

CALIFORNIA STATE UNIVERSITY, EAST BAY

Designation Code: **2009-10 CAPR 7**
Date Submitted: December 3, 2009

TO: The Academic Senate

FROM: Committee on Academic Planning & Review (CAPR)

SUBJECT: New options for the BA Chemistry, Biochemistry, Biology and Physics programs

PURPOSE: For Action by the Academic Senate

ACTION REQUESTED: That the Academic Senate approve the following effective for the 2011-12 catalog:

BA Chemistry - new option (Chem Ed)
BA Biochemistry - new option (Chem Ed)
BA Physics - new option (Physics Ed)
BA Biology – new option (Biology Ed)

BACKGROUND

INFORMATION: CAPR unanimously recommended at its November 5 meeting, and an email vote ending on December 3rd, that the Academic Senate approve the proposed new options in the BA Chemistry, Biochemistry, Biology, and Physics programs with the objective of more effectively preparing those students wishing to go on to obtain a single-subject teaching credential in Chemistry, Biology, or Physics.

See also 09-10 CIC 13

Attachments

Effective Date Quarter: Fall Year: 2011

**REQUEST FOR APPROVAL OF OPTION
IN CHEMISTRY EDUCATION, B.A. BIOCHEMISTRY**

1. Name of the **campus** submitting the request and the full exact title of the proposed aggregate of courses, whether it is an option or minor.
California State University, East Bay; Option in Chemistry Education
2. Full and exact **title** of the degree and major program under which the option will be offered.
B.A. Biochemistry
3. **Options already existing** under the major program for which the new aggregate of courses is proposed.
None.
4. **Purpose** of the proposed aggregate of courses:
The proposed aggregate of courses is designed for the student interested in teaching chemistry at the high school level. The option will prepare graduates to enter a single subject credential program. The course of study is flexible enough to allow the student to participate in the Bachelor's Plus Early Pathway program and earn both the bachelor's degree and a teaching credential in four years.
5. **Need** for the proposed aggregate of courses:
California will need 33,000 new mathematics and science teachers in the next 10 years. CSU has a commitment to prepare significantly more teachers in science disciplines. Offering this streamlined option will help in recruiting, supporting, and training our future chemistry teachers while still retaining the rigor of a Biochemistry degree.
6. List of all **requirements** including the **courses**, by catalog prefix number, title, and units of credit, as well as **total units** to be required under the proposed **option**.

CHEM 4400 Instructional Activities in Chemistry (2)

CHEM 4601 Environmental Chemistry I (4)

CHEM 4700 Survey of Chemical Literature (2)

GEOL 1000 Earth Systems Science (5)

PHIL 3335 Science, Technology and Values (4)

TED 3001 Exploring Education (3)

Total Units = 20

7. List of all **requirements** including **courses**, by catalog prefix, number, title, and units of credit, as well as **total units** to be required **for the major** in which the proposed option is to be included

The Bachelor of Arts degree, major in Biochemistry with an option in Chemistry Education, is designed for students interested in a career teaching chemistry at the high school level, but also prepares students to work as biochemists in an industrial setting. This program will prepare graduates to enter a single subject credential program. The major is also compatible with participation in the Bachelor's Plus Early Pathway program, which allows completion of both the Bachelor's degree and a teaching credential in four years. The major in Biochemistry with a Chemistry Education option consists of 114-117 units; the B.A. degree requires a total of 180 units.

BIOL 1401 Molecular and Cellular Biology (5)

BIOL 1402 Plant Biology (5)

BIOL 1403 Animal Biology (5)

CHEM 1101, 1102, 1103 General Chemistry (5, 5, 5)

CHEM 3301, 3302, 3303 Organic Chemistry (5, 5, 5)

CHEM 3501 Biophysical Chemistry (4)

CHEM 4411, 4412, 4413 General Biochemistry (4, 4, 4)

CHEM 4430 General Biochemistry Lab (4)

CHEM 4431 Advanced Biochemistry Lab (2)

CS 1020 Introduction to Computers or CS 1160 Introduction to Computer Science I (4)

MATH 1304, 1305 Calculus I, II (4, 4)

PHYS 2701, 2702, 2703 Introduction to Physics (4, 4, 4)

Electives (3 – 6 units)

BIOL 3121 Principles of Genetics (5)

BIOL 3151 Principles of Animal Physiology (5)

BIOL 3405 Microbiology (6)

CHEM 3200 Bioanalytical and Forensic Instrumentation (4)

CHEM 4440 Protein Structure (3)

CHEM 4450 Nucleic Acid Chemistry (3)

CHEM 4460 Major Organ Biochemistry (3)

CHEM 4810 Undergraduate Research (2)*

CHEM 4900 Independent Study (1–4)*

*No more than two units of CHEM 4810 or CHEM 4900 or combined can be applied to the upper division chemistry electives.

Total Units = 94 – 97

8. **New courses** to be developed and existing **courses** to be **modified** with the nature of the modification indicated.

CHEM 4400 Instructional Activities in Chemistry (2)

9. **Additional instructional resources**--faculty, space, equipment, library volumes, computers, etc.--needed to implement and sustain the proposed aggregate of courses. List all resources needed for the first five years beyond those currently projected, including specific resources, cost, and source of funding.
One weighted teaching unit (WTU) for a faculty member to teach a new 2 unit course once a year (CHEM 4400 Instructional Activities in Chemistry).

10. **Consultation.**

Representatives of the Biology, Earth and Environmental Science, Mathematics and Computer Science, and Physics departments have contributed to the development of this proposed option. All departments within the College of Science were consulted via the CSCI Curricular Committee. The Department of Teacher Education was also consulted and raises no objection.

11. **CERTIFICATION OF DEPARTMENT APPROVAL** by the chair and faculty.

Chair: Original signed by Ann Mcpartland

Date: 5/20/09, 11/04/09

:

12. **Approval of college dean and college faculty review body.**

Dean: Original signed by Alan Monat

Date: 5/22/09, 11/04/09

First Quarter/Year of Offering Quarter: FALL Year: 2011 Date Submitted to APGS: 11/4/09 Catalog: 2011/12
--

REQUEST FOR APPROVAL OF OPTION IN BIOLOGY EDUCATION, B.A. BIOLOGY

13. **Department:** Biological Science

14. Full and exact **title** of the Option, along with the degree and major program under which the option will be offered: B.A. Biology, Biology Education Option

15. Full and exact **title** of the Minor: N/A

16. **Options or Minors already existing** under the major program for which the new aggregate of courses is proposed. No B.A. Option currently exists in Biology.

5. **Purpose** of the proposed aggregate of courses: The goal of the B.A. Biology Education Option is to provide a solid background in biology as well as provide general science breadth appropriate for prospective biology teachers. This Option covers all of the content areas necessary for teaching both high school biology and general science courses in middle and high schools, thus preparing graduates to enter a single subject credential program. This Option should attract and foster students interested in becoming high school biology teachers and can be integrated with CSUEB's Bachelor's Plus Early Pathway (BPEP) single subject credential program.

6. List of all **requirements** including the **courses**, by catalog prefix number, title, and units of credit, as well as **total units** to be required under the proposed **option**.

I. Physical Sciences and Mathematics Core (41 units)

A. Chemistry (23 units)

- CHEM 1101-2-3 General Chemistry (15)
- CHEM 2301-2 Organic Chemistry (8)

B. Physics (5 units)

- PHYS 1700 Elements of Physics (4) and PHYS 1780 Elementary Physics Lab (1)

C. Mathematics (8 units)

- MATH 1304 Calculus I (4)
- STAT 3031 Statistical Methods in Biology (4)

D. Earth Science (5 units)

- GEOL 1000 Earth Systems Science (5) - **OR** – GEOL 1001 Introduction to the Earth Sciences (4) and GEOL 1002 Earth Sciences Laboratory (1)

II. Biological Sciences Core (42 units)

A. Lower Division (20 units)

- BIOL 1401 Molecular and Cellular Biology (5)
- BIOL 1402 Plant Biology (5)
- BIOL 1403 Animal Biology (5)
- BIOL 2025 Introduction to Microbiology (5)

B. Upper Division (22 units)

- BIOL 3110 Principles of Ecology (4)
- BIOL 3121 Principles of Genetics (5)
- BIOL 3122 Principles of Developmental Genetic Analysis (4)
- BIOL 3130 Principles of Evolutionary Biology (4)
- BIOL 3151 Principles of Animal Physiology (5)

III. Teacher Education Core (7 units)

- PHIL 3335 Science, Technology and Values (4)
- TED 3001 Exploring Education (3)

TOTAL UNITS IN THE MAJOR WITH BIOLOGY EDUCATION OPTION: 90

7. For a new option, list of all **requirements** including **courses**, by catalog prefix, number, title, and units of credit, as well as **total units** to be required **for the major** in which the proposed option is to be included. Current catalog description of the B.A. in Biology is as follows; however, a new B.A. in Biology, General Biology Option will be proposed which will replace this description.

I. Physical Sciences and Mathematics (21-39 units)

CHEM 1601 (or 1605), 1602 Basic Chemistry for the Health Sciences or CHEM 1101-2-3 General Chemistry and CHEM 2301-2 Survey of Organic Chemistry (12-23)

MATH 1130 College Algebra or MATH 1300 Trigonometry and Analytic Geometry or MATH 1304 Calculus I or STAT 3031 Statistical Methods in Biology (4)

PHYS 1700 Elements of Physics and PHYS 1780 Elementary Physics Laboratory or PHYS 2701-2-3 Introductory Physics (5-12)

II. Biological Sciences (28-29 units)

BIOL 1401 Molecular and Cellular Biology (5)

BIOL 1402 Plant Biology (5)

BIOL 1403 Animal Biology (5)

BIOL 3121 Principles of Genetics (5)

Two courses (8-9 units) selected from:

BIOL 3110 Principles of Ecology

BIOL 3122 Principles of Developmental Genetic Analysis

BIOL 3130 Principles of Evolutionary Biology

BIOL 3151 Principles of Animal Physiology

III. Electives (30-49 units)

Any upper division biology course except BIOL 3032. BIOL 2010 (or 2011) and 2020 may also be used.

8. List of **new courses** that were developed and existing **courses** that needed **modification** as a result of this new Option or Minor, if any, submitted along with this proposal: N/A

9. **RESOURCE IMPLICATIONS** of the proposed new Option or Minor, if any: N/A

10. **CONSULTATION** with other affected departments and program committee:

a) The following **department(s)** has (have) been consulted and raise **no objections**:

All Departments in the College of Science and Teacher Education were consulted and there were no objections.

b) The following **department(s)** has (have) been consulted and **raise concerns**: N/A

11. Certification of **DEPARTMENT APPROVAL** by the chair and faculty.

Original signed by Michael Hedrick

Date: 11/04/09

12. Certification of **COLLEGE APPROVAL** by the dean and college curriculum committee.

Dean/Associate Dean: Original signed by Alan Monat

Date: 11/04/09

Effective Date Quarter: Fall Year: 2011

**REQUEST FOR APPROVAL OF OPTION
IN CHEMISTRY EDUCATION, B.A. CHEMISTRY**

17. Name of the **campus** submitting the request and the full exact title of the proposed aggregate of courses, whether it is an option or minor.
California State University, East Bay; Option in Chemistry Education
18. Full and exact **title** of the degree and major program under which the option will be offered.
B.A. Chemistry
19. **Options already existing** under the major program for which the new aggregate of courses is proposed.
None currently under the B.A.
20. **Purpose** of the proposed aggregate of courses.
The proposed aggregate of courses is designed for the student interested in teaching chemistry at the high school level. The option covers all the content areas necessary for teaching chemistry, thus preparing graduates to enter a single subject credential program. The course of study is flexible enough to allow the student to participate in the Bachelor's Plus Early Pathway program and earn both the bachelor's degree and a teaching credential in four years.
21. **Need** for the proposed aggregate of courses:
California will need 33,000 new mathematics and science teachers in the next 10 years. CSU has a commitment to prepare significantly more teachers in science disciplines. Offering this streamlined option will help in recruiting, supporting, and training our future chemistry teachers while still retaining the rigor of a Chemistry degree.
22. List of all **requirements** including the **courses**, by catalog prefix number, title, and units of credit, as well as **total units** to be required under the proposed **option** or **minor**.
- BIOL 1000 Basic Concepts in Biology (5)
- CHEM 4400 Instructional Activities in Chemistry (2)
- CHEM 4601, 4602 Environmental Chemistry I, II (4, 4)
- GEOL 1000 Earth Systems Science (5)
- PHIL 3335 Science, Technology and Values (4)

TED 3001 Exploring Education (3)

Total Units = 27

23. List of all **requirements** including **courses**, by catalog prefix, number, title, and units of credit, as well as **total units** to be required **for the major** in which the proposed option is to be included.

The Bachelor of Arts degree, major in Chemistry with an option in Chemistry Education, is designed for students interested in a career teaching chemistry at the high school level, but also prepares students to work in the chemical industry. This program prepares graduates to enter a single subject credential program. The major is also compatible with participation in the Bachelor's Plus Early Pathway program, which allows completion of both the Bachelor's degree and a teaching credential in four years. The major in Chemistry with a Chemistry Education option consists of 111 units; the B.A. degree requires a total of 180 units.

CHEM 1101, 1102, 1103 General Chemistry (5, 5, 5)

CHEM 2200 Quantitative Analysis (5)

CHEM 3200 Bioanalytical and Forensic Instrumentation (4)

CHEM 3301, 3302, 3303 Organic Chemistry (5, 5, 5)

CHEM 3400 Introductory Biochemistry (4)

CHEM 3501 Biophysical Chemistry (4)

CHEM 4700 Survey of Chemical Literature (2)

CS 1020 Introduction to Computers or CS 1160 Introduction to Computer Science I (4)

MATH 1304, 1305 Calculus I, II (4, 4)

PHYS 2701, 2702, 2703 Introduction to Physics (4, 4, 4)

Chemistry Electives (11 units):

CHEM 4161 Advanced Inorganic Chemistry (3)

CHEM 4311 Advanced Organic Chemistry (4)

CHEM 4810 Undergraduate Research (2)*

CHEM 4900 Independent Study (1-4)*

*No more than two units of CHEM 4810 and CHEM 4900 or combined can be applied to the upper division chemistry electives.

Total Units = 84

24. **New courses** to be developed and existing **courses** to be **modified** with the nature of the modification indicated.
CHEM 4400 Instructional Activities in Chemistry (2)
25. **Additional instructional resources**--faculty, space, equipment, library volumes, computers, etc.--needed to implement and sustain the proposed aggregate of courses. List all resources needed for the first five years beyond those currently projected, including specific resources, cost, and source of funding.
One weighted teaching unit (WTU) for a faculty member to teach a new 2 unit course once a year (CHEM 4400, Instructional Activities in Chemistry).
26. **Consultation.**
Representatives of the Biology, Earth and Environmental Sciences, Mathematics and Computer Science, and Physics Departments have contributed to the development of this proposed option. All departments within the College of Science were consulted and gave their approval via the CSCI Curricular Committee. The Department of Teacher Education was also consulted and raised no objections.
27. **Certification Of department chair and faculty.**

Chair: Original signed by Ann McPartland Date: 5/20/09, 11/04/09
28. **Approval of college dean and college faculty review body.**

Dean: Original signed by Alan Monat Date: 5/22/09, 11/04/09

First Quarter/Year of Offering Quarter: FALL Year: 2011 Date Submitted to APGS: 6/1/09

Catalog: 2011/12

**REQUEST FOR APPROVAL OF OPTION IN
PHYSICS EDUCATION, B.A. PHYSICS**

29. **Department:** Physics
30. Full and exact **title** of the Option, along with the degree and major program under which the option will be offered: Physics Education Option, B.A. Physics
31. **Options already existing** under the major program for which the new aggregate of courses is proposed. none
4. **Purpose** of the proposed aggregate of courses: This option is intended for students who plan on becoming high school physics teachers.
5. For a new option, list of all **requirements** including **courses**, by catalog prefix, number, title, and units of credit, as well as **total units** to be required **for the major** in which the proposed option is to be included.

Major in Physics with Option in Physics Education

The Bachelor of Arts degree, major in Physics with an option in Physics Education, is designed for students interested in a career teaching physics at the high school level, but also prepares students to work as an industrial physicist. This program covers all of the content areas necessary for teaching both high school physics and general science courses in middle and high schools, thus preparing graduates to enter a single subject credential program. The major is also compatible with participation in the Bachelor's Plus Early Pathway program, which allows completion of both the Bachelor's degree and a teaching credential in four years. The B.A. degree major with a Physics Education option consists of 91 units; the B.A. degree requires a total of 180 units.

I. Lower Division (46 units)

BIOL 1000 Basic Concepts in Biology (5)

CHEM 1100 Introduction to College Chemistry (5)

GEOL 1000 Earth Systems Science (5)

MATH 1304, 1305, 2304 Calculus I, II, III (4, 4, 4)

MATH 2101 Elements of Linear Algebra (4)

PHYS 1001, 1002, 1003 General Physics (5, 5, 5)

II. Upper Division (45 units)

MATH 3331 Differential Equations (4)

PHIL 3335 Science, Technology and Values (4)

PHYS 3101 Analytic Mechanics I (3)

PHYS 3151 Thermal Physics I (3)

PHYS 3180 Computational Physics (4)

PHYS 3280 Electronics (4)

PHYS 3281 Experimental Physics (4)

PHYS 3301, 2 Quantum Mechanics I, II (3, 3)

PHYS 4001, 2 Electromagnetism I, II (3, 3)

PHYS 4250 Selected Topics *or* 4850 Undergraduate Research (3)

PHYS 4950 Physics Capstone (1)

TED 3001 Exploring Education (3)

91 units total

6. List of **new courses** that were developed and existing **courses** that needed **modification** as a result of this new Option, if any, submitted along with this proposal: none

7. **RESOURCE IMPLICATIONS** of the proposed new Option, if any: none

8. **CONSULTATION** with other affected departments and program committee:
 - a) The following **department(s)** has (have) been consulted and raise **no objections**:
Departments of Teacher Education, Biological Sciences, Chemistry and Biochemistry, and Earth and Environmental Sciences. All departments within the CSCI were consulted via CSCI Curricular Committee.

 - b) The following **department(s)** has (have) been consulted and **raise concerns**: N/A

9. Certification of **DEPARTMENT APPROVAL** by the chair and faculty.
Chair: Original signed by Jason Singley Date: 5/14/09, 11/03/09

10. Certification of **COLLEGE APPROVAL** by the dean and college curriculum committee.

Dean/Associate Dean: Original signed by Alan Monat

Date: 5/22/09, 11/04/09