complete a concept map and curriculum changes

Students

- Analyze the four options offered in light of increased enrollment expectations.

Faculty

- Manage expected vacancies to enhance research and course offerings in the areas that are anticipated to lead to greater employment opportunities for students
- Assure adequate resources (i.e. start up funds and lab space) to recruit and maintain faculty

Resources

- As much as possible, ensure individual faculty offices
- Maximize enrollments to maximize resource allocation
- Capitalize on B6 upper division GE science requirement
- Write equipment replacement plan

Other goals

- Teaching
 - Maintain and improve equipment
 - Adequately staff support positions
 - Maintain grant-funded research equipment for specified use
 - Develop option to enhance involvement in K-12 science education
 - Develop Master's Plan c, Comprehensive Examination Track
 - Monitor effect of new options lab courses on equipment use
 - Advocate for increased space for instruction, research and offices
- Research
 - Allocate lab space
 - Improve essential core facilities for research labs
 - Reinstate travel funds for faculty
- Learning Outcomes
 - Determine assessment mechanisms for Student Learning Outcomes
- Increase FTES by strategic response to enrollment demands from GE and service courses. The program will respond to the new B6 upper-division GE requirement, and anticipates a large demand from students in general. The program will also respond to the educational impact of the push for increased numbers of nurses in the healthcare workforce. With the doubling of the Nursing Program at CSUEB will come increased demands for the prerequisite courses offered through the program, namely a two-quarter course in Human Anatomy and Physiology, and Microbiology. Increased FTES from these courses will lead to increased program resources.

- Institute a program-based student recruitment plan. The program will interact directly with targeted biology high school teachers, and will hold a "biology field day" on campus inviting students named by teachers as individuals slated to attend other universities, but who would be likely to choose CSUEB Biology with "the right marketing."

5. CAPR ANALYSIS OF THE PROGRAM'S FIVE-YEAR REVIEW

5.1 Program

- The detailed self study documents adequately presented and discussed supporting data fo program success The benchmark data especially on the comparison of comparable programs at other CSU's and comparison of the Biology programs with other programs of the College of Science is valuable.
- The program has made adequate progress on most of the goals it set in the last five year review. The two objectives where little progress was achieved, pertains to the resources. This is an important issue for many programs within CSUEB.
- The division among the Biology faculty is noted in the report of the Outside Reviewer and the program response. While it is clear that tension of some sort is present in the department, the source is not clear. Regardless, the program has done an excellent job in teaching, research, maintaining enrollment and other campus activities.

5.2 Assessment

- The Exit survey is a good indication of the over all services offered by the program.
- The program should develop an assessment plan to 1) measure the learning outcomes in each degree program and present those data in its next five year review, 2) demonstrate program effectiveness.
- SLOs have been written for each degree program and must be assessed

5.3 Students

- Enrollment in the program is increasing and projected to continue
- The program is encouraged to institute the mandated advising program it described
- Including courses to address the needs of other programs (i.e. Nursing and GE) is admirable and will benefit all programs
- The program's recruitment plan should be instituted

5.4 Faculty

- CAPR supports the programs goal of develop a hiring plan to address concerns from different subdisciplines within the program and the goal of hiring the best teacher-scholars available

CAPR RECOMMENDATION FOR CONTINUATION OF THE PROGRAM

CAPR recommends the continuation of the degrees and programs in the Department of Biology without modification.

DATE OF THE PROGRAM'S NEXT ACADEMIC REVIEW

The date of the new Five Year Review of the program is 2009-2010.