



Discontinuation of the BS in Natural Sciences

RES 232420

AAC

RESOLVED: That the BS in Natural Sciences be discontinued.

RESOLVED: That all policies for program discontinuation be observed including providing a means for all currently active students to finish their plan of study.

RATIONALE: The BS in Natural Sciences was designed to give students pursuing a career in teaching a pathway to achieve Subject matter certification in the sciences by preparing them to pass the California Subject Exams for Teaching (CSET) in science. The passage of AB 130 by the California State Legislature now allows candidates for teacher credential programs to achieve subject matter certification in science by holding a traditional disciplinary degree in a scientific discipline, and thus the BS in Natural Sciences is no longer needed.

Attachments:

Email_Program discontinuation proposal--BS in Natural Sciences_2024-02-22
Natural Sciences Program Discontinuation Memo
UPRC Letter_BS in Natural Sciences_October 23, 2023

Distribution List:

President
Provost and VP for Academic Affairs
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Department Chairs
General Faculty

Academic Senate

California State University, Bakersfield
9001 Stockdale Hwy. • 22 EDUC • Bakersfield, CA 93311

Approved by the Academic Senate: April 11, 2024
Sent to the President: April 23, 2024
President Approved: April 26, 2024

From: [Debra Jackson](#)
To: [Aaron Hegde](#)
Cc: [Katherine Van Grinsven](#); [Deisy Mascarinas](#)
Subject: Program discontinuation proposal--BS in Natural Sciences
Date: Thursday, February 22, 2024 3:41:29 PM
Attachments: [Natural Sciences Program Discontinuation memo.pdf](#)
[UPRC Letter BS in Natural Sciences October 23, 2023.pdf](#)
[Program Review 2023 -- Natural Sciences.pdf](#)

Dear Dr. Hegde,

The Director of the Natural Sciences program has proposed the discontinuation of the B.S. in Natural Sciences degree program. This proposal was shared with the Interim Provost, Dr. Rodriguez, on February 6, 2024. After a 14 day response period had elapsed with no objections, Dr. Rodriguez consented on February 22, 2024 for the proposal to be forwarded to the Academic Senate for review and approval.

Please find attached a memorandum from the Director of the Natural Sciences program dated February 7, 2024, the recent Natural Sciences program self-study dated February 21, 2023, and the report from the University Program Review Committee dated October 23, 2023.

Thank you,
Debra

DEBRA L. JACKSON, Ph.D.

She/her/hers
Associate Vice President for Academic Affairs
Dean of Academic Programs
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CALIFORNIA STATE UNIVERSITY
BAKERSFIELD

Date: 2/7/2024

To: Dr. James L. Rodríguez, Interim Provost and Vice President for Academic Affairs

From: Dr. Carl Kloock, Chair, Department of Biology; Program Director, Interdepartmental Program in Natural Sciences and Chair, Natural Sciences Advisory Committee.

CC: Dr. Aaron Hegde, Chair, Academic senate
Dr. Debra Jackson, AVP for Academic Affairs
Dr. Denver Fowler, Associate Dean for Graduate and Undergraduate studies
Dr. Jane Dong, Dean, NSME
Dr. Maureen Rush, Chair, Dept of Mathematics and Member Natural Sciences Advisory Committee
Dr. William Krugh, Chair, Dept. of Geological and member Natural Science Advisory Committee
Dr. Sarah Forester, Chair, Dept. of Chemistry and Biochemistry
Dr. Andreas Gebauer, Dept. of Chemistry and Member, Natural Sciences Advisory Committee
Dr. Travis Moore, Chair, Dept. of Physics and Engineering
Dr. Luis Vega, Interim Dean, SSE
Dr. BreAnna Evans-Santiago, Chair, Department of teacher education
Ms. Debbie Meadows, Director of education accreditation and member, Natural Sciences Advisory Committee

Department Chairs above: Please distribute to the faculty in the departments of Biology, Chemistry and Biochemistry, Geological Sciences, Mathematics, Physics and Engineering, and Teacher Education

Attachments: Natural Science Program Review Self-study, 2022-23
University Program Review Committee report.

Subject: Discontinuation of the Interdisciplinary Program in Natural Sciences

Pursuant to the CSUB Policy on Discontinuance of Academic degree programs, this memorandum is sent to all constituents above. The department chairs referenced above are asked to distribute to their faculty to ensure that all faculty members who may teach courses in the program are informed of the proposed discontinuance.

Any of the above, or individual Faculty who disagree with the discontinuation of the program have fourteen (14) days from the date above

Rationale for discontinuation.

Summary:

The reason the BS in Natural Sciences exists is to give students pursuing a career in teaching a pathway to achieve Subject matter certification in the sciences by preparing them to pass the California Subject Exams for Teaching (CSET) in science. The passage of AB 130 by the California State Legislature now allows candidates for teacher credential programs to achieve subject matter certification in science by holding a traditional disciplinary degree in a scientific discipline. Given this reality, The Natural Sciences program has become redundant with the traditional science degrees, which provide an alternative pathway to achieving subject matter certification and provide more potential career flexibility for these student outside of education.

Detailed rationale:

Assembly Bill 130 (AB 130). (see link: https://www.ctc.ca.gov/docs/default-source/commission/agendas/2021-12/2021-12-2f.pdf?sfvrsn=611925b1_2) was passed in December 2021, and regulations pertaining to this bill were adopted and signed by the governor in July 2021 (https://www.ctc.ca.gov/docs/default-source/commission/coded/2021/coded-21-05.pdf?sfvrsn=ac402ab1_2). AB 130 changes the way that subject matter requirements may be satisfied. On the next page, please find excerpted relevant portions of section 80096 with language pertaining specifically to science credentials highlighted for reference:

AB 130 presents an existential issue for the program. Students earning any appropriate degree will be considered subject matter competent with no need to pass the CSET (though CSET will remain as an option for candidates whose degrees do not fit the defined criteria). Given that the Natural Science degree is designed specifically as preparation for the CSET, this change brings the need for the degree into question.

§ 80096. Determination of Subject Matter Competency.

- (a) When reviewing official transcripts for subject matter competency under sections 44259(b)(5)(A)(iii) (and (v) of the Education Code, acceptable coursework shall be defined as:
- (1) Coursework earned with a grade of “C” or higher. Courses earned with “Pass,” “Credit,” or another designation deemed by the institution of higher education to be equivalent to a grade “C” or higher is also acceptable.
 - (2) Coursework that is degree-applicable to an Associate or higher degree and credit-bearing. Remedial coursework is not acceptable.
 - (3) Coursework that was completed at a regionally accredited institution of higher education.
 - (4) Upper division or graduate coursework that exceeds one or more subject matter domain, if the course content requires existing knowledge of the subject matter domain.
- (b) When reviewing official transcripts for subject matter competency for a Single Subject Credential under section 44259(b)(5)(A)(iv)(I) of the Education Code, a major in one of the subject areas in which the commission credentials candidates shall mean:
- ...
- (3) For the single subject area of Science, successful completion of a baccalaureate or higher degree at a regionally accredited institution of higher education where the title of the degree earned includes the science concentration subject area of the credential to be earned in the name of the major, as follows:
- (A) For the Foundational-Level Science credential, successful completion of any degree major offered by the science department of a regionally accredited institution of higher education.
 - (B) For the Biological Science credential, the title of the degree must include the area of Biology.
 - (C) For the Chemistry credential, the title of the degree must include the area of Chemistry.
 - (D) For the Geoscience credential, the title of the degree must include the area of Geoscience or Earth Science.
 - (E) For the Physics credential, the title of the degree must include the area of Physics.

...

Changes to Education Code § 44259 (b) (5) are also relevant, and available as appendix A in the document linked above. Excerpt:

Education Code § 44259 (b) (5) (A) Verification of subject matter competence, demonstrated through one of the following methods:

- ...
- (iv) Successful completion of a baccalaureate or higher degree from a regionally accredited institution of higher education with the following, as applicable:
- (I) For single subject credentials, a major in one of the subject areas in which the commission credentials candidates.
-

AB 130 makes the disciplinary concentrations of the BS in Natural Sciences unnecessary for prospective teachers. If students can achieve subject matter certification with a degree in any of the disciplinary fields, the Natural Sciences degree becomes much less desirable for students. Few students decide to become science teachers early in their academic career, and with this change, there would not be an advantage, even for first-year student, to major in Natural Sciences: they could pursue a teaching career with a traditional degree in the discipline. In addition, because of the broad recognition and acceptance of traditional degrees outside of California's Educational system, traditional degrees serve students better than Natural Science degrees because they make it easier for students to pursue other career goals should they change their minds about teaching or be unable to meet the requirements to enter a credential program.

The foundational concentration was designed to meet the very specific need of producing high-quality middle school teachers. While it clearly meets the spirit of AB 130, it may encounter some bureaucratic difficulty as it is not technically offered by a "science department" (see § 80096-b3A, above). It is unclear whether an offering by an interdepartmental program would qualify. A larger problem for the Foundational concentration is the current extremely low enrollment in this concentration. A program that serves 1-2 majors per year is simply not viable. In addition, students seeking the foundational science credential have other routes available to them, as discussed in detail in the program review, which is attached (see section 1D-2b). And, with the language of AB130, any science degree would grant an individual subject-matter competency acceptable for foundational science. Despite its small niche, the foundational concentration is also un-desirable for students because, even more so than the disciplinary concentrations, it limits career options: the only relevant career route available to graduates with this degree is teaching middle school science.

Given the new reality for subject matter certification under AB 130, the previously favorable cost:benefit ratio of the program must be re-evaluated. The Natural Science degree is no longer beneficial for students pursuing a teaching career and limits student's career option more than the alternative degrees available to them. Thus it is the recommendation of the Natural science Advisory Committee that the Natural Science program be placed on moratorium and accept no new students. Students currently in the program should be informed of this and given the option to change their major or complete coursework necessary to earn the Natural Science degree. The University Program review committee has completed their review of the Natural Science program self-study and concurs with this recommendation (see attached).



M E M O R A N D U M

DATE: October 23, 2023

TO: Dr. Carl Kloock, Chair, Department of Biology & Director of BS in Natural Sciences

FROM: The University Program Review Committee
Dr. Ángel Vázquez-Ramos, Chair; Dr. Hager El Hadidi; Dr. Jacquelyn Ann K. Kegley; Dr. Yeunjoo Lee; Dr. Dayanand Saini; Dr. Danielle Solano; Dr. Jinping Sun; Dr. Debra Jackson, ex officio

CC: Dr. Vernon Harper, Provost and Vice President for Academic Affairs
Dr. Debra Jackson, Associate Vice President for Academic Affairs, Dean of Academic Programs
Dr. Aaron Hegde, Chair, Academic Senate
Dean Jane Dong, School of Natural Sciences and Mathematics

SUBJECT: Interdisciplinary Program in Natural Sciences (BS in Natural Sciences)
Self-Study and Program Plan

Introduction

The BS in Natural Sciences is an interdepartmental program in the School of Natural Sciences, Mathematics and Engineering (NSME) designed specifically for students who wish to pursue a career as a Middle- or High-School teacher. The program consists of courses offered by the Departments of Biology, Chemistry, Engineering, Geology, Mathematics, and Physics.

Currently, to meet the State Subject Matter requirements to enter a teacher credential program, students complete a series of exams (the California Subject Exams for Teachers, or CSET) in science. Prospective middle school teachers (Foundational Science Concentration) take a single exam in general science, while prospective High school teachers take the general science exam plus an exam in the discipline(s) they plan to teach. These disciplines correspond to the four disciplinary concentrations in the Natural Science major: Biology, Chemistry, Geology, or Physics.

The basic structure of the program follows the CSET structure: Students take a core of majors-level science courses consisting of 11-12 units in each of the core disciplines to provide general breadth in science, followed by a depth concentration of 28-32 units in one discipline, or for middle school teachers only, a foundational concentration consisting of the single subject teacher credential program (46-50 units), resulting in a four-year

blended program that includes both the BS degree and the Foundational Science Credential. High school teachers take credential coursework as a 5th-year, post-graduate program.

Although students can enter the credential program as science teachers with a major as long as they pass the appropriate CSET exams and have a bachelor's degree, the BS in Natural Science provides students with a more focused and efficient preparation for meeting the state subject matter requirements. In traditional disciplines-based majors, students would generally not get the breadth of preparation offered by the Natural Science program.

In reviewing the BS in Natural Sciences, the University Program Review Committee (UPRC) examined the following documents:

- ☐ The BS in Natural Sciences Self Study and Program Plan AY 2014-2015 through 2021-2022: received February 21, 2023
- ☐ Dean's Review dated August 1, 2023

The program has requested discontinuance, so no external review is needed.

Response to Previous Reviews

The BS in Natural Sciences has provided responses to the UPRC recommendations from the previous review. A summary of those responses is provided below.

- ☐ It was recommended that an engineering faculty representative be recruited to the Advisory Board. The program notes that this has not been done.
- ☐ It was recommended that the program monitor CSET results to shed light on the effectiveness of the program. The program has done this, and the results are reported and discussed in Evidence of Program Quality.
- ☐ It was recommended that the program track student scholarship. This has proven difficult both due to the pandemic and to the nature of the students and their focus on a career in teaching.
- ☐ It was recommended that the program hire a part-time administrative support to assist with outreach, monitor CSET results and to track student research and career goals. This has not been done. The program has no budget beyond the 3 WTUs a year provided the program coordinator. The Self Study commends Ms. Vanessa Mayorga, the ASC for Biology, who provides administrative assistance when necessary.
- ☐ It was recommended that the program develop an outreach plan and work with CSUB's Center for Career Education & Community Engagement (CECE) and Enrollment Management to increase the visibility of the program. This has not been done.
- ☐ It was recommended that the program explore the possibility of a minor or certificate program. This possibility was explored, a proposal was developed and received tentative approval from the NSME Curriculum Committee pending certain modifications. This item slipped through the cracks during the pandemic and never came to fruition.

Relevant Changes in the Program

The only significant change in the curriculum was to add a course in Engineering (SCI 3210, Fab Lab Teaching Internship) to the core curriculum. This course provides students with exposure to engineering concepts and processes, and students act as guides for school groups visiting the Fab Lab facility, so it fits nicely into the teacher education mission of the program by giving students experience with this audience in an educational setting.

The biggest change is not in the program itself, but in the context in which the program operates: the implementation of the provisions of Assembly Bill 130 (AB 130). AB 130 changes the way that subject matter requirements may be satisfied. AB 130 presents an existential issue for the program. Students earning any appropriate degree will be considered subject matter competent with no need to pass the CSET (though CSET will remain as an option for candidates whose degrees do not fit the criteria above). Given that the Natural Science degree is designed specifically as preparation for the CSET, this change brings the need for the degree into question.

Given the new reality for subject matter certification under AB 130, the previously favorable cost: benefit ratio of the program must be re-evaluated. The Natural Science degree is no longer beneficial for students pursuing a teaching career and limits student's career option more than the alternative degrees available to them.

Given these new circumstances, the Interdisciplinary Program in Natural Sciences recommends that the Natural science program be placed on moratorium and accept no new students. Students currently in the program should be informed of this and given the option to change their major or complete their current Interdisciplinary program.

The UPRC commends the program for providing this thorough and honest assessment of the current situation.

Program's Role in Relation to the University

The mission of the BS in Natural Sciences is to prepare program graduates with the subject matter knowledge necessary to become highly skilled science teachers in the State of California. The Self-Study notes that the program's mission was well aligned with the University's until AB 130 was enacted by the state. AB 130 has made the program redundant as the benefits of producing teachers (Goal 2) can now be more readily realized by students earning traditional degrees in the individual scientific disciplines. AB 130 has also eliminated the need for Goal 3 for prospective teachers. Hence, the program does not make significant contributions to the University's mission anymore.

Per the alignment matrix (Appendix 5), every course in the BS in Natural Sciences advances the University Goals. In particular, the BS in Natural Sciences is the most well-rounded science major on campus. It includes extensive coursework in four basic science disciplines: Biology, Chemistry, Geology, and Physics, as well as Engineering and Mathematics.

The program's curriculum is designed around the State of California's requirements for science teachers, as exemplified by the California Subject Exams for Teachers (CSET) in science. The program excellently prepares students in general science, with a pass rate of >90%. However, the CSET will soon no longer be required for

prospective teachers (Middle or High School), which makes the program's design and purpose obsolete. The UPRC agrees with this assessment.

Because the program is interdisciplinary and does not offer courses in general education, service, or certificate categories, its small resource base (i.e., its reliance on the course offerings by the departments of Biology, Chemistry and Biochemistry, Geological Sciences, Physics and Engineering, and Mathematics and their faculty) does not impact these associated programs. Hence, the recommended termination of the program will not affect these functions of the University. The UPRC agrees with this assessment.

Evidence of Program Quality

The BS in Natural Sciences program primarily uses student performance on the CSET in Science exam as the assessment criteria. Before a change in CSET exam structure in 2017, between 2010 and 2016, the passage rate of Natural Science students was generally higher than that of other CSUB STEM students (especially, as expected, on the general science exams) and above or comparable to the statewide average, (Table 1, p. 9). Hence, the program was successful at its primary goal. On the other hand, the passage rate for the disciplinary exams was lower than that for the general science exams. The program recognizes this deficiency and has focused on program improvement accordingly. The program hoped that the change to a Semester-based BS program, accompanied by an increase in the number of units within each disciplinary concentration, will help with this issue.

The program's student learning outcomes (SLOs) are tied directly to the CSET assessment. The first student learning objective (i.e., Objective 1) is assessed directly by the CSET General Science exam, for which Natural Sciences students have >92% pass rate from 2010-2016, plus one additional student passing in 2020. The second student learning objective (i.e., Objective 2) is assessed directly by the four disciplinary CSET exams for which Natural Sciences students have >83% pass rate from 2010-2016.

The UPRC commends the program faculty for its continued commitment to student success and focused efforts for program improvement.

The small enrollment and the small size of the program's graduating class in most academic years (<5) make it difficult to get reliable data on the placement of students in careers and graduate/professional programs. However, anecdotally, many graduates enter the credential program and often get jobs as teachers before they finish the credential program. Given the recommendation to terminate the program, any efforts to seek such data in the future will be irrelevant.

Because the Natural Science program does not have any faculty in the program itself, measures of student involvement in scholarship or creative activities are reported at the departmental level. Similarly, the achievements of individual faculty who teach courses in this program are more appropriately indicated in the reports of their home departments. Further, the program does not administer alumni satisfaction or employer satisfaction surveys.

Data related to student retention, graduation rates, time-to-degree, etc., largely unavailable due to the small size of the graduating class in most academic years. Where data is available, such as median time to degree, the program's numbers are identical to the School of Natural Sciences, Mathematics, and Engineering (NSME) for first-time freshmen but quite a bit higher for upper-division transfer students. Most transfer students lack

prerequisites and essentially begin a new, four-year degree program when they change their major to Natural Sciences.

CSULA and CSU Fresno have similar programs, and they follow a very similar overall approach of requiring both breadth and depth components in their programs. On the other hand, CSUB's core course sequence includes an engineering course, which is unique. CSUB's Natural Sciences program is unique in offering a degree concentration specifically targeted towards Middle-school teachers, including the bachelor's degree and the credential in an integrated program.

CSU East Bay used to have a subject matter sequence like CSUB's Foundational concentration, but not as a separate degree. Its program no longer appears to exist. CSU Stanislaus offers the foundational credential and claims that the foundational credential is for "students strong in science but not necessarily with a science degree." However, CSUB's Foundational Concentration is a science degree.

The program has previously provided its students with opportunities to teach in summer programs such as Camp BLAST for rural middle school students. The other options include the Math Science Teacher Initiative (MSTI), which provides \$3000/year to students who meet the basic requirements. In exchange, students must provide 100 hours of tutoring at the Middle or High school level, providing them with valuable practical experience with students of an appropriate age.

The Noyce Scholarship program and MSTI, which had specific diversity goals and criteria, previously supported the enrolled students. Unfortunately, the Noyce Scholarship program no longer exists, and although MSTI still exists, the program has chosen to focus on Elementary teachers rather than Middle/High school teachers and no longer accept Natural Science students, even as part of credential program support. Further, the Natural Sciences program is an independent entity. Typically, a few students are enrolled in the program; hence, the program needs no targeted recruiting efforts with specific diversity goals. Similarly, the interdepartmental nature of the program does not allow it to play a role in faculty recruitment or hiring. Hence, efforts to recruit faculty who reflect the community's diversity are not warranted.

Evidence of Program Viability and Sustainability

The numbers of both Natural Science majors and graduates have declined from an average of over twenty majors per term and ~4 graduates per year to ~11 majors per term and ~2 graduates per academic year. While science teachers are in high demand and low supply, it is expected that enrollment will drop even further due to AB 130.

As an interdepartmental program with no faculty of its own (the Natural Science Advisory Committee serves as the primary planning entity for the program) the Natural Science program has no control over faculty, financial, and other resources; it has no operational budget and no dedicated administrative support. While dedicated administrative support could potentially be helpful, the current recommendation to terminate the program renders such effort a waste of resources.

Program Plan

The Natural Science Advisory Committee recommends that the program should be put on moratorium and stop accepting new students. Existing students should be given the option of completing the degree or changing

their major. The Natural Science program should be terminated upon degree completion of the last remaining students. Specifically, the Dean recommends that the program ensure all impacted programs are fully consulted, prepare a proposal to place Natural Sciences Program on moratorium with a teach out plan, and communicate the upcoming changes to stakeholders (e.g., high schools). The UPRC concurs. The Dean also suggests exploring the possibility of creating a minor in Science Education, however the UPRC does not see this as necessary; students interested in teaching would be better served by taking the prerequisites and foundational requirements for admission to the credential program.

Commendations

The UPRC commends the Natural Science program for the following:

- ☐ A thorough and honest assessment of how AB 130 affects the program.
- ☐ Commitment to student success and focused efforts for program improvement.

Recommendations

The UPRC recommends the Natural Sciences program:

- ☐ Be placed on moratorium and stop accepting new students.
- ☐ Work with existing students to complete their degree and terminate the program upon degree completion of the last students.