

Program Review – Earth Sciences – May 2009

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I Overview of Program/Department

The Earth Sciences Department provides a comprehensive general education program in the areas of Physical Geology lecture and laboratory, the History of Planet Earth lecture and laboratory, Natural Disasters, and Oceanography lecture and laboratory. Similar classes are offered in Geography – physical, cultural – lecture and laboratory. Field trip experiences to visit and sample the geology, oceanography, and geography of the southern California region from the coast to the mountains and desert are a major emphasis in the Earth Sciences Department. Working with the Teacher Education Program at El Camino College, an Earth Science in Education class has been created to meet the needs of future teachers.

Earth Sciences are relatively stable. As most sections currently fill, the program would need to expand to accommodate a growth in the student population. Faculty will continue to expand the curriculum to increase options for students. The course developed for the Teacher Education Program, Geology 6, is offered every semester. The facilities are currently adequate.

The incorporation of technology into the program continues to be of interest to faculty. The faculty will be setting up a touch screen computer kiosk Summer and Fall Semester 2009 to allow students and the local community to access real time data revolving around weather, ocean currents and seismic activity. Some faculty members incorporate Student Response Systems (clickers) into their classrooms.

Geography is relatively stable. However, since current sections generally fill, the program would need to expand to accommodate a growth in the student population. At this time there is an imbalance between the numbers of cultural geography sections offered in contrast to physical geography. Due to the popularity of this course, growth will occur here first. Geography shares the same facilities as Earth Sciences and is currently adequate. The addition of the computer lab in the area has allowed faculty to incorporate technology in the classroom. The faculty recommends the addition of the kiosk for student access to real-time seismic, meteorological, and oceanographic data. The Earth Sciences Department is currently in the process (Spring Semester 2009) of acquiring the kiosk due to a generous gift from the El Camino College Foundation.

The Earth Science Department has very involved full-time faculty members, including the new full-time hire position to teach Geology and Oceanography. Faculty members are active in their discipline and participate in professional organizations both as officers and attendees. They are also very involved in student life on campus outside of the classroom. Science Club advisors are members of the department. The current Honors Program Director is a Geology/Oceanography instructor. Earth Science faculty continue to lead Study Abroad Programs and will continue into the future (2010). The Oceanography 10 online course is the first course in the Natural Sciences Division to be offered online that has an accompanying laboratory (as a hybrid course). Earth Science

faculty also participate in the Onizuka Space Science Day every year, and give public demonstrations at the Madrona Marsh Nature Center in Torrance. The Geology Program is also directly involved with the South Bay Gem and Lapidary Society and supports their activities. The South Bay Gem and Lapidary Society is the source of funds for the Wally Ford Scholarship that honors academic achievement for students that are excelling in their Geology and Oceanography classes.

The Earth Sciences Department is continually working to improve enrollment and retention. Faculty members regularly interact with counselors and other campus programs to recruit students. However, retention is always an area of emphasis, and faculty work closely with the Tutor Center located in the Learning Resource Center (LRC) on campus to assist student success in the classrooms. Faculty recommend tutors every semester for Geology and Oceanography. Full-time faculty in Geology and Oceanography mentor part-time faculty to assist them with success and retention issues.

The Geology and Oceanography faculty at El Camino College support and assist our colleague Mr. Leonard Clark at the Compton Learning Center. We invite him to our Department meetings and assist him with learning resources. We have given to Mr. Clark materials and supplies to facilitate his teaching at the Compton Learning Center.

II Analysis of Institutional Research Data

The analysis of the Success and Retention rates are discussed for the high enrollment classes in Geography, Geology, and Oceanography, as these are overall more statistically representative of the performance of the Earth Sciences Department. The following data is from Institutional Research for Fall 2004 to Fall 2007

Success and Retention Rates

Fall 2004

<u>Class</u>	<u>total # grades</u>	<u>Success Rate %</u>	<u>Retention Rate %</u>
Geog-1	356	65.4	76.7
Geog-5	149	69.8	79.9
Geol-1	279	65.9	79.9
Ocn-10	372	73.4	82.5
Total	1456	70.1	80.9
NS Division	4765	62.2	75.6
College		65.4	80.3

Fall 2005

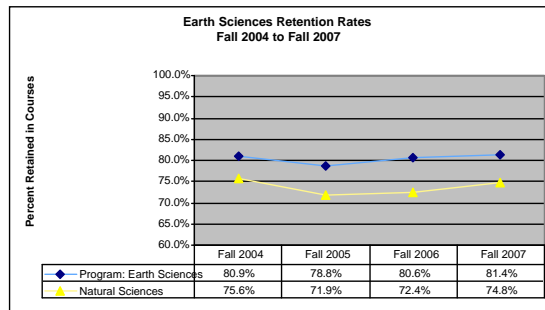
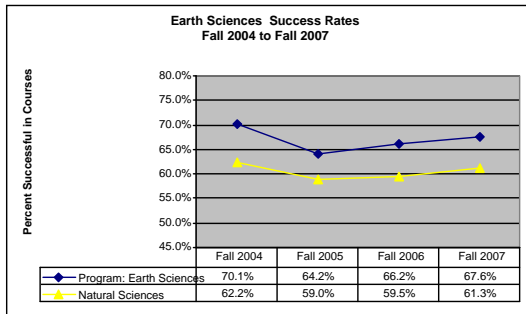
<u>Class</u>	<u>total # grades</u>	<u>Success Rate %</u>	<u>Retention Rate %</u>
Geog-1	393	51.1	69.0
Geog-5	155	72.3	82.6
Geol-1	263	59.3	77.9
Ocn-10	391	68.8	82.1
Total	1478	64.2	78.8
NS Division	4940	59.0	71.9
College		63.3	77.7

Fall 2006

<u>Class</u>	<u>total # grades</u>	<u>Success Rate %</u>	<u>Retention Rate %</u>
Geog-1	376	51.6	73.4
Geog-5	150	62.0	70.0
Geol-1	221	69.7	84.2
Ocn-10	386	72.3	84.7
Total	1431	66.2	80.6
NS Division	4982	59.5	72.4
College		62.8	77.6

Fall 2007

<u>Class</u>	<u>total # grades</u>	<u>Success Rate %</u>	<u>Retention Rate %</u>
Geog-1	345	62.3	80.6
Geog-5	165	70.3	78.8
Geol-1	236	63.1	84.7
Ocn-10	351	68.1	76.4
Total	1353	67.6	81.4
NS Division	5109	61.3	74.8
College		62.8	77.3

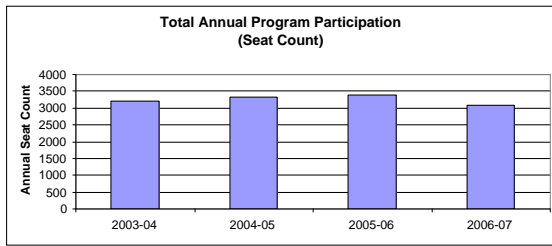


Total Annual Program Participation (4-year trend)

Irene Graff in Institutional Research provided the following data. This is year-round data. (ND = error in data sheet from Institutional Research).

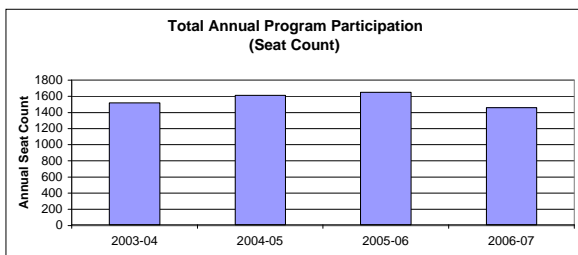
Earth Sciences Department

	<u>03-04</u>	<u>04-05</u>	<u>05-06</u>	<u>06-07</u>
Sections	91	100	ND	107
Seats	3212	3333	3375	3073
Undup. Students	2872	2931	2922	2691
Seats/Undup. Studs	1.1	1.1	1.2	1.1



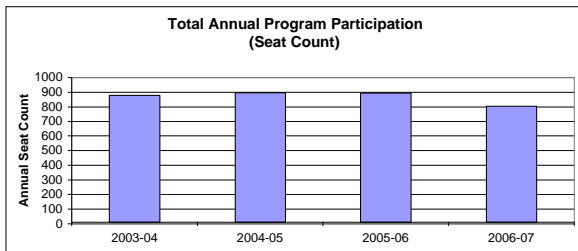
Geography

	<u>03-04</u>	<u>04-05</u>	<u>05-06</u>	<u>06-07</u>
Sections	40	45	48	44
Seats	1520	1612	1651	1459
Undup. Students	1394	1425	1428	1248
Seats/Undup. Studs	1.1	1.1	1.2	1.2



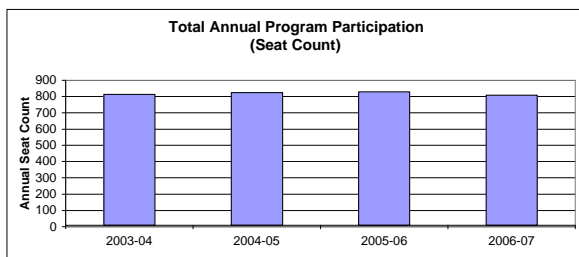
Geology

	<u>03-04</u>	<u>04-05</u>	<u>05-06</u>	<u>06-07</u>
Sections	28	31	27	28
Seats	879	897	895	805
Undup. Students	679	703	679	643
Seats/Undup. Studs	1.3	1.3	1.3	1.3



Oceanography

	<u>03-04</u>	<u>04-05</u>	<u>05-06</u>	<u>06-07</u>
Sections	23	24	ND	35
Seats	813	824	829	809
Undup. Students	799	803	815	800
Seats/Undup. Studs	1.0	1.0	1.0	1.0



Analysis

Overall, the Success and Retention rates for the Earth Sciences Department are consistently greater than the Natural Sciences Division for the years Fall 04 – Fall 07. Values for the Earth Sciences are comparable to El Camino College overall; however, the success and retention rates for the Earth Science Department in comparison to the college are consistently slightly better. Consistent retention rates of around 80 % reflect the strong emphasis that the full-time instructors in the Earth Sciences Program place on success and retention. Although the Success and Retention rates for the Earth Sciences Department are always better than the Natural Sciences Division as a whole, these values may in part reflect the GE nature of the Earth Science courses versus the more rigorous and academically challenging majors classes offered in Chemistry, Physics, Anatomy, or Biology.

There does not appear to be an overall consistent pattern for Success and Retention rates when comparing the high-enrollment Geography, Geology, and Oceanography classes. Success rates for the Geography 1 classes are consistently low in comparison to Geography 5 and the Geology and Oceanography classes. Success rates in the Geography 1 class are overall similar to those of the Geology 1 classes. Oceanography 10 consistently has higher success rates in comparison to the Geology 1 classes, and is more comparable to the Geography 5 classes. There is however, some variation in the retention values for the Oceanography classes.

When comparing the Success Rates for classes in the Earth Sciences program some variation can be observed from year to year. Geography 1 shows a large decline from Fall 2004 to Fall 2005 and 2006. Geography 5 shows big enrollment changes through the years 2005 to 2007. Geology 1 also has some changes from year to year. The Earth Sciences Department has struggled for many years with a large cohort of part-time instructors who come and go over time. As a result it may be difficult to retain part-timers and address “quality control issues.” Perhaps major swings in Geography and Geology success rates may be explained by quality issues with part-time instructors. In comparison, Oceanography classes have fairly consistent Success rates. With the Fall 2008 hire of a new Full-time instructor for Geology, quality control issues should decline for the Geology classes. Geography may continue to struggle.

Trends for the Annual Seat Count (2003 – 2007) for the Earth Sciences Department show steady growth in enrollment through 2005 – 2006, followed by a decline during the 2006 – 2007 academic year. This enrollment decline appears to be most strongly affected by a decline in Geography enrollment. Geology shows a slightly smaller decrease, and only a very small drop in Oceanography enrollment. The overall decline in enrollment for the Earth Sciences Department may reflect campus-wide enrollment challenges. In addition,

the relatively larger drops in enrollment for Geography may be due to quality control issues with part-time instructors. Perhaps the Full time Geography Instructors might want to think about more rigorous evaluation of their part-time instructors.

III Curriculum

Sara DiFiori has recently completed (Fall 2008) a Curriculum Review and update to the Geology 15 class and changed the name to Natural Disasters. This name change is to make the class more marketable and timely in terms of events on planet Earth today.

Other courses that have not been reviewed during the past six years or longer are presently undergoing curriculum review to bring them up to date. This process will be completed by the end of Spring Semester 2009, or Summer 2009 at the latest.

At the Earth Sciences Department meeting for April 2009 the following assignments were accepted by faculty members for reviewing the following courses. Revised Course Outlines have been submitted and will be reviewed by the Natural Sciences Division Curriculum Committee during Spring and Summer 2009.

Mr. Matt Ebner: Geography 2, Geography 20abcd, Geography 5, Geography 8

Mr. Jerry Brothen: Geography 9

Ms. Sara DiFiori: Geology 1 and Geology 3

Dr. Chuck Herzig: Geology 2 and 4, Geology 6, and Geology 30 and 34

Mr. Joe Holliday: Geology 32 and 36

Dr. Jim Noyes: Oceanography 10

IV Student Learning Outcomes (SLOs)

Earth Science Department level SLOs are as follows:

Oceanography

Student Learning Outcomes:

- Students can identify the salient features of the basic concepts of oceanography. (This includes the ability to recall the definitions of the specialized vocabulary of oceanography.)
- Students recognize and can accurately articulate how the ocean affects humans' lives and how human activities affect the ocean.
- Students can identify the key elements of the scientific method (hypotheses, tests, observations, conclusions/interpretation of observations) in popular accounts of scientific research in magazines, newspapers, etc.

Geology

Student Learning Outcomes:

- Students can identify the salient features of the basic concepts of geology. (This includes the ability to recall the definitions of the specialized vocabulary of geology.)
- Students recognize and can accurately articulate how the Earth affects humans' lives and how human activities affect the Earth
- Students can identify the key elements of the scientific method (hypotheses, tests, observations, conclusions/interpretation of observations) in popular accounts of scientific research in magazines, newspapers, etc.

Geography (Physical)

Student Learning Outcomes:

- Students can identify the salient features of the basic concepts of physical geography. (This includes the ability to recall the definitions of the specialized vocabulary of geography.)
- Students recognize and can accurately articulate how their physical environment affects humans' lives and how human activities affect their physical environment.
- Students can identify the key elements of the scientific method (hypotheses, tests, observations, conclusions/interpretation of observations) in popular accounts of scientific research in magazines, newspapers, etc.

The Earth Science Department completed an SLO cycle for its high enrollment classes during the Fall 2008 and Winter 2009 semesters. The following SLO's were implemented and evaluated during Fall 2008 semester for the Geology 1 (also during Winter 2009), Geography 1, and Oceanography 10 classes:

Oceanography: Students recognize and can accurately articulate how the ocean affects humans' lives and how human activities affect the ocean.

Geology: Students recognize and can accurately articulate how the Earth affects humans' lives and how human activities affect the Earth.

Geography (Physical): Students recognize and can accurately articulate how their physical environment affects humans' lives and how human activities affect their physical environment.

For assessment of the SLOs, instructors used a department-developed rubric (guided by Jim Noyes) to evaluate these SLO's. The Earth Science Department is currently evaluating the results of the SLO implementation for Fall 2008 semester during the Spring 2009 semester.

At the beginning of the Spring 2009 semester the Earth Sciences Department implemented a second SLO to assess students' basic knowledge of Earth Sciences. A SLO questionnaire was given to students in the high enrollment sections of the Geology, Geography, and Oceanography classes that consisted of a first-week of the semester basic knowledge survey. We will administer an end of the semester follow-up questionnaire to assess learning outcomes. The results of this SLO will be evaluated during the Summer 2009.

The next SLO assessment cycle for the Earth Sciences Department will be during the Fall 2009 semester. We will be implementing and assessing a Department SLO to all classes that addresses Student Learning Outcomes regarding the Scientific Method. Jim Noyes will again be taking the lead on this process.

V Facilities and Equipment

Following a remodel of the Natural Sciences complex within the past six years facilities and equipment are current within the Earth Sciences Department. The department is

always updating its DVD library and continuously updates its teaching materials through the purchase of rock and mineral specimens, maps, atlases, and other timely equipment purchases. Ms. Sara DiFiori has recently purchased new surveying equipment and sieves for the quantitative analysis of sand.

We have purchased a second 3D relief globe this Spring Semester to supplement the one already present. The purpose is to share two globes equally between the Geology, Oceanography classes and the Geography classes. The Earth Science faculty wishes to purchase an additional 3D globe (\$4000.00) for more equal access of the globes between Geography and Geology – Oceanography.

A major desire and recommendation of the Earth Sciences Department for about six years is to acquire a kiosk that could be placed in the central hallway for general student use. The purpose of the kiosk is to use touch screen technology with a dedicated computer to provide up to date information regarding earthquakes, meteorology, oceanography and other Earth processes for students. The Earth Science faculty strongly believes that this kiosk would enhance student access to the Earth and increase the level of interest in the Earth at El Camino College. As of Spring Semester 2009 the Geography Program received a generous grant from the El Camino College Foundation to purchase a kiosk. We have made our recommendations for a product and it is currently being purchased (Spring semester 2009). The Kiosk and supporting software will be installed and made available for student and the public's use during Summer and Fall 2009.

The Earth Sciences Department desires to purchase more display cabinets for the main central hallway on the second floor of the Natural Sciences building. We currently have adequate display cabinets for Geology but wish to expand the display space for Geography and Oceanography. Earth Science faculty strongly believe that the display cabinets add to our classroom presentations and student feedback regarding the rocks, fossils and minerals, and other materials on display has always been strong and positive.

The Earth Science Department also wishes to purchase the following:

- (1) A model to demonstrate the Coriolis Effect (\$1000.00)
- (2) Additional maps for classroom instruction and display (\$2000.00)
- (3) An additional 3D globe for classroom instruction (\$4000.00)
- (4) Benches in the main hallway for students (\$1000.00)

VI Staffing

The Earth Science Department hired a full-time faculty member beginning Fall 2008 to teach Geology and Oceanography classes. The addition of this faculty position alleviates quality control issues with part-time instructors for the Geology and Oceanography classes that have plagued these classes during the past five years. Earth Science faculty strongly believe that students will have a more successful experience of the Earth Science curriculum when a full-time instructor is present to devote the time and energy to a quality program. Geography continues to encounter issues with the quality and availability of part-timers that may continue to impact the success and retention rates in

these classes. Hiring a full-time Instructor in Geography may not occur in the near future especially during these economically challenging times. The Earth Science faculty recommend at this time that the hire of a full-time instructor for the Geography program is important to maintain the quality of the program into the future and to improve success and retention rates in the Geography classes (annual cost = \$80,000.00).

The Earth Sciences Department is fortunate to have a full-time Staff - Laboratory Technician dedicated to the maintenance of equipment and classroom concerns. Ms. Sim Yoe handles all equipment and maintenance issues very professionally and faculty members appreciate her ongoing great dedication and service.

VII Planning

Due to the recent spike in oil prices the Geology Department is experiencing an increase in the number of majors who transfer to 4-year colleges and universities. Declared majors in the Geological and Environmental Sciences are at a 10-year high. There is now a Geology seminar held every month by the faculty to support these majors and to prepare them for a future in Geology or the Earth Sciences, and to assist these students with the transfer process to a college or university. Although oil prices have recently subsided (but will eventually increase again), continued interest in the Earth generated by global issues such as climate change, depletion of natural resources, seismic issues in the Los Angeles area, and other timely events will continue to foster growth in the number of declared Geology majors. Faculty will continue to offer a quality program in their classes and utilize the excellent facilities at El Camino College to support these students.

The Geology faculty are seeking to develop an Advisory Committee for the Earth Sciences to mentor and advise the department in order to stay current with recent trends and projections in the Earth Sciences. We would invite local experts from the Oil Industry, Environmental Technology, and academic institutions (universities) to form the committee. We would work with the Advisory Committee to develop a Department Seminar to invite locally based Geologists and Technicians to give monthly seminars. We would provide a small stipend for the speakers (~\$50.00).

There have not historically been many Oceanography majors, about one per year – this trend continues. Geography majors continue at their historic rate of about 2 majors per year that transfer to a 4-year college or university.

Geography has previously offered a class in Geographic Information Systems (GIS) – Geography 8, but has not been offered for about six years primarily due to the lack of a qualified instructor. GIS is a major component of geographical studies today and is where many geography majors ultimately find employment. Current Geography faculty members have discussed reviving the GIS program at El Camino College. Implementing this class would require a qualified instructor, updating software, and scheduling the class in a timely manner that would meet the needs of the interested student population. These discussions continue, and we are recommending that the GIS program be offered on a continuing basis in the future. The Course Outline for Geography 8 has been revised and submitted to the Division Curriculum Committee during Spring Semester 2009.

Looking ahead to the next five years, Earth Science faculty will continue to offer a quality program at El Camino College. This requires the continued dedication of the full-time faculty and maintaining the excellent facilities. Faculty needs for the Geology and Oceanography classes are set. Geography has the priority to hire a full-time faculty member to maintain the quality of the program. The Earth Science Department will continue to upgrade its technological requirements as these become available. Faculty will continue to emphasize success and retention in the classroom, and will mentor part-time instructors to help them achieve high success and retention rates. We also seek closer ties with the Oil Industry and Environmental Technology Sector in order to provide resources for our students. An Advisory Committee drawn from these local industries is being developed during Summer and Fall 2009.

The Earth Sciences Department will be hosting the National Association of Geoscience Teachers Far-Western Section Spring Meeting in two years (2011). We successfully presented this meeting three years ago at Zzyzx, located in the Mojave Desert. Selected faculty will seek release time and we will ask for funds from the Natural Sciences Division in order to budget a successful meeting.

VIII Conclusion/Recommendations/Ongoing Activities

(1) At this time the Earth Sciences Department is well positioned to continue to offer a quality program. Full-time faculty needs for Geology – Oceanography have been met (the number one priority as stated in the previous Program Review). A full-time faculty hire is necessary for Geography, but may be challenging to achieve in these economically difficult times. Annual cost for Full-time Geography Instructor = \$80,000.00.

(2) For the next six years the Earth Sciences Department at El Camino College will continue to be a source of future majors transferring to 4-year colleges and universities. We will continue to offer field excursions as a major component of our curriculum. Our recruitment and transfer of geology majors will in part validate the success of our program.

(3) Earth Science faculty continue to offer a monthly seminar to prepare Earth Sciences major for a career in the Earth Sciences. This is a unique program that benefits future majors with our experiences and recommendations for their future activities. As a follow-up to the monthly seminar series, we are developing an Advisory Committee for the Earth Sciences inviting local industry and academic leaders. A goal of the Advisory Committee will be to develop a Seminar Series to bring local experts in geology, oceanography, and geography to El Camino College to lecture students about potential careers in the Earth Sciences. A small stipend will be offered at \$50.00.

(4) It is important that the Geology curriculum is adequate to meet the needs of our transferring majors. In order to meet this need we strongly recommend that the History of Planet Earth (Geology 2) and supporting History of Planet Earth laboratory class (Geology 4) is offered every academic year. These classes were cancelled during the Spring 2009 semester meaning that these classes were not available during the entire 2008-2009 academic year for our transferring Geology majors. The classes were

cancelled due to low enrollment before the Spring 2009 semester had even begun. Because these classes are extremely important to our transferring Earth Science majors, we strongly desire that they be offered every academic year. At this time the History of Planet Earth classes are scheduled for Fall 2009. We do not want them to be cancelled.

(5) Geography will implement a GIS curriculum. Such a program will attract more transferring majors in geography. The Geography Department is planning to offer a course in GIS (Geographic Information Systems) – Geography 8 during the Fall 2009 or Spring 2010 semester. The Geography Department seeks to re-establish the GIS classes and offer them on a continuing basis. The Geography Department will develop a budget to purchase and update software and any hardware needs for the GIS program (projected cost ~ \$20,000.00). The Geography Department also desires to hire a full-time instructor in Geography that would be able to teach the GIS curriculum (as discussed in item # 1, annual cost = \$80,000.00)

(6) The Earth Sciences Department has strongly desired a kiosk in the central hallway in order for students and the general public to access seismic, meteorological and oceanographic data in a real-time basis. Success will be measure by the foot traffic and use of the kiosk. We want to hear the following: “Hey there was an earthquake, let’s find out where it was using the kiosk in Earth Sciences.” This will be validation of our role in the community as an information source for Earth processes. Due to a generous grant from the El Camino College Foundation earmarked for the Geography program, a kiosk is being purchased during the Spring and Summer 2009. The kiosk will be installed and made accessible to students and the public during Summer and Fall 2009.

(7) The Earth Science Department will purchase a globe of the Earth that presents the Earth’s surface in detailed relief. This globe will provide additional hands-on experiences for students in the Earth Science classes, which we believe enhances student success and retention in our classes. Cost = \$4000.00.

(8) Geology 34 and 36 field excursion classes will be activated for the Fall 2009 (Geology 36) and Spring 2010 (Geology 34) semesters. These classes provide hands-on experiences and allow our mostly urban population of students to get away from Los Angeles and experience Earth processes firsthand in the nature. Cost to rent vans for these excursions for each individual class is \$1500.00.

(9) Full time faculty continue to update laboratory manuals every year. This is an important component of our program because we have many laboratory classes that provide a hands-on experience for our students. Our urban students also travel to selected geologic, geographic, and oceanographic sites to view actual Earth processes in action. These experiences for our students greatly enhance their success and retention in our classes.

(10) Curriculum review is in process for Geology 1, 2, 3, 4, 6, 30, 34, 32, 36 classes as well as Geography 2, 5, 8, 9, and 20abcd classes. The Natural Sciences Division Curriculum Committee will be reviewing these classes during Spring and Summer 2009.

(11) Additional equipment needs are new binocular microscopes to update old ones that are falling apart. We cannot complete certain laboratory activities without good quality microscopes. We wish to purchase five binocular microscopes as soon as possible. Cost per microscope = \$1500.00.

(12) The Earth Sciences faculty desire five more hallway display cases to show our students and other visitors to the department the fossil, rock and mineral, oceanography, and geography collections. Both students and visitors have consistently rated such displays as very enjoyable. Cost per display case = \$500.00. The faculty also wish to purchase benches in the hallway for the students at a cost of \$1000.00.

(13) The Earth Sciences Department will be hosting the National Association of Geoscience Teachers Far-Western Section Spring Meeting in two years (2011). We successfully presented this meeting three years ago at Zzyzx, located in the Mojave Desert. Selected faculty will seek release time and we will ask for funds from the Natural Sciences Division in order to budget a successful meeting. Cost according to faculty salaries and negotiated release time.

(14) Additional equipment purchases include the following:

- (a) A model to demonstrate the Coriolis Effect (\$1000.00)
- (b) Additional maps for classroom instruction and display (\$2000.00)
- (c) Additional media for classroom instruction (\$500.00 annually).