



SACRAMENTO
STATE

Program Proposal Form B



Academic Group (College): Natural Science and Mathematics	Date of Submission to College Dean: Sept. 18, 2007
Academic Organization (Department): Geology	Requested Effective: Fall <u>X</u> , Spring <u> </u> , 2008 <u> </u> .
Department Chair: David Evans	Contact if not Department Chair:
Title of the Program: B.A. in Earth Science	

Type of Program Proposal:

- Modification in Existing Program:**
- Substantive Change
 - Non-Substantive Change
 - Deletion of Existing Program
- X **New Programs**
- Initiation (Projection) of New Program on to Master Plan
 - New Degree Programs
 - Regular Process
 - Fast Track Process
 - X Pilot Process
 - New Minor, Concentration, Option, Specialization, Emphasis
 - New Certificate Program

PLEASE NOTE: Form B is to be used only as a Cover Form. Additional information is requested for each of the above as noted in the corresponding procedure in the Policies and Procedures for Initiation, Modification, Review and Approval of Courses and Academic Programs found at <http://www.csus.edu/acaf/univmanual/index.htm>

Briefly describe the program proposal (new or change) and provide a justification.

The Earth Science Major is a new B.A. degree program in the Geology Department. This program is needed due to changes in the California Commission on Teacher Credentialing subject matter preparation standards. Previously, earth science teachers were expected to complete a traditional geology major as preparation for a Single Subject Credential. Under the new standards, earth science teachers must be proficient in meteorology, oceanography and astronomy, subjects not typically included in a Geology major, and not included in the Sacramento State Geology major. The Earth Science major is designed to prepare students for the California Subject Examinations for Teachers (CSET) in Earth and Planetary Science. It is also appropriate preparation for a career as an interpretive park ranger, a science writer, or an environmental lawyer. The major is not intended as preparation for a career as a geoscientist.

Approvals:

Department Chair:

Thorne

Date:

9/19/07

College Dean:

Laurel Deffern

Date:

9/20/07

University Committee:

Date:

Associate Vice President and Dean
for Academic Affairs:

Date:

8/27/07

Requirement - Bachelor of Arts Degree in Earth Science

This major is not intended to prepare professional scientists. It is designed for Earth Science Teachers, Park Rangers, Environmental Lawyers and Science Writers.

Units required for Major: 63-72

Minimum total units required for BA: 120

Courses in parentheses are prerequisites.

A. Required Lower Division Courses (35-43units)

Select one of the following introductory Geology lecture-lab combinations:

- | | | | |
|---|------|-------|--|
| 4 | GEOL | 005 | Geology of Mexico; OR |
| 3 | GEOL | 007 | Natural Disasters and |
| | GEOL | 008L | Earth Science Lab (GEOL 7 may be taken |
| 1 | | | concurrently); OR |
| 3 | GEOL | 008 | Earth Science and |
| | GEOL | 008L | Earth Science Lab (GEOL 8 may be taken |
| 1 | | | concurrently); OR |
| 3 | GEOL | 010* | Physical Geology and |
| | GEOL | 010L* | Physical Geology Lab (GEOL 10 may be taken |
| 1 | | | concurrently) |

Each of the following courses

- | | | | |
|---|------|-------|--|
| 3 | GEOL | 012 | Historical Geology (GEOL 10) |
| 1 | GEOL | 012L | Historical Geology Lab (GEOL 10L) |
| | GEOL | 017 | Earth Materials (GEOL 5, GEOL 7, GEOL 8 or GEOL |
| 4 | | | 10) |
| | CHEM | 006A | Intro to General Chem (One |
| 5 | | | year high school algebra; high school chemistry |
| | | | strongly recommended); OR |
| | CHEM | 001A* | General Chemistry I (High school algebra |
| 5 | | | [two years] and high school chemistry; or |
| | | | equivalent) |
| 4 | BIO | 007 | Introduction to the Science of Biology OR |
| 5 | BIO | 001* | Biodiversity, Evolution and Ecology AND |
| 5 | BIO | 002* | Cells, Molecules and Genes |
| | PHYS | 005A | General Physics: Mechanics, Heat Sound (Recently |
| 4 | | | completed three years of high |
| | | | school algebra and geometry; and a college |
| | | | course in algebra and trigonometry for |
| | | | those having an inadequate mathematics |
| 4 | | | background) AND |
| | PHYS | 005B | General Physics: Light, Electricity, Magnetism and |
| 4 | | | Modern Physics (PHYS 005A or instructor |
| | | | permission) |
| 4 | ASTR | 004 | Introduction to Astronomy (One year of high school |
| 3 | | | geometry or instructor permission) |
| | ASTR | 006 | Astronomy Observation Lab (ASTR 004, may be |
| 1 | | | taken concurrently) |
| | MATH | 026A | Calculus I for Social and Life Sciences ASTR 004, |
| 4 | | | may be taken concurrently) |

B. Required Upper Division Courses (26 units)

Each of the following courses

- | | | | |
|---|------|------|--|
| 4 | GEOL | 103A | Sedimentology/Stratigraphy (GEOL 17 or GEOL 100) |
|---|------|------|--|

2	GEOL	111A	Field Geology (GEOL 103A)
	GEOL	111B	Field Techniques (GEOL 111A must be taken concurrently)
2			
3	GEOL	130	Oceanography
3	GEOG	111	Elements of Meteorology

Plus any 6 units from the following courses

3	GEOL	105	Paleontology (GEOL 12, GEOL 12L)
	GEOL	110A	Structural Geology and Tectonics (GEOL 111A, 111B)
4			
	GEOL	114	Volcanology (GEOL 5, GEOL 7, GEOL 8, or GEOL 10)
3			
3	GEOL	120	Surficial Processes (GEOL 111A, GEOL 111B)
	GEOL	121	Geology of California (GEOL 5, GEOL 7, GEOL 8, or GEOL 10)
4			
3	GEOL	140	Geology and the Environment
	GEOL	170	Geology of the Planets (GEOL 5, GEOL 7, GEOL 8, or GEOL 10)
3			
	GEOL	184	Geology Field Trip (GEOL 5, GEOL 7, GEOL 8, or GEOL 10)
2			

Plus 6 units from the following courses or from listed above but not previously taken

3	GEOG	113*	Climate
3	GEOG	116	Global Climate Change
3	GEOG	117	Landforms
3	GEOG	161	California Water Resources
	ANTH	151	Human Paleontology (ANTH 001, ANTH 001A or permission)
3			
3	ANTH	124	Environmental Archaeology
3	RLS	153	Environmental Interpretation and Outdoor Education
3	PHIL	125	Philosophy of Science
3	ENGL	118T	Professional Writing
3	JOUR	131	Column and Review Writing
3-5	Other upper-division geology courses with permission of instructor		

* Indicates courses recommended for students wishing to prepare for CSET Exam for teaching high school science

Campus Approval
Proposal for New Degree Major Program
B.A. degree in Earth Science

1. Definition of Program:

Campus: California State University, Sacramento
Degree title: B.A. degree in Earth Science
Department: Geology Department
Implementation date: Fall 2008
Contact person: David Evans, chair
Drafted by: David Evans, Assoc. Prof. And Chair; and Judi Kusnick,
Assoc. Prof.

Objectives:

This program is needed to respond to changes in the California Commission on Teacher Credentialing subject matter preparation standards. Previously, earth science teachers were expected to complete a traditional geology major as preparation for a Single Subject Credential. Under the new standards, earth science teachers must be proficient in meteorology, oceanography and astronomy, subjects not typically included in a geology major, and not included in the current Sacramento State geology major.

The proposed Earth Science major is designed to prepare students for the California Subject Examinations for Teachers (CSET) in Earth and Planetary Science. It is also appropriate preparation for a career as an interpretive park ranger, a science writer, or an environmental lawyer. The major is not intended as preparation for a career as a geoscientist.

Total number of units: 35-43
Courses: see attached
New required course: Geology 17, Earth Materials needed to initiate program
No new electives required.

Prerequisites for entry to program: none
Conditions for continuing in program: none beyond University requirements

Articulation with community college programs:

Articulation agreements already exist for all lower division courses in the Earth Sciences major except the new course Geology 17, Earth Materials.

2. Need for Proposed Degree Major Program:

Other CSU campuses offering the program:

Only two CSU campuses offer B.A. majors similar to this one: San Francisco State and San Jose State. On other campuses, the need is filled through a Natural Science B.A. degree in which students may choose a geology concentration within the major (CSU Los Angeles, Bakersfield). Two campuses use the name Earth Science for a more technical B.S. degree, sometimes called an Earth Systems Science degree, intended to prepare interdisciplinary earth scientists for technical positions (CSU Long Beach, Cal Poly San Luis Obispo). No neighboring institutions offer an Earth Science degree, although UC Davis offers a B.S. degree in Natural Sciences with a concentration in Geology; this is a somewhat more technical degree than we are planning, with the dual purpose of preparing teachers and broad-based scientists.

Similar programs on campus:

No existing major at CSU Sacramento offers the same preparation as the proposed Earth Science major. The Geology B.A. and B.S. are designed for technical preparation. The Geography B.A. degree concentrates on the exterior of the Earth and excludes oceanography and astronomy; the Environmental Studies B.A. degree contains fewer science courses and is more oriented toward environmental policy.

Demand for program:

This program is warranted both by the pressing need for teachers prepared to teach earth science and by student demand.

The State of California and the Sacramento region both face a critical shortage of qualified science teachers that is expected to grow as baby boomer teachers retire in the coming decade. While CSU remains the primary source of credentialed teachers in California, providing about half of California's teachers, the system is currently not producing enough science teachers to meet the annual demand. The CSU system currently produces about 750 science teachers per year; only a handful is credentialed to teach earth science.

Teachers qualified to teach Earth Science are particularly in short supply. For example, in the Grant Unified School District, only 3 of the 28 earth science and general science teachers have degrees in earth science. Among those who teach earth science, four have degrees in other sciences; one has a degree in Liberal Studies. Fully one quarter of the science teachers in that district do not have a degree in science at all.

This shortage of qualified earth science teachers is likely to become more acute in the near future. California recently instituted a change in the way a school's Academic Performance Index is computed to favor standards-based courses. As a result, many schools are replacing their ninth grade General Science non-standards-based courses with Earth Science courses. These courses are often required of virtually all ninth grade students, and thus promise to become some of the most heavily enrolled science courses in high schools. Yet properly prepared earth science teachers continue to be a small fraction of science teachers in California.

Sacramento State has already begun to experience the demand for well-prepared earth science teachers. Over the past few years, three regional school districts have approached the Center for Mathematics and Science Education for assistance in retraining their science teachers to teach earth science. Test results in all these districts in Earth Science have been abysmal, and all would welcome new teachers prepared to teach high quality earth science courses.

We also see a demand for this program from students. Among students who have contacted the department for advising about becoming secondary teachers, a majority has expressed a preference for the proposed Earth Science major over the Geology degree. We currently have half a dozen students interested in starting the program as soon as it is approved, and this is without any marketing at all.

Expected number of students:

We anticipate that within three years we will have 12 to 15 students in the Earth Science major. This estimate is based the number of students typically enrolled in the Single Subject Matter program (5 to 6 per year) plus the fact that we expect this program to be more popular than the former Single Subject Matter program because it offers prospective teachers those courses that most directly relate to the material they will teach in high school. Moreover, we expect the Earth Science degree to be attractive to students with an interest in the discipline who do not anticipate become professional geologists.

3. Additional Support Resources Required

We estimate that the initiation of this program can be absorbed within the Geology Department's current resources. The program calls for only one new course, which we can equip with existing Department materials and funds. We anticipate that the faculty needed for this course will be made available by combining sections that are experiencing declining enrollment of Liberal Studies students (specifically, combining sections of Geology 8). We expect to absorb advising into our current advising structure. We do not anticipate any increased need for support staff or space requirements. If we are successful, the program should pay for itself through increased FTES.

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