

Program Review, Analysis, and Planning

Department Name: Physical Sciences

Data Analysis

Based on data provided by ORPIE:

1. Are your department's average FTES/FTEF and average enrollment per section lower, higher, or similar to college-wide average FTES/FTEF and average enrollment per section? Why? (150 words limit)
 - a. Astronomy: The average FTES/FTEF per section is higher than the college-wide average and the average enrollment per section is similar to the college-wide average. Lecture sections capped at 80 compensate for lab sections capped at 25. Additionally, not all students enroll the lab, so the lecture enrollment is greater than that of the labs, which increases both the average FTES/FTEF and average enrollment per section.
 - b. Chemistry: The average FTES/FTEF per section is similar to the college-wide average and the average enrollment per section is lower than the college-wide average. Most of the lecture sections are capped at 50 or 75, and all of the lab sections are capped at 25. All chemistry students must enroll a lab section. These enrollment caps coupled with high fill rates, lead to the average FTES/FTEF per section being similar to the college-wide average and the average enrollment per section being lower than the college-wide average.
 - c. Geology: The average FTES/FTEF per section is similar to the college-wide average and the average enrollment per section is lower than the college-wide average. Five of the seven geology sections offered are capped above 37, the college-wide average enrollment per section, so the lower than college-wide average enrollment is partly due to a few of the sections having suboptimal fill-rates. Despite some of the sections having suboptimal fill-rates, the large-class-factor section and the very high fill-rates of the remaining sections lead to the average FTES/FTEF per section being similar to the college-wide average.
 - d. Physical Science: The average FTES/FTEF per section is similar to the college-wide average and the average enrollment is lower than the college-wide average. The one lecture and one lab section are capped at 32, which is what lowers the average enrollment per section, but the high fill-rate for these two sections keeps the average FTES/FTEF per section similar to the college-wide average.
 - e. Physics: The average FTES/FTEF per section is similar to the college-wide average and the average enrollment is lower than the college-wide average. All of the lab sections are capped at 32, which lowers the average enrollment per section. The large-class-factor section and the very high fill-rates of some of the sections lead to the average FTES/FTEF per section being similar to the college-wide average.
2. What factors have contributed to your trends in enrollment? If your department is experiencing an enrollment decline, what is your department's plan to address the enrollment decline? (150 words limit)

- a. Astronomy: Enrollment is declining. One factor that might be partially responsible for the declining enrollment is the lack of a full-time faculty member to oversee the program. We will try to increase enrollment by offering both online lecture and lab sections beginning fall of 2019.
 - b. Chemistry: Enrollment is increasing. Since the Great Recession we have steadily offered more sections. This, coupled with a strong demand for chemistry courses, has led to the increase in enrollment.
 - c. Geology: Enrollment is increasing. Over the last few years we have steadily offered more sections. This, coupled with a strong demand for geology courses, has led to the increase in enrollment.
 - d. Physical Science: Enrollment has not changed. Enrollment has not changed because the same two sections have been offered for several years and both have consistently had fill-rates near 100%. Course waitlists suggest that there is insufficient demand for more sections.
 - e. Physics: Enrollment is declining. In part, this decline is due to competition from local community colleges, which, like Golden West, have increased course offerings since the Great Recession. Additionally, the declining enrollment is likely due to physics having a reputation for being difficult, a reputation earned by the faculty adhering to a standard of excellence, an approach our department supports. However, the insufficient math preparation of many physics students coupled with a standard of excellence leads to lower than average success rates, which furthers physics' reputation as a difficult subject. In an effort to increase student success and so begin to change physics' reputation, instructors will seek to add an embedded tutor to their classes, assuming a qualified individual can be identified. We are also optimistic that the move to the new building in fall 2019 will increase enrollment due to the improved classroom facilities. We will consider the possibility of increasing our physics offerings, perhaps offering PHYS G280 every semester instead of every other semester, and possibly offering it during the summer.
 - f. The department will partner with GWC's outreach specialist to increase awareness of and interest in the programs offered by our department. The department will regularly survey its students to better learn how we can meet their needs.
3. Looking at the demographic of your student population, what strategies has your department considered or implemented to be more inclusive of the distinct student populations you serve? (250 words limit)
- a. Astronomy: Faculty are encouraged to revise their course syllabi to include equity principles in an effort to be more inclusive of the student populations served.
 - b. Chemistry: Faculty underwent the equity review process offered by the Equity Squad, which led to the revision of many course syllabi to include equity principles. Faculty began a department mentorship program to ensure that new and part-time faculty became aware of equity principles that they could implement in their courses to be more inclusive of the student populations served. Faculty encouraged and supported student participation in Project RAISE.
 - c. Geology: Faculty included equity principles in their course syllabi in an effort to be more inclusive of the student populations they serve.

- d. Physical Science: Faculty began using a flipped classroom pedagogy and more in-class work to increase student engagement with the course material, which should heighten the inclusion of the student populations served.
 - e. Physics: Faculty included equity principles in their course syllabi in an effort to be more inclusive of the student populations they serve. Faculty encouraged and supported student participation in Project RAISE.
 - f. We will regularly survey our students to better learn how we can meet their needs.
4. How does your program course success rate compare to GWC's overall course success rate? If your course success rates are in decline or below the college average, what is your department plan to address the success rate? (250 words limit)
- a. Astronomy: The program's course success rate is greater than GWC's overall course success rate, but it is declining. Faculty will increase the consistency between different sections of the same course. Different lecture sections of the same course will begin using the same text and different lab sections of the same course will begin performing the same experiments. This consistency should lead to improved instruction and an increase in course success rates.
 - b. Chemistry: The program's course success rate is less than GWC's overall course success rate. Several things will be done to address the lower than average success rates: The requirement of Preparation for General Chemistry (CHEM G130) as a prerequisite for General Chemistry A (CHEM G180) will become effective fall 2019, which should improve the preparation of General Chemistry A students and, consequently, their course success rates. The revision of the Preparation for General Chemistry labs to better prepare students for General Chemistry A will continue. Faculty will increase the use of embedded tutors. Faculty will use Chemistry Instructional Assistant (CHEM G205) students to provide additional classroom support. Faculty will revise their courses to include more exams per term, which should lower stakes of each evaluation and improve student performance.
 - c. Geology: The program's course success rate is greater than GWC's overall course success rate.
 - d. Physical Science: The program's course success rate is less than GWC's overall course success rate. Faculty will continue the implementation of a flipped classroom pedagogy and more in-class work to increase student engagement with the course material and so increase success rates.
 - e. Physics: The program's course success rate is less than GWC's overall course success rate. In an effort to increase the lower than average course success rates, instructors will seek to add embedded tutor support to their classes.
 - f. We will regularly survey our students to better learn how we can meet their needs.
5. Looking at success rates for different demographic groups, which groups are experiencing disproportionate impact in student success? If there are student groups experiencing disproportionate impact, what is your department's plan to address the disproportionate impact? (250 words limit)
- a. Astronomy: The following groups were disproportionately impacted in student success: Black or African American, Hispanic/Latinx, Nat. Hawaiian/Pac. Islander, Two or more; Men; Economically disadvantaged, Foster Youth.

- b. Chemistry: The following groups were disproportionately impacted in student success: Am. Indian/Alaska Native, Black or African American, Hispanic/Latinx, White, Two or more; Men; Economically disadvantaged, DSPS, Veteran, Foster Youth. The Preparation for General Chemistry course will review expected math skills throughout the beginning portion of the term in an effort to better serve these disproportionately impacted groups.
 - c. Geology: The following groups were disproportionately impacted in student success: Am. Indian/Alaska Native, Nat. Hawaiian/Pac. Islander, Two or more; Men; DSPS, Foster Youth, International.
 - d. Physical Science: The following groups were disproportionately impacted in student success: Asian, Hispanic/Latinx; Men; Foster Youth, CalWorks.
 - e. Physics: The following groups were disproportionately impacted in student success: Black or African American, Hispanic/Latinx, Nat. Hawaiian/Pac. Islander, White, Two or more; Men; Foster Youth.
 - f. The department will do the following in an effort to better these disproportionately impacted groups: Increase our use of embedded tutors to develop course content skills, build study skills, and provide encouragement and support. Examine the possibility of creating a special embedded tutoring program for Hispanic/Latinx students (the group with the largest number of disproportionately impacted students) in an effort to develop a sense of community and belonging among these students, as well as develop course content skills, build study skills, and provide encouragement and support. Regularly survey our students to better learn how we can meet their needs.
6. Does your department confer a degree or certificate? What is your department's plan to increase the number of students receiving degrees or certificates? (150 words limit)
- a. Astronomy: No.
 - b. Chemistry: Yes, an AA degree. We will investigate the possibility of offering a certificate that recognizes completion of certain pre-medical school courses, such as completion of the four-semester chemistry sequence offered by the department (CHEM G180, G185, G220, and G225). Many of our students are returning students that already have a BA or BS degree and whose goal is to complete their pre-medical school requirements.
 - c. Geology: Yes, both an AA and an ADT degree. The faculty will personally notify those students who are close to obtaining an AA or ADT of steps they need to take in order to obtain their degree and will help them apply for the degree.
 - d. Physical Science: No.
 - e. Physics: Yes, both an AA and an ADT degree.
 - f. The following apply to all of the department programs that confer a degree: We will review our schedule of course offerings to verify that they allow students to obtain a degree in the minimal amount of time. If our schedule of courses does not currently allow this, we will change our schedule of course so that it does. We will look to start a speaker series involving professional scientists talking about their work in an effort to increase interest in obtaining a degree in one of our department's programs. A special effort will be made to include professionals whose race, ethnicity, or special population status matches that of the groups we serve who are experiencing a disproportionate impact. We will regularly survey our students to better learn how we can meet their needs.

7. Are students transferring to four-year institutions from your program? What is your department's plan to increase the number of students transferring to a four-year institution? (150 words limit)
- Astronomy: NA.
 - Chemistry: Yes.
 - Geology: Yes.
 - Physical Science: NA.
 - Physics: Yes.
 - The following apply to all of the department programs that confer a degree: We will review our schedule of course offerings to verify that they allow students to obtain a degree in the minimal amount of time. If our schedule of courses does not currently allow this, we will change our schedule of course so that it does. We will determine whether there are any classes we could offer that students seeking to transfer or obtain TAG are missing. We will regularly survey our students to better learn how we can meet their needs.
8. Did you complete the two-year program review requirement for CTE? If no, why not? (150 words limit)
- Not applicable.
9. Did your department complete all course SLOs assessment? If no, why not? (150 words limit)
- Astronomy: Yes.
 - Chemistry: Not during 2015-2016, but yes since then. Despite having been assessed and entered in TracDat, the Preparation for General Chemistry (CHEM G130) SLO assessments were deleted.
 - Geology: No.
 - Physical Science: Yes.
 - Physics: Yes since 2017-2018. Prior to 2017-2018 the part-time instructors teaching some of the physics sections were unaware of the need to assess an SLO in each section every term.
10. Did your department review all Course Outlines of Record in the last 6 years? If no, why not?
- Astronomy: Yes.
 - Chemistry: Yes.
 - Geology: Yes.
 - Physical Science: No for PHSC G100. Since there is no full-time faculty member responsible for PHSC G100, it has been overlooked.
 - Physics: Yes for PHYS G185, G280, and G285. No for PHYS G110, G111, G120, and G125. Faculty have made no significant changes in their teaching of some course over the last six years and so thought a review of the course outlines of record was unnecessary.

Review of Last Cycle Program Review

Provide assessment of your previous program review initiatives. Summarize any accomplishments that your program achieved (List 3 to 5 bullet points). Limit to 250 words.

- The major goal of the previous program review was to prepare for our move to the new math-science building. We will move into the new math-science building this summer. We are largely ready for this move and consider this goal to have been essentially achieved.
- Our goal of using the additional lab space afforded by the new math-science building to increase our course offerings has been achieved. The fall 2019 schedule for our department will include several additional sections.
- The development and implementation of a prerequisite for General Chemistry A (CHEM G180) that involves completion of Preparation for General Chemistry (CHEM G130) or a high enough score on a chemistry placement exam is almost complete. This new prerequisite will be effective fall 2019.
- A summer science camp for older elementary and middle school students was developed and implemented. The summer science camp will next be offered during the summer of 2020. (Due to our move to the new math-science building there will be no summer science camp during the summer of 2019.)
- Several of the lab courses offered by the department have been improved by the purchase and inclusion of new equipment, such as telescopes and cloud chambers.
- Our goal of obtaining a dedicated budget to fund our laboratory classes has not been achieved.

PROGRAM PLANNING/BRAIN STORMING

Based on your analysis of previous program review and current data, list 3-5 goals that your department wants to accomplish in the next three years?

1. Obtain a dedicated budget to fund our laboratory classes.
2. Review our schedule of courses to verify that they allow students to obtain a degree in the minimal amount of time.
3. Pursue the creation of a special embedded tutoring offering for Hispanic/Latinx students in an effort to develop a sense of community and belonging among

these disproportionately impacted students and so decrease their achievement gap.

4. Develop and implement one or more surveys to better determine the needs of our students.
5. Improve our outreach activities.
 - a. Partner with GWC's outreach specialist to increase awareness of and interest in the programs offered by our department.
 - i. Develop sets of science demonstrations for various age groups. Science demonstrations would then be performed for visiting student groups on our campus. These demonstrations would accompany the explanation of what our programs involve and the opportunities they offer students.
 - b. Look to start a speaker series involving professional scientists talking about their work in an effort to increase interest in obtaining a degree in one of our department's programs.
 - c. Look to purchase a seismograph and place it in a prominent location in the new math-science building. This visual centerpiece should create interest in the geology program.

Program Planning

Description of Department's Goal?	What metric will you use to measure your goal?	What actions will the department take?	Which of the College's mission and goal does this goal support?		List necessary support and/or resources if applicable.
<p>Goal 1: Obtain a dedicated budget to fund our laboratory classes.</p>	<p>Obtaining a dedicated budget to fund our laboratory classes would indicate success.</p>	<p>Make the college aware of our need for a dedicated budget to fund our laboratory classes. Explain the precarious nature of our current funding, which leads to unnecessary worry, poor use of human resources, and risks providing insufficient materials for the support of our laboratory classes.</p>	<input checked="" type="checkbox"/> Transfer <input checked="" type="checkbox"/> Degrees <input type="checkbox"/> Certificates <input type="checkbox"/> Career advancement <input type="checkbox"/> College readiness	<input checked="" type="checkbox"/> Student Success <input type="checkbox"/> Equitable Achievement <input type="checkbox"/> Learning Environment <input type="checkbox"/> Communication <input type="checkbox"/> Engagement <input checked="" type="checkbox"/> Resource Optimization	<p>We request an annual budget of \$36,000 (\$31,000 from the Lottery Fund and \$5,000 from the General Fund) to fund our laboratory courses.</p>
<p>Goal 2: Review our schedule of courses to verify that they allow students to obtain the degrees offered by our department in the minimal amount of time.</p>	<p>We will determine whether our schedule of courses allows students to complete the degrees offered by our department in two years.</p>	<p>If our schedule of courses does not allow students to complete the degrees offered by our department in two years, we will change our schedule of course so that it does.</p>	<input checked="" type="checkbox"/> Transfer <input checked="" type="checkbox"/> Degrees <input type="checkbox"/> Certificates <input type="checkbox"/> Career advancement <input type="checkbox"/> College readiness	<input checked="" type="checkbox"/> Student Success <input type="checkbox"/> Equitable Achievement <input type="checkbox"/> Learning Environment <input type="checkbox"/> Communication <input type="checkbox"/> Engagement <input type="checkbox"/> Resource Optimization	<p>NA</p>
<p>Goal 3: Pursue the creation of a special embedded tutoring offering for Hispanic/Latinx students in an effort to develop a sense of community and belonging among these disproportionately impacted students and so decrease their achievement gap.</p>	<p>Creating an embedded tutoring offering dedicated to Hispanic/Latinx students would be a first measure of success. A second measure of success would be a resulting decrease in the number of Hispanic/Latinx students who are disproportionately impacted.</p>	<p>Ask the Office of Student Equity and Achievement Program if financial support for an embedded tutoring offering dedicated to Hispanic/Latinx students is available. Ask the coordinator of the embedded tutoring program if an embedded tutoring offering dedicated to</p>	<input checked="" type="checkbox"/> Transfer <input checked="" type="checkbox"/> Degrees <input type="checkbox"/> Certificates <input type="checkbox"/> Career advancement <input type="checkbox"/> College readiness	<input checked="" type="checkbox"/> Student Success <input checked="" type="checkbox"/> Equitable Achievement <input checked="" type="checkbox"/> Learning Environment <input type="checkbox"/> Communication <input type="checkbox"/> Engagement <input type="checkbox"/> Resource Optimization	<p>Financial support for an embedded tutoring offering dedicated to Hispanic/Latinx students.</p>

		Hispanic/Latinx students is possible. Find Hispanic/Latinx students to serve as embedded tutors.			
Goal 4: Develop and implement one or more surveys to better determine the needs of our students.	Learning something useful from the surveys.	Identify a department member to oversee development of the survey. Develop survey questions. Finalize survey for initial use at the beginning of the fall 2019 term.	<input checked="" type="checkbox"/> Transfer <input checked="" type="checkbox"/> Degrees <input type="checkbox"/> Certificates <input type="checkbox"/> Career advancement <input type="checkbox"/> College readiness	<input checked="" type="checkbox"/> Student Success <input checked="" type="checkbox"/> Equitable Achievement <input checked="" type="checkbox"/> Learning Environment <input checked="" type="checkbox"/> Communication <input type="checkbox"/> Engagement <input type="checkbox"/> Resource Optimization	NA
Goal 5: Improve our outreach activities.	The number of current and potential students who attend one of our outreach events.	Develop sets of science demonstrations for various age groups. Work with the College outreach specialist to organize on-campus outreach events. Identify professional scientists, ideally individuals whose race, ethnicity, or special population status matches that of the groups we serve who are experiencing a disproportionate impact, willing to talk about their work. Determine the cost of a seismograph and the best location for it in the new math-science building.	<input checked="" type="checkbox"/> Transfer <input checked="" type="checkbox"/> Degrees <input type="checkbox"/> Certificates <input type="checkbox"/> Career advancement <input type="checkbox"/> College readiness	<input type="checkbox"/> Student Success <input checked="" type="checkbox"/> Equitable Achievement <input type="checkbox"/> Learning Environment <input checked="" type="checkbox"/> Communication <input type="checkbox"/> Engagement <input type="checkbox"/> Resource Optimization	<ul style="list-style-type: none"> • Funding for the chemicals and equipment necessary for the science demonstrations. • Release time for faculty to develop the science demonstrations. • Access to the STEM Center for both the science demonstrations and the speaker series. • A STEM Center director to help coordinate outreach activities in the STEM Center. • Funding for a seismograph. • A dedicated

					location in the new math-science building for the seismograph.
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