# Update

## Program (GIS) – Geology AS-T.1005

**Program Catalog Summary:**
Associate in Science for Transfer:

SC Program: AS-T.1005

PROGRAM DESCRIPTION: The Associate in Science in Geology for Transfer degree provides the foundation for students interested in the study of the earth and provides breadth in both geologic processes and earth history. Field-based experiences and investigations are critical to geology and, within this degree, core courses and recommended transferable electives prepare the transfer student for university studies that expound upon such experiences. The Associate in Science in Geology for Transfer degree is designed to provide students with a common core of lower division courses required to transfer and pursue a baccalaureate (4-year) degree in geology in the CSU system.

This degree is approved through the California Community College Chancellor's Office. Upon satisfactory completion of all degree requirements and filing an application for graduation with Admissions and Records, the student's transcript will reflect completion of this degree.

PROGRAM LEARNING OUTCOMES:

Upon successful completion of the AS-T in Geology, students will be able to:

1. Describe major concepts and provide theoretical perspectives in geology utilizing appropriate vocabulary.
2. Develop and apply basic research methods as required in field and laboratory studies in geology.
3. Practice critical thinking to evaluate internal and surface Earth processes and their results.
4. Utilize geologic concepts and theory to analyze and interpret field situations supported by lab and field-collected evidence.

REQUIREMENTS:

In addition to the 37-39 unit general education pattern for CSU or IGETC, students must complete the core courses listed below for the Associate in Science in Geology for Transfer Degree. Students must also obtain a minimum grade point average of 2.0 and a C or better in each major course, or a "P" if the course is taken on a Pass/No Pass basis.

REQUIRED CORE:

CHEM 1A General Chemistry 5
CHEM 1B General Chemistry 5
ESCI 1 Physical Geology 4
ESCI 2 Historical Geology 4
MATH 3A Calculus 4
MATH 3B Calculus 5

Additional Recommended Preparation:

While these additional courses are not required for this degree, completing these courses will better prepare students for upper division coursework in geology. Some of these may be required for the Bachelor's degree. Check the catalog for the CSU campus to which you plan on transferring. BIOL 1 Principles of Biology

ESCI 3 Mineralogy and Crystal Optics
ESCI 14 Meteorology
ESCI 15 Oceanography
MATH 14 Statistics
PHYS 2AB General College Physics
PHYS 4AB Physics

ASSOCIATE IN SCIENCE IN GEOLOGY FOR TRANSFER DEGREE REQUIREMENTS:

| | |
|---|---|
| Major | 27 |
| General Education | 37-39 |
| General Electives | 0-3 |
| Degree Total Will Not Exceed | 60 Units |

## *Fall 2017*

**Improvements needed? Reference Items from program review - e.g. equipment, software, or personnel:** To understand improvements needed, one first needs to recognize the character of this degree. The AS-T in Geology is comparable to other, but not all, science AS-T degrees in that there is a core set of courses defined by the statewide TMC which DO NOT adequately prepare the transfer student for entry as a junior undergraduate at a 4 year institution within the discipline. To quote the committee regarding the AS-t Geology TMC "Due to the limits imposed by SB 1440, the Geology FDRG had to determine how to "fit" major preparation into the 60 unit limit. Ideally students need to complete an entire year of geology (C-ID Geology 101 & 111) along with an entire year of general chemistry, calculus, calculus-based physics, and possibly mineralogy (C-ID Geology 280), if it is taught at the institution, to be prepared for junior year coursework. As such, the proposed TMC is followed by coursework that would not be a component of the TMC, but that students could be recommended to complete prior to transfer." As a result, the TMC is focused on the GE patter and 2 semesters each of Geology, Chemistry and Math at the exclusion of another 2 semesters of Geology and Physics. Further, the TMC's math level begins at calculus (MATH 3A) and the beginning TMC chemistry (CHEM 1A) requires at least MATH 102. Students seldom, if ever, enter Shasta College prepared at this level. For another comparison, though Shasta College lacks the AS-T in Biology, here is the Biology FDRG comment but do note this TMC does include some Physics at the expense of Math: "It is highly recommended that counselors at community colleges discuss other possible courses that are part of major preparation at a target CSU campus and encourage students to take some of these additional courses prior to transfer".
To improve the outcomes for this degree, the following should be addressed:
-Allow for more than 360 units to transfer in the Sciences (a "super-science" degree) at the state level.
-Allow ESCI 2 Historical Geology to be offered at enrollment numbers at 10+ (this course is the second of the two-course sequence identified in the TMC and part of the AS-T Geology at Shasta College. The course has been cancelled the last 2 of the 3 offerings (Spring 2016, 2017) though the course was enrolled with majors.
-Advertise this degree to incoming students interested in the sciences, and through outreach to local High Schools since such scientists are in high demand and are projected to be through 2030 with greater than average expansion (See US Labor and Statistics Occupational Outlook Handbook: ) Further, the average national annual salary for a Geology AS degree is $54,000 while a BS averages an annual salary of $89, 000, bother very livable wages (again see
-Stop consistently funneling science interested students into the two Natural Science degrees (University Studies and General Studies AA and AS degrees). These two degree tracks can assemble any set of 18 units across a wide variety of science courses potentially without providing any significant advancement toward a specific science degree.
**Who completed this form?:** Randal Reed
**Participation in the report:** Area Faculty (list in the next box)
**Summarize Participation comments:** No outside comments were gathered.
**Recommendation for Discontinuance:** N/A This review recommends continue with qualification. See suggestions for improvement.
**Analyze Overall PLO achievement:** There were no Program Learning Outcomes achieved since there have been no AS-T Geology degrees awarded since its approval in 2012-13.

**What changes could be (or have been) made to improve the program?:** As noted above under "improvements needed", allow ESCI 2 to survive enrollment quotas when offered, advertise the degree, petition for more than 60 transferable units for science majors, place science interested students an appropriate degree paths, and, not explicitly noted above, look for ways to be math-ready earlier in their time at Shasta College.

**Resources needed to implement the changes noted above:** Give permission for majors-track second, third or fourth semester courses to survive enrollment quotas; develop advertising strategies and materials on campus and toward High Schools which would need funding; petition the Chancellor and state through our Academic Senate state representatives and the office of Instruction to allow more than 60 transferable units for science majors (this likely requires funding); address the great excess of natural Science AA/AS degrees awarded as compared to Biology, Geology, Chemistry, Physics, Natural Resources, Oceanography, Meteorology/Climatology, Earth Science Teacher and Agricultural sciences tracks.

**Labor Market Demand:** Geoscientists (includes Geology, Oceanography) employment outlook projects growth at 14% through 2030 (much higher than the average of all jobs) as described here: https://www.bls.gov/ooh/life-physical-and-social-science/geoscientists.htm. The AGI, an industry analysis group projects similarly as seen here in a comparison of the sciences: https://www.americangeosciences.org/workforce/currents/2015-median-salaries-geoscience-related-occupations. STEM occupations are projected to grow at 28% nationally and there were over 8.6 million STEM jobs nationally with California leading the way in additions logging over 160,000 between 2009-2015.

**Other data indications for program improvement:** There have been 3 cancelled Spring sections of ESCI 2 Historical Geology though the most recent cancellation was the result of staffing, the prior two were due to enrollments below the enrollment quota. ESCI 1 Physical Geology, the first semester Geology course in this major's track, has had historically high success and high retention. Other "core courses" include CHEM 1A and 1B which have comparable, though slightly lower for CHEM 1A (5 to 10 points), success and retention rates and MATH 3A and 3B which have success and retention rates 15 to 25 points lower. There are "Additional Recommended Preparation" courses which have comparable or higher success and retention rates (BIOL 1, ESCI 15, PHYS 2A, PHYS 2B, PHYS 4A, PHYS 4B) but of note is ESCI 3 which is the FDRG recommended third semester course for the Geology undergraduate Geology transfer as it has never been offered (requires/co-requires CHEM 1A) and ESCI 14 which was last offered in Fall 2013 though it is to be offered Fall 2018.

**Replicating community college programs north of Sacramento?:** College of the Siskiyous, College of the Redwoods, Butte College, Feather River College, Lake Tahoe Community College, and Lassen Community College all do have an AS-T Geology degree.

**CSU and UC Transfer impact analysis::** This degree has had no impact on transfer to UC/CSU Geology or related programs. A greater impact is recorded by the University Studies Geology AA which allows for multiple Geology courses as well as a selection of supporting courses the Geology major would need.

**Influence on related programs and services:** This degree does not appear to impact other programs and services.

**Specific additional program reflections:** While graduates with this degree would find abundant job opportunities in California and nationwide, few if any students have entered into this degree track with the needed MATH background to move through the program in 4 semesters. Further, if they did, they would not transfer adequately as a junior with the 60 unit limit into a UC/CSU Geology program and should remain at Shasta College to complete Physics, BIOL 1 and ESCI 3 though there is no degree incentive for the student to do so or for the college to offer ESCI 3.

**Other factors for consideration:** The Next Generation Science Standards- California edition (NGSS-Ca) may serve to "advertise" geology and other earth Sciences over the next decade. Primary, Middle and Secondary schools are to have implemented NGSSCa already, though few schools have, and what is key to the NGSS-Ca, is that every science class is to be systems oriented having the science of a particular grade level wrapped by Earth Science (i.e. 7th grade Life Science is about ecology and systems responses as they impact habitat; 8th grade physics considers the physics behind natural systems, essentially ecology, such as heat transfer through Earth Systems, etc.). It may be that NGSS-Ca drives future Geology enrollment as it may drive enrollment in all Earth Science disciplines.

**Related Documents:**

Currents112-2015MedianSalaries_0.pdf