A.1 Core Outcome I - Completion

Observing the number of students who declared your program as their major and took required major courses (Program Award Tool data), what insights can you share? Consider both the number of students who received awards and the number of students who have declared your program as their major.

<table>
<thead>
<tr>
<th>Category</th>
<th>2012-3</th>
<th>2013-4</th>
<th>2014-5</th>
<th>2015-6</th>
<th>2016-7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total awards by the college</td>
<td>966</td>
<td>1218</td>
<td>1320</td>
<td>1664</td>
<td>1669</td>
</tr>
<tr>
<td>Total degrees by the college</td>
<td>604</td>
<td>746</td>
<td>787</td>
<td>989</td>
<td>958</td>
</tr>
<tr>
<td>Total certificates by the college</td>
<td>362</td>
<td>472</td>
<td>533</td>
<td>675</td>
<td>711</td>
</tr>
<tr>
<td>Program awards</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td># Number of students declared program (during year)</td>
<td>16</td>
<td>18</td>
<td>29</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td># Students active in program (total)</td>
<td>44</td>
<td>45</td>
<td>64</td>
<td>58</td>
<td>67</td>
</tr>
<tr>
<td># students successful in 1+ core courses</td>
<td>18</td>
<td>18</td>
<td>21</td>
<td>19</td>
<td>14</td>
</tr>
<tr>
<td>Successful in at least 1 core course but fewer in 15 core units</td>
<td>16</td>
<td>17</td>
<td>19</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>Successful in at least 15 core units but fewer than 30</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Successful in at least 30 units but fewer than 60</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Successful in at least 60 core units*</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* Since no program has more than 60 core units, this number should be zero and is included as a data control.

According to the report, the number of geology students has increased steadily, if gradually, over the reporting period, whether measuring the number of declared majors or the number of students active in the program. In the different categories delineated in the analysis, the number of students was increased from 2012-3 to 2014-5 and has since remained stable. There are not a lot of geology courses offered (17 units including oceanography) so the number of students completing more than 15 units is low.

The number of awards is zero reflecting the degree of difficulty and time required to complete the A.S., as opposed to the recently approved AS-T degree.
Analysis of these data includes the following questions:

a. What are the core courses?
b. Are students completing the core courses but not applying for the degree?
c. What is the enrollment capacity for the core courses?
d. Do self-declared active majors include students planning to enter the allied health program?

a. What are the core courses?

Currently, the geology department offers an AS-T degree as well as an AS degree. The AS degree is being phased out through curriculum review. The requirements are quite similar except for differences in the math requirement. Note that neither degree program includes required major electives. We do know, however, that many geology majors do take advanced courses in chemistry, physics, and mathematics while at Hartnell—possibly contributing to a high average number of units to completion, which is discussed elsewhere.

b. Geology AS degree required courses (source: 2017-8 Hartnell Catalog of Courses):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEL-1</td>
<td>Physical Geology</td>
<td>4.0</td>
</tr>
<tr>
<td>GEL-2</td>
<td>Introduction to Geology</td>
<td>3.0</td>
</tr>
<tr>
<td>GEL-6</td>
<td>History of the Earth</td>
<td>4.0</td>
</tr>
<tr>
<td>GEL-25</td>
<td>Environmental Geology</td>
<td>3.0</td>
</tr>
<tr>
<td>OCN-1</td>
<td>Oceanography</td>
<td>3.0</td>
</tr>
<tr>
<td>MET-1</td>
<td>Meteorology</td>
<td>3.0</td>
</tr>
<tr>
<td>CHM-1A</td>
<td>General Chemistry</td>
<td>5.0</td>
</tr>
<tr>
<td>PHY-2A and 2B</td>
<td>College Physics, or</td>
<td>8.0</td>
</tr>
<tr>
<td>PHY-4A and 4B</td>
<td>General Physics/Mechanics;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electricity and Magnetism</td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>38.0</td>
</tr>
</tbody>
</table>

The A.S. degree was the only degree offered during the reporting period, was the only degree awarded by the Earth Science Department (and, therefore, A.S. degrees comprise all of the program awards to date). The AS-T degree was approved in 2017 and the geology and chemistry requirements are the same, physics is an optional requirement for the AS-T. The A.S. degree, however, requires meteorology and oceanography and so the A.S. requires more units (30-40) than the AS-T (26). The lesser number of units required for the AS-T may help encourage more completion.
The number of core units thus ranges from 26 to 40 units, depending on the degree. Students who have been “successful in at least 30 core units but less than 60 units” can be presumed to have substantially completed requirements for a geology degree. The number of students in that category is zero because the geology classes offered do not total 30 units. There has been one A.S. degree awarded in the past ten years indicating that most geology students that complete their degrees do so at the bachelor’s degree level. Anecdotal evidence and communication with former geology students indicates they transfer as geology majors without formally petitioning for the associate’s degree, as the lack of awarded degrees indicates.

c. If nearly 30 students declared as geology majors in 2016-7, what is our capacity in any one year to enroll them?

Typically, the breakdown of core classes and their contractual limits are as follows*:

<table>
<thead>
<tr>
<th>Course</th>
<th>Sections offered</th>
<th>Maximum number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEL-1,2,6</td>
<td>8 sections per year (total)</td>
<td>200 students</td>
</tr>
<tr>
<td>CHM-1A</td>
<td>5-6 sections</td>
<td>135-162 students</td>
</tr>
<tr>
<td>CHM-1B</td>
<td>3-4 sections</td>
<td>81-108 students</td>
</tr>
<tr>
<td>PHY-2A, 2B</td>
<td>1 sequence</td>
<td>27 students each section</td>
</tr>
<tr>
<td>PHY-4A</td>
<td>4 sections</td>
<td>108 students</td>
</tr>
<tr>
<td>PHY-4B</td>
<td>2 sections</td>
<td>54 students</td>
</tr>
<tr>
<td>MAT-3A</td>
<td>6 sections</td>
<td>234 students</td>
</tr>
</tbody>
</table>

*Lots of sections of MAT-13 (statistics) and MAT-25 (precalculus); these are not limiting factors

1 Since these are sequences, this presumes duplication of students from the first course in the sequence.

All classes are offered in both fall and spring semesters, except GEL-1 (fall only) and GEL-6 (spring only) and PHY-2A (fall only) and PHY-2B (spring only).

The science faculty have gone to great lengths to avoid conflicts in the scheduling of these classes so that students can combine them and complete their coursework in a timely manner. The classes fill consistently,
frequently with waitlists, but students can generally be accommodated when they register for these classes.

More detailed analysis might (or might not) reveal schedules that promote more timely completion and/or greater success.

d. The number of “Students Declared Program” and the “Number of Students Active in Program” seems quite high compared to the number of students who complete courses. Some considerations:

Hartnell offers two geology classes per semester. Most of the enrolled students are not geology majors but are fulfilling their general education requirement. They are not geology majors in the strict sense, but are taking prerequisite courses in the geology department, and might be considered active members of the program. They are certainly actively enrolled in geology classes and might account for the large numbers.

How do you inform potential students about your program? How do students know which courses they should take for your program and in what sequence?

Depending on their status, students might develop their education plans with a STEM/general counselor, a TRiO counselor, or an EOPS counselor. Geology faculty often advise students informally about the course sequence or proper preparation as well—certainly while students are actually enrolled in the courses.

Geology faculty have been involved with the STEM Internship program. This interaction often results in wide-ranging discussions that help students develop their transfer and career goals.

A.2 Core Outcome II - Time and Units to Completion

Observing the Time & Units data, what insights do you get from the data in general?

The benchmark for these data are 3 years and 60 units to degree completion. The five-year cumulative data at Hartnell College for transfer (4.3 years) and first-time students (4.5 years) are similar and show a median time of 4.4 years to degree completion. The number of units to complete the degree for the same five-year cumulative comparison however are dissimilar. First-time
students earn 92 units, while the transfer students graduate with 74 units. The median units to degree for all students is 88.5.

Analysis of first-time geology science students (n=15) found no numbers for comparison to those reported for the college. The students are transferring to the university without completing a geology degree.

Observing the Subject Analysis tool, and focusing on the percentage of capacity of your program, is the college offering enough sections or too many sections of the courses in your program?

The geology faculty offer the required major courses on a routine basis (GELs 1/2/6-11 units). To meet these demands, additional sections are offered in King City.

Over the course of five years, the capacity of the geology program has ranged from a low of 65.95% in 2017-8 to 103.96% in 2013-14. In the current year the regular instructor unexpectedly went on medical leave perhaps reducing enrollment. The department has been very stable in its number of section offerings, typically four or five each semester.

Classes are offered during the evening as well as daytime, and a limited number of classes (oceanography) are undergoing curriculum review to be offered online.

Our program analysis suggests that, in aggregate, we are meeting these demands. More class offerings would probably have similar enrollment meaning there is a somewhat untapped demand particularly in South County.

Does the way the courses in your degree and certificate program are scheduled enable students to take courses when they need them, plan their lives around their classes from one term to the next, and complete their program on time? If it does not, are there any obvious fixes?

If the students are college ready they can complete the program in a three year benchmark time period. 85% of the students are reportedly not ready for college-level in Math and English when they arrive at Hartnell so typically it takes some additional time to complete the prerequisites. Scheduling is not an impediment to completion of the degree.
How do you work with underprepared students? How do you share the educational resources that are available on campus with all your students? Please give examples of when these resources have worked well and when they have not.

Students come to Hartnell underprepared in basic mathematics, reading and writing, and study skills. Faculty share resources by announcing them in class, posting them on their websites and on Canvas. Examples of resources include:

1) **Supplemental Instruction (SI).** A student that successfully completed the course with an ‘A’ or ‘B’ assists the currently enrolled students using peer-lead sessions. The SI works with the students in small groups and one-on-one and has them compare notes, discuss readings and concepts, works on handouts, and gives practice quizzes. Students who attend the sessions gain a greater understanding of the course content, learn helpful strategies, earn higher grades, and are more likely to successfully complete the course.

2) **Online links to textbook resources.** The geology faculty direct students to online textbooks resources that provide study guides, flashcards, quizzes, summaries and outlines of their course textbooks.

3) **Online links to PowerPoint lectures.** The geology faculty present the lectures to students as freely available materials for study to all students.

4) **Canvas materials and communication.** Students have access to additional faculty materials via Canvas, an integrated online course learning management system. They use this for study materials, but also for communicating with each other, forming study groups, asking questions about the course content.

**A.3 Core Outcome III - Transfer**

Observing the number of transfer students from the transfer volume data, what insights do you get from the data in general?

The most obvious trend in the transfer volume data is a general increase in the number of students who successfully transferred from Hartnell into the CSU and the UC systems. During the years of the study, there was only one anomalous year of decrease in transfers from Hartnell to CSU and UC systems (2012 for CSU and 2013 for UC). But other than those single anomalous decreasing years,
there has been a steady increase in successful transfers from Hartnell into UC and CSU universities.

On the other hand, there was a decreasing trend in the number of Hartnell students who transferred into in-state private universities and out of state universities. Most studies showed a community college transfer rate of 30% to 40%. This is roughly consistent with Hartnell transfer rates for our general cohorts (the cohorts with only the criteria of stating an intention to transfer). So, in summary, it appears that our transfer rates are roughly consistent with the national average.

It takes more than two years at Hartnell to achieve an average transfer rate above 60%, mainly because students are taking remedial courses before they begin their transfer level course work.

What interactions do you have with students about transfer options? Please give examples.

The geology department does not have a formal system of discussing transfer with our students. Instructors discuss transfer options during informal conversations with individual students. Another indirect way that geology instructors help students think about transfer options is through club activities and geology seminars.

How are program learning outcomes aligned with the skills and knowledge students will need to succeed in transferring to baccalaureate degree programs?
The Geology department has the following five program learning outcomes (PLOs).

(1) Apply the scientific method to knowledge acquisition and transfer of information.

(2) Demonstrate proficiency in the areas of graphical presentation, oral communication and scientific writing.

(3) Examine the various Earth system components and their complex interaction through inquiry-based interdisciplinary curricula in the physical sciences.
(4) Use observing systems, geospatial technology, computers, information processing, and data analysis.

(5) Explain the significance of geological resources and their economic and sustainable value for long-term habitation of the planet by humans.

Together, these six PLOs represent the core skills and knowledge necessary for success in our majors geology courses, and thereby these PLOs align with our students' success in transferring to four year institutions.

**A.4 Core Outcome IV - Employment**

**Observing the Employment data, what insights do you get from the data in general?**
Employment data is not available for our program. Students have obtained employment with local agencies or firms following completion of STEM internships.

**How and when do you inform students about prospective employment opportunities?**
Jobs in geology tend to require at least a B.S. degree, so most of our students will not be eligible for these job opportunities until after they transfer and finish their B.S. However, when outside internships or similar positions are available for students, we will announce them in class and/or pass the opportunities along to MESA.

**How are program learning outcomes aligned with the skills and knowledge students will need to succeed in their future employment?**

Our program learning outcomes include some of the major concepts that geology students will need to know as they transfer to a 4-year school. In addition to those who will seek employment after attaining the B.S., many of our former students will attempt to enter graduate school following their B.S. Their future employment opportunities will be quite varied, but they will certainly require knowledge of the concepts included in our program learning outcomes.

**A.5 - Recommendations**
Reflecting on your observations and analysis from A.1 through A.4, what recommendations do you have for your program?

Geology students are electing to complete all of their mathematics, physics, and chemistry science requirements at the community college, before transferring to the university. If students continue to opt for completing all of these lower division courses at the two-year institution, they will undoubtedly also remain at Hartnell College for an extended period of time.

Since many of the geology majors arrive at Hartnell underprepared, and thus require additional prerequisite courses before enrolling in courses that articulate to the university, and since students are then deciding to remain and complete most or all of their lower-division geology requirements, the geology graduation rates and number of units are unlikely to meet the 3 year/60 unit state benchmark.

The new AS-T degree should be publicized and promoted to encourage students to complete the degree. A class on climate change should be developed.

B - Questions About Previous Activities

Evaluate the success of each completed activity in Section D.1 (Previously Scheduled Activities) from your Spring 2017 PPA. What measurable outcomes were achieved? Did the activities and subsequent dialog lead to significant change in student learning or program success?

Activity- adopt new environmental science TMC

There have been discussions following the promulgation of the new AS-T environmental science degree and there is continued interest from Biology.

Activity: revise oceanography

Update: OCN-1 has been revised and sent to Curriculum as both a traditional and online course.

Activity: update meteorology course
Since the new AS-T for geology does not require a meteorology course it may not be necessary to revise this course due to lack of instructors.