



ASTRONOMY/EARTH SCIENCE

Program Review

2006 - 2007

Prepared for Citrus Community College
By:

George Hathaway, Faculty
Denise Kaisler, Faculty
David Kary, Faculty
Gloria Ramos, Faculty
Lillian LaSpina, Administrative Secretary
Chris Pagano, Administrative Secretary
Eric Rabitoy, Dean of Science, Engineering and Health Sciences

ASTRONOMY/EARTH SCIENCE

PROGRAM REVIEW COMMITTEE MEMBERS

2006-2007

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FACULTY

FULL-TIME FACULTY:

George Carlson (retired 2002)
Robin Carter (resigned 2001)
George Hathaway
Denise Kaisler
David Kary
Gloria Ramos
David Ryba

ADJUNCT FACULTY:

James Bauer
David Amiel
David Duluk
Joanne Eisberg
Philip Kang
Paul Livio
Ginger Ryba

LIST OF CERTIFICATES/AWARDS OFFERED

This program does not offer any approved certificates or skill awards.

LIST OF DEGREES (none)

LIST OF INDUSTRY-BASED STANDARD CERTIFICATES (not applicable)

ORGANIZATION

Presently, within the Earth Science/Astronomy Program, there are three areas of general instruction: Astronomy, Geography, and Earth Science. Within the catalog and the class schedules, Astronomy is often referred to as Earth Science/Astronomy and Geology is often referred to as Earth Science/Geology. This has caused some confusion among students (especially the Earth Science/Astronomy paradox), and has also caused some confusion as to what specific programs were contained within Earth Science and the direction those programs were to take. While there are no established or separate formal programs, faculty within Earth Science have informally created and led two subprograms within Earth Science, specifically Astronomy and Geology. Because of these natural separations, the faculty within the Earth Science/Astronomy Program have prepared two "sub" program reviews, one for Astronomy and one for Earth Science. The Astronomy Program Review was prepared by Dave Kary, Ph.D., Denise Kaisler, Ph.D., and Gloria Ramos, M.S., and the Earth Science Program Review was prepared by George Hathaway, Ph.D.



ASTRONOMY

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ASTRONOMY SEQUENCE OF COURSES

ESCI 115.....Planetary Astronomy	3 Units
ESCI 116.....Stellar Astronomy	4 Units
ESCI 117.....Life in the Universe	3 Units

COURSES NOT OFFERED IN THE LAST 2 YEARS

ESCI 115H.....Planetary Astronomy (Honors).....	3 Units
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The Astronomy faculty has adopted the Institutional General Education Competencies of Citrus College. The General Education Competencies (as set forth in the Academic Senate minutes dated August 25th 2004) are as follows:

Institutional General Education Competencies- Part of Institutional Mission

General education competencies serve as a common set of core curricular components identified and defined by faculty. Student learning outcomes are behaviors based on these competencies.

Any student transferring, completing a degree or certificates from Citrus College, must demonstrate effectively assessed awareness, understanding, knowledge, skills, and abilities in the selected competencies.

1. Communication (personal expression and information acquisition)

Examples:

Reading analytically and critically	Speaking articulately
Writing with clarity and fluency	Listening actively

2. Computation

Examples:

Technology	Computer proficiency
Math proficiency	Decision analysis
Analyzing and using numerical data (Synthesis and evaluation)	
Application of mathematical concepts and reasoning	

3. Creative, Critical, and Analytical Thinking

Examples:

Curiosity	Research
Analysis	Learning Strategies
Synthesis	Problem Solving
Evaluation	Decision making
Creativity	Aesthetic awareness

4. Community, Global Consciousness

Examples:

Respect for others beings	Citizenship
Cultural awareness	Interpersonal skills
Ethics	Lifelong learning
Community service	Self esteem
Integrity	Empathy

5. Technology/information competency

Examples

Basic computing and word processing

6. Discipline/subject Area Specific Content Material - Project Plan

ASTRONOMY PROGRAM DESCRIPTION

The mission of the Astronomy program is to provide general, lower division coursework leading to an associate degree, to prepare students to transfer to four-year institutions, and to develop a better understanding of the natural processes that operate in the universe.

The program has two primary courses covering planetary and stellar astronomy. The latter includes astronomy laboratory experience. Both of these classes are primarily directed at students needing a general education physical science course for transfer and/or associates degrees. In addition, we have developed an honors planetary astronomy class that will be offered in spring 2008.

Class offerings in both planetary and stellar astronomy are available for students who cannot attend classes during the day. Both courses are offered in an on-line format. Planetary is taught fully online, while stellar is offered as a hybrid class with labs and discussion sections given on campus. In addition, traditional sections of both courses are offered in late afternoons and/or evenings.

Program Student Learning Outcomes:

Students completing courses in the Astronomy Program will have acquired understanding, knowledge, skills and abilities in the following competencies:

Communication

Use astronomy in the news to explain astronomical objects and processes to their peers to help improve understanding of current astronomical research.

Computation

Estimate and/or calculate the characteristics of astronomical objects, and understand the meaning of these calculations in order to better understand the natural processes that produce these characteristics.

Creative, Critical, and Analytical Thinking

Formulate scientific hypotheses in order to distinguish between scientific and non-scientific questions and methods.

Develop an understanding of relevant astronomical process as well as processes from related sciences (e.g. physics, geology, chemistry) and apply these processes to predict the properties of astronomical bodies.

Community, Global Consciousness

Understand the size and scale of the universe to better appreciate the Earth's place within it.

Understand the ways in which natural formation and evolutionary processes lead to the astronomical objects around us to better appreciate the origins and evolution of the Earth.

Program Goals:

The goals of the program are:

1. Provide general education science courses for transfer credit to four-year colleges and universities.
2. Meet the student learning outcomes and core competencies institutionalized by Citrus College.
3. Provide basic astronomical knowledge and skills for students.
4. Provide general education science courses required for students to complete an Associates degree.

SLO TIMELINE

The Astronomy faculty will develop student learning outcomes for all Astronomy classes offered at Citrus College based on the following schedule.

Course Title Projected date to develop course outline

ESCI 115	Planetary Astronomy	done
ESCI 115H	Planetary Astronomy (Honors)	done
ESCI 116	Stellar Astronomy	done
ESCI 117	Life in the Universe	done

Any new classes created will include student learning outcomes.

The department will work with the curriculum development committee to ensure the course outlines are being developed according to standards developed by the committee.

MISSION

COMMENDATIONS

1. The program conforms to the District's mission statement to provide transfer courses.
2. Course numbering follows a logical pattern.
3. Prerequisites are consistent with our transfer institutions.
4. Student population in Astronomy courses reflects the District's diversity.
5. Curriculum reflects that of transfer institutions.
6. Course syllabi meet academic senate guidelines.

PREVIOUS RECOMMENDATIONS COMPLETED

1. Explore the feasibility of offering astrophysics and planetary geology classes as part of the community college mission. *Faculty explored the feasibility of offering astrophysics and planetary geology classes and found that they were not consistent with transfer requirements for 4-year schools.*
2. Astronomy faculty should consider adding a “computational hour” to astronomy courses as part of the honors program. *Faculty have developed an honors planetary astronomy class that has passed through the curriculum committee.*

RECOMMENDATIONS

1. Create a separate astronomy program to better reflect the fact that Astronomy and Earth Science operate independently in most matters and make clearer to students the content of the astronomy classes.
2. Work with other Science faculty to prepare and begin offering the “Earth Sciences for Educators” course.
3. Work with biology faculty to develop a “Life in the Universe” course.
4. Develop an “Introduction to Cosmology” course for non-majors students.
5. Faculty should investigate offering a “late start” version of the Planetary Astronomy online class to better serve the non-traditional student population.
6. Faculty should develop closer ties with science teachers at area high schools.

NEED

COMMENDATIONS

1. Each course stands alone, not depending on students having completed other science classes.
2. Faculty have developed distance education classes for both planetary and stellar astronomy.
3. Each semester one astronomy lab section is now offered in the afternoons to provide astronomy lab experience for students who are not able to attend evening classes.
4. Astronomy faculty worked with other Earth Science faculty to develop the outline for an “Earth Sciences for Educators” course.
5. Astronomy faculty have made necessary changes to the honors planetary astronomy class to meet transfer requirements.

PREVIOUS RECOMMENDATIONS COMPLETED

1. Evaluate the equipment and design needs for teaching space in the new Math-Earth Science building. *Faculty served on the committee advising the design of the new Math/Science building.*

2. Continue to develop web pages for classes and specific instructors. *Class materials have been placed online both on the San Dimas server and the new Citrus College web site. In addition, faculty have been using Blackboard to support both traditional and online classes.*
3. Continue to bring new technology into the classroom environment. *Faculty have continued to develop and use new software and hardware (including an infrared camera) to enhance learning in the classroom.*
4. Replace retired faculty. *In Fall 2004, a new full-time astronomy faculty member was hired, and one other full-time faculty member was hired in part to teach astronomy classes.*

RECOMMENDATIONS

1. Faculty need to coordinate with other science faculty and the articulation officer to ensure that courses continue to transfer even as UC reviews its transfer requirements.

QUALITY

COMMENDATIONS

1. ESCI 115 and 116 articulate with courses at UC and CSU campuses
2. The faculty have developed grading standards, critical thinking methods, problem solving and written assignments consistent with college-level work.
3. The faculty attend conferences and in-service functions regularly.
4. Faculty have developed several new hands-on laboratory exercises, including several labs that give students direct sky-observing experience.
5. Faculty have applied for and received grants from the ASCC to pay for new telescopes to be used by astronomy students.
6. Faculty have begun updating lab equipment and purging older equipment that is no longer in use.
7. Full-time faculty member Denise Kaisler has earned her Ph.D.
8. Two new adjunct faculty members, Paul Livio, MS, and James Bauer, Ph.D., have joined the department.

PREVIOUS RECOMMENDATIONS COMPLETED

1. Evaluate how to improve student completion of required hours arranged. *Faculty are using both locally developed and published computer-based exercises to ensure students make the most effective use of their hours arranged.*
2. Faculty should increase their awareness of other Community Colleges and their programs in Earth Sciences. *Faculty have begun making contact with astronomy faculty at other nearby colleges.*
3. Faculty in Astronomy and Geology should evaluate the need to move Astronomy and Geology laboratories (or specific portions of them) to computer laboratory facilities in the new Mathematics-Earth Science

building once it is completed. *Astronomy labs have been moved to the new Math-Science building, which provides a much more flexible space for both traditional and computer-based lab work.*

4. Astronomy faculty should evaluate the need to list Math 130, Beginning Algebra, as a recommended prerequisite for Astronomy 116. *Math 130, Beginning Algebra, has been listed as a recommended pre-requisite for both Stellar and Planetary Astronomy.*

RECOMMENDATIONS

1. Faculty need to develop astronomy labs that take better advantage of the facilities available in the new Math building. These new labs should also put greater emphasis on inquiry-based learning and a prediction/observation/analysis approach to lab work rather than “cookbook” style lab procedure.
2. Lab equipment updating needs to continue in conjunction with the development of new labs.
3. Begin assessment of student learning outcomes.
4. Build new solar telescopes and write new daytime labs to support the afternoon stellar astronomy lab sections.

FEASIBILITY

COMMENDATIONS

1. Astronomy faculty has taken considerable personal initiative to incorporate technology into their instructional program.
2. The department uses computer applications to enhance the traditional lecture and laboratory experience in Astronomy.
3. Computer exercises are available for student use.

PREVIOUS RECOMMENDATIONS COMPLETED

1. Evaluate the design of the teaching facilities in the new Math-Earth Science building. *Faculty served on the committee advising the design of the new Math/Science building.*
2. Consider the needs for a fixed-site, real time telescope facility. *Instead of pursuing a fixed site observatory, faculty have developed student observing labs that focus on using small telescopes to give students direct observing experience.*
3. Facility to support Distance Education students. *The Web Office and TECS department have provided support for the offering of distance education classes in both Planetary and Stellar Astronomy.*

RECOMMENDATIONS

1. Astronomy faculty should continue investigating enhanced online materials (such as audio- and video- of lecture materials) that can be used to assist student understanding of astronomical concepts.

COMPLIANCE

COMMENDATIONS

1. The new Math building provides improved compliance with federal regulations.
2. Faculty members have worked with the DSPS office and the Web Office to ensure that faculty web sites comply with federal regulations.

RECOMMENDATIONS

1. Faculty should continue to work with the DSPS office and the Distance Education Office to ensure that online content continues to comply with federal regulations.



EARTH SCIENCE

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Earth Science Sequence of Courses

ESCI 111Earth and Space Sciences for Educators4 units
ESCI 118	.....Physical Geography	.....3 units
ESCI 120	.....Physical Geology	.....4 units
ESCI 121	.....Historical Geology	.....4 units
ESCI 122	.....Geology: Earth History	.....3 units
ESCI 124	.....Environmental Geology	.....3 units
ESCI 125	.....California Geology	.....4 units
ESCI 130	.....Physical Oceanography	.....3 units
ESCI 140	.....Geology of Death Valley National Park	.....1 unit
ESCI 141	.....Geology of Yosemite National Park	.....1 unit
ESCI 142	.....Geology of Channel Islands National Park	.....1 unit
ESCI 143	.....Geology of Joshua Tree National Park	.....1 unit
ESCI 144	.....Geology of Lassen Volcanic National Park	.....1 unit
ESCI 145	.....Geology of Sequoia-Kings Canyon National Park	.....2 units
ESCI 180	.....Introduction to Geographic Information Systems	.....3 units
ESCI 698A-D	.....Cooperative Education	.....1-4 units
ESCI 699A-D	.....Cooperative Education	.....1-4 units

Classes Not Offered in Last Two Years

ESCI 121	.....Historical Geology	.....4 units
ESCI 122	.....Geology: Earth History	.....3 units
ESCI 124	.....Environmental Geology	.....3 units
ESCI 125	.....California Geology	.....4 units
ESCI 140	.....Geology of Death Valley National Park	.....1 unit
ESCI 141	.....Geology of Yosemite National Park	.....1 unit
ESCI 142	.....Geology of Channel Islands National Park	.....1 unit
ESCI 143	.....Geology of Joshua Tree National Park	.....1 unit
ESCI 144	.....Geology of Lassen Volcanic National Park	.....1 unit
ESCI 145	.....Geology of Sequoia-Kings Canyon National Park	.....2 units
ESCI 698A-DCooperative Education1-4 units
ESCI 699A-DCooperative Education1-4 units

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Any student transferring, completing a degree or certificates from Citrus College, must demonstrate effectively assessed awareness, understanding, knowledge, skills, and abilities in the selected competencies.

1. Communication (personal expression and information acquisition)

Examples:

Reading analytically and critically	Speaking articulately
Writing with clarity and fluency	Listening actively

2. Computation

Examples:

Technology	Computer proficiency
Math proficiency	Decision analysis
Analyzing and using numerical data (Synthesis and evaluation)	
Application of mathematical concepts and reasoning	

3. Creative, Critical, and Analytical Thinking

Examples:

Curiosity	Research
Analysis	Learning Strategies
Synthesis	Problem Solving
Evaluation	Decision making
Creativity	Aesthetic awareness

4. Community, Global Consciousness

Examples:

Respect for others beings	Citizenship
Cultural awareness	Interpersonal skills
Ethics	Lifelong learning
Community service	Self esteem
Integrity	Empathy

5. Technology/information competency

Examples

Basic computing and word processing

6. Discipline/subject Area Specific Content Material - Project Plan

Program Description

The mission of the Earth Science Program is to provide general, lower division coursework leading to an associate degree, to meet the prerequisites of other courses, to prepare students to transfer to four-year institutions, and to empower students to be able to make sound decisions about accessing yet preserving Earth materials.

The program has 15 courses covering a range within the Earth Sciences; specifically Geography, Geology, and Oceanography. Five courses described in the recent college catalog offer laboratory experience (Introduction to Geographic Information Systems, Earth and Space Sciences for Educators, Physical Geology, California Geology, and Historical Geology), and seven courses offer field instruction (California Geology and the series ESCI 140 through ESCI 145). Our total student enrollment is approximately 300 students per semester.

We offer no courses in a distance education format, and we have no honors courses. While the program has 15 courses, only four (Physical Geography, Physical Geology, Physical Oceanography, and Introduction to Geographic Information Systems [annually]) have been offered on a consistent basis since our last program review.

Program Student Learning Outcomes:

Students completing courses in the Earth Science program will have acquired understanding, knowledge, skills and abilities in the following competencies:

Communication

Earth Science students will use proper vocabulary and notation when describing scientific concepts pertaining to Earth's processes and environments. They will be able to read scientific books, journals, or articles and critically analyze scientific information. They will be able to communicate to others information about our Earth's processes and environments.

Creative, Critical, and Analytical Thinking

Students will develop an understanding of, and curiosity toward, the natural world. They will develop the skills necessary to synthesize and analyze scientific material pertaining to the Earth's processes and environment, checking for its validity and accuracy.

Community, Global Consciousness

Students will demonstrate an understanding of the natural world that will increase community and global awareness of environmental concerns and set them on the path of Lifelong Learning.

Program Goals:

The goals of the Earth Science program are:

- To help the students understand the importance of Earth Science.
- To prepare the students for subsequent Earth Science courses.
- To prepare the students for transfer to other educational institutions.
- To prepare the students for the workforce.
- To prepare the students to communicate to others about, and make sound ecological decisions concerning, the marine environment.

SLO Timeline

The Earth Science faculty will develop student learning outcomes for all Earth Science classes offered at Citrus College based on the following schedule.

Course Title Projected date to develop course outline

ESCI 111	Earth and Space Science for Educators	Spring 2008
ESCI 118	Physical Geography	Spring 2008
ESCI 120	Physical Geology	Fall 2007
ESCI 121	Historical Geology	Spring 2008
ESCI 122	Geology: Earth History	Spring 2008
ESCI 124	Environmental Geology	Fall 2007
ESCI 125	California Geology	Spring 2008
ESCI 130	Physical Oceanography	Completed
ESCI 140	Geology of Death Valley National Park	Fall 2007
ESCI 141	Geology of Yosemite National Park	Fall 2007
ESCI 142	Geology of Channel Islands National Park	Fall 2007
ESCI 143	Geology of Joshua Tree National Park	Fall 2007
ESCI 144	Geology of Lassen Volcanic National Park	Fall 2007
ESCI 145	Geology of Sequoia Kings Canyon National Park	Fall 2007
ESCI 180	Introduction to Geographic Information Systems	Completed

Any new classes created will include student learning outcomes. The faculty will work with the curriculum development committee to ensure the course outlines are being developed according to standards developed by the committee.

MISSION

COMMENDATIONS

1. We provide lower division general education coursework leading to an associate's degree.
2. Earth Science Faculty initiated seven (7) new transferable (CSU; UC limited) and life-long learning courses that are now on record (ESCI 140-145 and ESCI 125).
3. Earth Science Faculty developed and submitted to their Dean five (5) new courses (Geology of the Hawaiian Islands in conjunction with the study abroad program, Physical Geology without a lab, Mineralogy, Geology of the National Parks, and Earth and Space Science for Educators) and submitted to their Dean updates and enhancements to ten (10) existing courses (ESCI 120, ESCI 121, ESCI 122, ESCI 125, and ESCI 140-145) to better meet student transfer and General Education needs.

PREVIOUS RECOMMENDATIONS COMPLETED

No applicable previous recommendations.

RECOMMENDATIONS

1. Consider offering and scheduling transfer courses on record: Historical Geology (ESCI 121), Earth History (ESCI 122), and Environmental Geology (ESCI 124) to meet general education and transfer standards established by CSU and UC systems, and associate degree standards for Citrus College.
2. Consider offering and scheduling transfer (limited) and life-long learning courses on record: Geology of Death Valley National Park (ESCI 140), Geology of Yosemite National Park (ESCI 141), Geology of Channel Islands National Park (ESCI 142), Geology of Joshua Tree National Park (ESCI 143), Geology of Lassen Volcanic National Park (ESCI 144), and Geology of Sequoia-Kings Canyon National Parks (ESCI 145) to meet General Education and transfer standards established by CSU and UC systems, associate degree standards for Citrus College, and community life-long learning courses.
3. Consider developing and offering: (1) a Physical Geology course without a lab component, or offer a separate lecture and a separate laboratory component, (2) a transferable course in Mineralogy (with a laboratory component), (3) distance education, and hybrid, courses, and (4) a series of life-long learning courses illuminating the geology of selected California State Parks; provide a diversity in class offerings for transfer students and community learning, thus improving Mission compliance.
4. Consider developing and offering team-taught General Education courses in: (1) Planetary Geology (Earth Science-Astronomy instructors), and (2) Evolution of Life (Earth Science-Biology instructors). Offering these

courses will develop closer ties within science departments and provide students and community with a modern perspective and more diverse choices in General Education science course offerings.

5. Consider upgrading Physical Oceanography (ESCI 130) to include a laboratory component, thus offering enhanced transferability in marine sciences and offering Citrus College students more choices in meeting the Physical Science with a lab requirement for their Associate degree.
6. Consider reevaluating ESCI 111 (Earth and Space Science for Educators) as part of a larger review of the Science for Educators series of courses in order to enhance the desirability of students to enroll in the course.
7. Consider developing and offering Geology of the National Parks and restructuring California Geology.
8. Explore the opportunities to do in-service activities for K-12 teachers at their school site or at a workshop at Citrus College in effort to promote geoscience education in primary and secondary schools and to increase pool of prospective geoscience majors within the UC and CSU system and Citrus College.
9. Work with Articulation Officers to change limited (CSU only) transferability courses on record to fully transferable.
10. Consider emphasizing geology and oceanography instruction over physical geography to make more effective use of department personnel.
11. Consider working with the Articulation Officer to possibly change course numbering to follow a more logical, less confusing sequence showing a hierarchy that students can follow; for instance higher numbered courses should be indicative of having lower numbered courses as prerequisites.

NEED

COMMENDATIONS

1. Faculty is commended for developing and submitting to their Dean five (5) new courses (Geology of the Hawaiian Islands in conjunction with the study abroad program, Physical Geology without a lab, Mineralogy, Geology of the National Parks, and Earth Science for Educators) and submitting to their Dean SLO updates and other enhancements to ten (10) existing courses (ESCI 120, ESCI 121, ESCI 122, ESCI 125, and ESCI 140-145) to aid in meeting student transfer needs.
2. Two adjunct instructors were hired to teach Introduction to Geographic Information Systems (ESCI 180) and Physical Oceanography (ESCI 130).

PREVIOUS RECOMMENDATIONS COMPLETED

1. Continue to develop web pages for classes and specific instructors. *Class materials, study aids, and other class business are placed online each semester by Earth Science faculty.*

2. Continue to bring new technology into the classroom environment. *Earth Science faculty use internet and software presentations for classroom instruction; in addition, a petrographic microscope was purchased to enhance classroom delivery and observations about mineralogy and petrology.*

RECOMMENDATIONS

1. Endeavor to promote the Earth Science Program by advertising in the Schedule of Classes, Clarion, and courses that incorporate Earth Science into curriculum (e.g., Natural History, Physical Geography, Introduction to GIS, Anthropology).
2. To help promote the Earth Science Program, offer more field classes and facilitate field instruction/trips, with faculty and journalistic involvement, to expose students to the exciting outdoor activities and academic stimulation associated with geological sciences.
3. Objectively review the state of Earth Science and Geology Programs at other academic institutions (US, CSU, and community colleges) and evaluate whether the Citrus College Earth Science Program is in line with current geosciences attitudes, trends, and advances and whether it meets the needs of students and faculty entering those disciplines.
4. Consider offering courses to meet not just lower division transfer needs, but preparation for major and higher status student transfer needs in addition to General Education requirements. Historical Geology, Mineralogy, and field component courses should be offered and scheduled on a regular basis to achieve these ends.
5. Consider hiring qualified faculty to meet current, and potential, program demands. Current Earth Science faculty WSCH is much higher than science department(s) averages; and increased class offerings for transfer purposes and lifelong learning demands (see Mission Recommendations) will make additional qualified instructors necessary also.

QUALITY

COMMENDATIONS

1. Course syllabi meet academic senate guidelines.
2. Full-time faculty members meet State minimum qualifications. A Ph.D. was awarded to Dr. Hathaway from UCLA in 2002.
3. Most courses, with the exception of ESCI 125 and ESCI 140-145 which are limited to CSU, articulate with those at UC and CSU campuses.
4. We developed and maintained a program webpage complete with access to course syllabi, homework assignments, study aids, appropriate links, and class business updates.

5. Grading standards, critical thinking methods, problem solving and written assignments are consistent with college-level work and facilitate Citrus College core competencies.
6. We continue to bring new technology into the classroom environment (e.g., web-based classroom business and instruction, computer utilization for instruction and student assignments, and online learning capabilities).
7. Multiple learning strategies and methods are used to ensure that all students are engaged in course lectures and laboratories.
8. Through use of level-appropriate, standardized laboratory manuals, Physical Geology laboratories have been improved.
9. Faculty is commended for conducting field trips and field classes, an essential part of any Earth Science program, thereby enhancing student transferability into Earth Science programs and community interest in Citrus College life-long learning courses.

PREVIOUS RECOMMENDATIONS COMPLETED

1. Faculty should increase their awareness of other Community Colleges and their programs in Earth Sciences. *Earth Science faculty have increased their awareness of other Community Colleges and their programs in the Earth Sciences. This was done as part of Hathaway's Fall 2006 sabbatical leave. The "awareness" is reflected in this program review.*

RECOMMENDATIONS

1. Meet with local representatives of academic institutions and industries to ensure that the Earth Science Program is meeting academic and industry needs.
2. Develop and integrate student learning outcomes into each course outline of record (please see timeline on page 20).
3. All class syllabi should include student learning outcomes, clear grading standards, attendance and test make-up policy, drop date, office hours, homework policy, and general DSPS and FERPA statements.
4. Replacements for full-time faculty should be arranged so staff development is more feasible for Earth Science faculty. Since there are no replacements for faculty they are hesitant to attend faculty development functions.
5. Class descriptions should be reviewed and updated as needed.
6. Continue to insure that Earth Science faculty has access to post information on class websites.
7. Insure, through TeCS, that software used in lecture halls is loaded properly and functions correctly on a consistent basis.

FEASIBILITY

COMMENDATIONS

1. Facilities, supplies, and library resources are adequate at the present time and will be monitored for adequacy on an on-going basis.

PREVIOUS RECOMMENDATIONS COMPLETED

No applicable previous recommendations.

RECOMMENDATIONS

1. Consider hiring a dedicated Geology laboratory tech and stockroom assistant.
2. Consider acquiring vehicles suitable for natural sciences field trips (i.e., suitable suspensions, clearance, and driving range). Develop a pool of responsible science students as qualified drivers and compensate them appropriately. Consider other innovative options to meet transportation needs.
3. Consider installing multiple computer stations with internet and printing capabilities in geology laboratories.
4. Consider increasing the number of Physical Geology sections taught to ensure an adequate base of students from which to draw to adequately fill higher level (Historical Geology and Mineralogy) Earth Science courses.

COMPLIANCE

COMMENDATIONS

1. Full-time faculty meet minimum California State and District qualifications.

PREVIOUS RECOMMENDATIONS COMPLETED

No applicable previous recommendations.

RECOMMENDATIONS

1. Update Course Outlines of Record to reflect Student Learning Outcomes language, and develop processes to accurately track SLO assessment within specific classes.
2. Faculty instructing Earth Science courses should meet required California minimum qualifications in Earth Science. Consider whether instructors of current cross-discipline courses, or potential cross-discipline courses, with a major Earth Science component should also meet required California

minimum qualifications in Earth Science or the courses should be team-taught.

3. Ensure that any (adjunct or full-time) faculty instructing geography courses meet minimum California qualifications.

Key Program Performance Indicator	<u>2001-02</u> Year 1	<u>2002-03</u> Year 2	<u>2003-04</u> Year 3	<u>2004-05</u> Year 4	<u>2005-06</u> Year 5
<i>Program Access</i>					
Majors					
New Majors					
Courses Offered (Labs included)					
Day	3	3	2	4	5
Evening	3	3	3	1	2
Weekend					
Short Term					
Distance Education	2	2	2	1	1
Classes Offered (# of sections) (Labs included)					
Day	27	23	19	26	26
Evening	17	14	6	13	10
Weekend					
Short Term					
Distance Education	4	4	3	2	4
Registrations					
Weekly Student Contact Hours	2,673.0	2,295.8	1,944.8	2,557.2	2,367.9
Full-Time Equivalent Students	173.1	148.7	125.9	165.6	153.3
Non-Traditional/Special Populations					
Available Jobs					
<i>Program Resources</i>					
Full-Time Equivalent Faculty	4.7	4.6	4.0	4.2	4.0
Credit Reimbursement Rate	2,794.76	2,850.73	2,790.53	2,922.30	3,259.71
Revenue-FTES x Reimbursement Rate	483,773	423,904	351,327	483,933	499,714
Total District Program Budget (includes Earth Science and Physics)	651,736	533,735	524,826	570,109	609,474
Personnel (includes Earth Science and Physics)	542,854	450,922	471,297	529,437	531,218

Program Resources (continued)	<u>2001-02</u> Year 1	<u>2002-03</u> Year 2	<u>2003-04</u> Year 3	<u>2004-05</u> Year 4	<u>2005-06</u> Year 5
Grants	NA	NA	NA	NA	NA
Supplies (includes Earth Science and Physics)	8,635	2,858	9,446	12,448	11,870
Industry Contributions	NA	NA	NA	NA	NA
VTEA	NA	NA	NA	NA	NA
Program Efficiency					
Productivity – WSCH/FTEF (525=good)	568.72	499.08	486.00	608.85	591.98
Average Class Size	38.9	39.4	45.9	42.4	40.5
Fill Rate at Census	85%	83%	99%	93%	88%
FTES per FTEF	36.8	32.3	31.5	39.4	38.3
Cost per FTES	3,281.40	3,31.36	3,933.75	3,455.43	3,720.44
Cost per Major					
Program Success					
Course Retention (D or better)	81%	87%	80%	79%	80%
Course Success – Any Course (C or better)	72%	71%	63%	65%	68%
Course Success – Next Course (C or better)	NA	NA	NA	NA	NA
Course Success – Advanced Course (C or better)	NA	NA	NA	NA	NA
Major Persistence					
Degrees Awarded	NA	NA	NA	NA	NA
Certificates Awarded	NA	NA	NA	NA	NA
Skills Awards	NA	NA	NA	NA	NA
Licenses	NA	NA	NA	NA	NA
Transfers	No Data				
Performance Following Transfer	No Data				
Student Satisfaction*	NA	NA	NA	NA	NA
Employment Rate*	NA	NA	NA	NA	NA
Employment Retention*	NA	NA	NA	NA	NA
Employer Satisfaction*	NA	NA	NA	NA	NA

<i>Student Demographic Data</i>		2001-02	2002-03	2003-04	2004-05	2005-06
Gender	Female	658 53.71%	596 58.6%	505 54.7%	643 52.92%	622 35.04%
Gender	Male	567 46.29%	420 41.3%	417 45.2%	572 47.08%	514 49.30%
Age	< 17	4 0.33%	2 0.20%	0 0.00%	1 0.08%	0 7.57%
Age	17 - 19	367 29.96%	299 29.4%	266 28.8%	390 32.10%	398 4.23%
Age	20 - 24	560 45.71%	458 45.0%	480 52.0%	596 49.05%	560 2.20%
Age	25 - 29	133 10.86%	112 11.0%	65 7.05%	97 7.98%	86 1.58%
Age	30 - 39	88 7.18%	83 8.17%	59 6.40%	66 5.43%	48 0.09%
Age	40 - 49	54 4.41%	35 3.44%	29 3.15%	50 4.12%	25 37.50%
Age	50 - 59	17 1.39%	21 2.07%	19 2.06%	15 1.23%	18 36.27%
Age	60 - 69	2 0.16%	6 0.59%	4 0.43%	0 0.00%	1 4.67%
Ethnicity	Hispanic	441 36.00%	344 33.8%	353 38.2%	462 38.02%	426 11.09%
Ethnicity	Caucasian	521 42.53%	422 41.5%	368 39.9%	457 37.61%	412 2.20%
Ethnicity	Black	51 4.16%	48 4.72%	52 5.64%	63 5.19%	53 0.26%
Ethnicity	Asian	75 6.12%	89 8.76%	77 8.35%	119 9.79%	126 0.26%
Ethnicity	Filipino	35 2.86%	23 2.26%	17 1.84%	30 2.47%	25 2.11%
Ethnicity	Native American	9 0.73%	6 0.59%	10 1.08%	7 0.58%	3 5.63%
Ethnicity	Pacific Islander	11 0.90%	10 0.98%	3 0.33%	4 0.33%	3 6.95%
Ethnicity	Other Non White	26 2.12%	23 2.26%	17 1.84%	21 1.73%	24 53.52%
Ethnicity	Unknown	56 4.57%	51 5.02%	25 2.71%	52 4.28%	64 31.60%
ED Goal	AA or AS Degree	106 8.65%	92 9.06%	63 6.83%	89 7.33%	79 2.11%
ED Goal	Degree & Transfer	673 54.94%	518 50.9%	496 53.8%	633 52.10%	608 0.97%
ED Goal	Transfer No Deg	341 27.84%	303 29.8%	281 30.4%	363 29.88%	359 2.82%
ED Goal	Certificate	31 2.53%	20 1.97%	23 2.49%	37 3.05%	24 2.02%
ED Goal	Job Skills	16 1.31%	34 3.35%	19 2.06%	17 1.40%	11 35.04%
ED Goal	Personal	40 3.27%	33 3.25%	28 3.04%	42 3.46%	32 49.30%
ED Goal	Unknown	18 1.47%	16 1.57%	12 1.30%	34 2.80%	23 7.57%

*Vocational Programs Only

Earth Science Program Performance Indicators – Calculation notes

Course and Class counts do not include Labs

Course or Class before 4pm counted as Day
at or after 4pm counted as Evening

FTES taken from enrollment report (IRMS Program Review Report *)

$WSCH = FTES \times 525 / 17.5$

$FTEF = \text{Course Hours from Catalog} / 18$ (hours includes Class and Labs)

$\text{Average Class Size} = \text{Enrollment} / \text{Sections}$ (both fields taken from enrollment report)

$\text{Fill Rate} = \text{Enrollment} / \text{Max Seats}$ (both fields taken from enrollment report)

* Course count for the academic year is the sum of course count in the fall and spring.
Same is true for class count (number of sections)