Cañada College

COMPREHENSIVE PROGRAM REVIEW REPORT

Astronomy & Physics

Program Context

1. Mission

Share how your program contributes to the College or fits into the College's Mission. For example, what other academic programs and student/academic services does your program engage with? Examples of student/academic services include the Learning Center, Library, STEM Center, SparkPoint, Dream Center, etc. Another example, how does your program fit into any of the College's plans (such as Equity, Technology, Strategic Enrollment, etc.)? If your program has a mission statement, you may include it here.

The Physics & Astronomy Department endeavors to prepare students for successful transfer to four-year institutions, to provide the prerequisite foundation in physical sciences for further work in engineering and the sciences, as well as radiologist technologists, to foster critical thinking and active learning, and to fulfill the needs and interests of students by having a well-rounded curriculum of lecture and laboratories. Physics&Astronomy also promotes student-centered, equitable learning through engaging, accessible, culturally sensitive, modern tools and services of education.

2. Articulation

Are there changes in curriculum or degree requirements at high schools or 4-year institutions that may impact your program? If so, describe the changes and your efforts to accommodate them. If no changes have occurred, please write "no known changes."

No known changes.

3. Community & Labor Needs

Are there changes in community needs, employment needs, technology, licensing, or accreditation that may affect your program? If so, describe these changes and your efforts to accommodate them. If no changes have occurred, please write "no known changes". CTE programs: identify the dates of your most recent advisory group meeting and describe your advisory group's recommendations for your program.

No known changes.

Looking Back

4. Curricular changes

List any significant changes that have occurred over the prior years in your program's curricular offerings, scheduling, or mode of delivery. For decisions made by your department, explain the rationale for these changes. If applicable, how have state policy changes affected your curricular offerings?

All physics and astronomy courses were adapted to be fully online capable as of fall 2020. Starting with Fall 2023 semester the courses were changed to be one of three types: Online-Asynchronous, online-synchronous or in-person. No hybrid courses continued to be offered. Since our last review, the California Legislature implemented AB 1705. Due to reliance of our courses on math preparation, we will monitor the effects of this implementation, and adapt as necessary.

5A. Progress Report - IPC Feedback

Provide your responses to all recommendations received in your last program review cycle.

On both the Physics and the Astronomy side our prior program review, our last feedback asked us to provide further description and summary of progress.

We have successfully completed our goal of acquiring the PASCO physics equipment. Updates to the astronomy equipment are still in progress.

With respect to curriculum content, the two principal problems we face with regard to the online mode of content delivery are 1) labs and 2) exams.

Program Review

For the online-students, we find that most students have responded quite well to the new learning environment. Although the classroom community is missing as is the hands-on lab activity, the students do seem to focus better on individually learning the material.

In the online environment we endeavor to provide the students with direction and resources to help them become independent active learners and take responsibility for their education. Does every student rise to this? Probably not. There are probably some students who just do enough to get by. However, anecdotal evidence suggest that there are a significant number of students who would not succeed in the traditional lecture/exam modality for a variety of reasons (cultural, economic, or medical to name a few) that are taking the initiative to learn the material in the online modality. Thus the on-line modality is helping to empower some of the traditionally disadvantaged students. This, to us, is the motivation to develop and improve the on-line educational environment.

5B. Progress Report - Prior Program Goals

Provide a summary of the progress you have made on the program goals identified in your last program review.

Our goal of increasing our recruitment/retention of women is now in its recovery phase (see analysis 8A below). Some of the dip in physics were due to general enrollment trends due to the pandemic, outside of our control. We have also been hindered by the Learning Center's unilateral decision to terminate the Physics Jam support program, which used to provide tutor/peer role model training in this goal.

We have completed our goal of acquiring and testing the functionality of the PASCO physics equipment.

Updates to the astronomy equipment are still in progress.

6A. Impact of Resource Applications

Describe the impact to date of previously requested new resources (assignment, equipment, facilities, research, funding) including both resource requests that were approved and not approved. What impact have these resources had on your program and measures of student success? What have you been unable to accomplish due to resource requests that were not approved?

There were prolonged administrative delays acquiring the PASCO equipment. While the equipment has now been tested for functionality, the laboratory exercises could not yet be rewritten in time to implement, and hence assess the effectiveness of the equipment update.

Nevertheless the update needed to happen, as the previous equipment is no longer supported by PASCO.

6B. Impact of Staffing Changes

Describe the impact on your program of any changes within the last program review cycle in staffing levels (for example, the addition, loss or reassignment of faculty/staff). If no changes have occurred please write "not applicable."

As of 2024 Astronomy started training, and making extensive use of a student assistant for observatory operations and maintenance.

Unfortunately, her position was temporary, through a grant, so her funding remained uncertain. As of this writing, we are still waiting for her to be reinstated.

In the Spring semester of 2024 the observatory saw use on 8 separate nights. Most of the use is for the ASTR 101 lab class, but also allowing for Skyline faculty to train on observatory use, and hence host their students as well. There are nights for the Astronomy Club as well. The observatory also hosts the semesterly Star Party (hosted by the Astronomy Club) which brings in large numbers of attendees from the Canada Community and their guests (80+ as of Spring 2024).

As of the Fall semester, we've also lent our services to the campus Cultural Center.

As of this report, we are up to its 6th night of observations for the semester, with at least three more to go, including the Star Party.

With the increased use of the observatory, and its proposed collaboration with Skyline College, we are proposing this assistant position to be permanently supported.

Current State of the Program

7A. Enrollment Trends

Use the data provided by PRIE to examine your enrollments by department or courses. Describe trends in headcount, FTES, and load. If applicable, describe any other enrollment data that is relevant to your program.

Headcount has steadily increased from 168 to 288 between 2019-2020 and 2023-2024, primarily lead by online sections of physics, with increases in white, hispanic, and Asian students.
One interesting group is the 'under 18'. Although small, our 'under 18' population grew from an average of 15.6 before 2022-23 to 33 in 2022-23. An increase of 112%. This increase occured in three of our courses: PHYS 210, 220, and 260. All three of these courses were offered in an online asynchronous fromat. A possible explaination is that more traditional high school students are takeing these courses because they can do so without interfering with their traditional high school schedule.

Physics load has steadily increased from 398 in 2019-20 to 535 in 2023-24.
Astronomy load has recoverd from a COVID low of 364 in 2021-22 to 439 in 2023-24.

7B. Significant Changes in Your Program

Have there been any significant changes in enrollment trends or course offerings? For example, has there been a significant increase or drop in FTES or Load? If applicable, consider trends in class cancellation rates and how it might have affected your course offerings. If needed, consider how the pattern of course offerings (times/days/duration/delivery mode/number of sections) affected your enrollment?

Although small, our 'under 18' population grew from an average of 15.6 before 2022-23 to 33 in 2022-23. An increase of 112%. This increase occured in three of our courses: PHYS 210, 220, and 260. All three of these courses were offered in an online asynchronous fromat. The conclusion is the more traditional high school students are takeing these courses because they can do so without interfering with their traditional high school schedule.

7C. Planning for Your Program

What changes could be implemented, including changes to course scheduling (times/days/duration/delivery mode/number of sections), curriculum, marketing, and articulation of pathways that might improve these trends? If applicable, include plans for faculty recruitment and faculty training. NOTE: If other sources of data are used, please upload these documents or provide URLs.

The trends have been positive so there is no need to make improvements. A more relevant question is, what needs to be done to sustain the trends? One possibility is, recurit faculty interested in futher developing the online education options.

8A. Access & Completion

Describe the student completion and success rate in your courses and/or program using the data provided by PRIE. Look at your course offerings, in the last program review cycle was it possible for a student to complete your certificates or degrees while only completing courses at Cañada College? How can the college help you improve student completion and success? What changes could be made?

The average success rate in PHYS 210 is about 76%. In PHYS 250 it is about 51%. In the remaining courses it is almost 90%. This is consistent with both 210 and 250 being the entry level courses (algebra and calculus levels. This is similar to what is observed in the MATH sequences.) There has not been a significant change in these sucess rates over the past five years.

Females are under-represented in the calculus based physics courses. 20% female, 76% male 4% other. This has been roughly constant for at least the last 20 years and is most likely due to factors outside of the physics curriculum. There was noticeable dip in some classes during a few of the COVID semesters, but as of the Fall of 2024, the gender ratio seems to have recovered.
Females are over-represented in the algebra based physics courses. 57% female, 40% male 3% other. This has been roughly constant for at least the last 20 years and is most likely due to factors outside of the physics curriculumn.
The female-to-male enrollment ratio in astronomy courses is roughly equal, as is the success rate.

Program Review

8B. Student Equity

One of the goals of the College's Student Equity plan is to close the performance gaps for disproportionately impacted students. Use the data provided by PRIE that indicates which groups are experiencing a disproportionate impact in your program. Which gaps are most important for improving outcomes in your program? How can the college help you address these gaps? What changes could be made?

In terms of success by ethnicity, hispanic students do not do as well as non hispanic students in the entry course PHYS 250, In the secondary courses PHYS 260, 270 the disparity is not significant.
The success gap in PHYS 250 needs some form of remeadation. Since our last review, the California Legislature implemented AB 1705. Due to reliance of our courses on math preparation, we will monitor the effects of this implementation, and adapt as necessary.
In Astronomy courses there is a notable equity deficiency for hispanic and multi-race students.
By observing, or listening to the learning habits of the successful groups, we can deduce that success rates are increased with students in closely cooperating peer groups, as well as using tutors and other student support services. We plan to more actively push hispanic students, and other groups with below average success rate, towards these services. Instead of just relying on these students seeking out services we announce, we plan to work with these services to specifically reach out to these students.
Success rates by gender are relatively equal between male, female, and 'not reported' in all but one course. That course is PHYS 260, where females are less successful than males, 77% compared to 90% respectively. However, the number of students involved is small and, apparently, this is within the margin of error.

8C. Completion – Success Online

The college has a goal of improving success in online courses. Using the data provided by PRIE, what significant gaps do you see in success between online/hybrid and non-online courses? What changes could be made to reduce these gaps? If your program does not offer online/hybrid courses, please write "not applicable".

The success rates for the asynchronous online courses are 76% for PHYS 210 and 92% for the other courses PHYS 220, 260, 270 and 405. Overlall, the online success rates are consistant with the in-person success rates.

In Astronomy there is noticeably higher rate of success for online students (74%) than other modalities, whereas for ASTR 101 face-to-face students have the highest success rate (74%), above the online (64%) success rate.

9A. SLO Assessment - Compliance

Are all active courses being systematically assessed over a three-year cycle? Refer to the Program's /Department's Three-Year Assessment Plan and describe how the plan is completed across sections and over time.

All SLO's are systematically being evaluated annualy and are up to date.

9B. SLO Assessment - Impact

Summarize the dialogue that has resulted from these course SLO assessments. What specific strategies have you implemented, or plan to implement, based upon the results of your SLO assessment?

The SLO results show no long-term significant changes. Observations on assessment format are being monitored, but our focus is much more on retention as a predictor of success.

10 PLO Assessment

Describe your program's Program Learning Outcomes assessment plan using your Program/Department's Three Year Assessment Plan Summarize the major findings of your PLO assessments. What are some improvements that have been, or can be, implemented as a result of PLO assessment?

The Program Learning Outcomes (PLO's) have been evaluated and the results are satisfactory. However, we found that the PLO's were a bit broad and need some refinement to be useful.

Looking Ahead

11. Planning for the future is an important part of Program Review. This is your opportunity to identify new directions for growth and improve your program. Based on your analysis of the data and your responses to the questions above, identify specific and measurable goals and action plans for achieving those goals. Consider

Program Review

goals such as, but not limited to: updating curriculum, closing equity gaps, responding to student and community needs, etc. Please enter your response in the textbox below

Short term (by next review cycle):

Goal 1: Continue to grow and adapt the accessibility of the delivery of our courses to students of all backgrounds, by advancing our technological resources, both in equipment and pedagogical delivery, to equitably prepare our students for their advancement in their majors, and transfer to universities.

Goal 2: Re-develop our connection with student support services on campus, including those at the Library, the Learning Center, Counseling, Student Life, and others, in order to lay the foundations for increased success, and retention rates.

Goal 3: increase success rate in entry level courses (PHYS 210 and 250).

Long term (ongoing):

Goal 4: Strategically refocus on the recruitment and retention of women in physics, astronomy, and the related fields of engineering, computer science, or others where they are severely underrepresented, by working with other departments (e.g. Mathematics), and student services, that affect these trends.

Next Step: If your program is requesting resources, please go to "STEP 2: Resource Request (OPTIONAL)" and submit your specific requests there. Otherwise, this is the last prompt in the comprehensive program review form.

Supporting Information

Non-Personnel Item (2024 - 2025)

Requested Year
2024 - 2025

Program Requesting Resources
Astronomy

Item Requested
Meade 8" telescope, https://www.meade.com/meade-8-f-10-lx200-acf-telescope-with-field-tripod.pdp

Item Description
An electronic, easy-to-use telescope capable of viewing both naked eye, and relatively easy deep-sky objects.

Program Goals this Request Supports
Goal 1: Continue to grow and adapt the accessibility of the delivery of our courses to students of all backgrounds, by advancing our technological resources, both in equipment and pedagogical delivery, to equitably prepare our students for their advancement in their majors, and transfer to universities.

Status
Continued Request - Active

Type of Resource
Instructional Expenses (under $5,000) e.g., lab supplies, Student Athletic supplies, calculators, etc.

Cost
4,500

One-Time or Recurring Cost?
One-time Cost

Critical Question: How does this resource request support closing the equity gap?
We are replacing old equipment with up-to-date ones. This request has already been approved in 2018, yet not been fully delivered since. We requested the replacement of 3 old telescopes, only 1 of which has been delivered. We are requesting the replacement of at least one more.

Critical Question: How does this resource request support Latinx and AANAPISI students?
Astronomy at our campus suffers from the same equity gap on success as other programs. We are trying to catch up to the offerings that CSM's Astronomy department delivers, but does not share. The increased use of our observatory for ASTR 101 laboratory classes (see our program review report) warrants continued update of outdated equipment for use by all.

Map Request to College Goals and Strategic Initiatives

Which of Cañada College's Goals does this resource request support?
Student Access and/or Success and/or Completion
Equity-Minded and Antiracist College Culture
Community Connections
Accessible Infrastructure and Innovation

Which of Cañada College's Strategic Initiatives does this resource request support?
Ensure students (particularly part-time students) experience a sense of belonging and connection to the College that helps them persist and complete
Support innovative teaching that creates more equitable and antiracist learning environments
Create and sustain an inclusive and/or antiracist and/or equity-minded campus culture
Strengthen the college culture of continuous assessment and improvement in order to ensure all programs effectively serve students and close equity gaps
Better share what Cañada offers

Resource Requests

Be the best college choice for local high school students
Provide adequate access to technology

Non-Personnel Item (2024 - 2025)

Non-Personnel Item (2024 - 2025)

Requested Year
2024 - 2025

Program Requesting Resources
Astronomy

Item Requested
Telescope camera for astrophotography

Item Description
ZWO ASI294 Pro Series, or equivalent, https://www.zwoastro.com/product/asi294/

Program Goals this Request Supports
Goal 1: Continue to grow and adapt the accessibility of the delivery of our courses to students of all backgrounds, by advancing our technological resources, both in equipment and pedagogical delivery, to equitably prepare our students for their advancement in their majors, and transfer to universities.

Status
Continued Request - Active

Type of Resource
Instructional Expenses (under $5,000) e.g., lab supplies, Student Athletic supplies, calculators, etc.

Cost
1,000

One-Time or Recurring Cost?
One-time Cost

Critical Question: How does this resource request support closing the equity gap?
This is a request previously put in, but didn't get a response. Our observatory is seeing increased use (see program review report), and we are trying to catch up to the same capabilities, and hence equity chances as CSM offers.

Critical Question: How does this resource request support Latinx and AANAPISI students?
Latinx and AANAPISI students are frequently the ones with busy schedules, often taking the astronomy classes online, and may need to rely on remote observations. Astrophotography may be the best alternate option, if they can't personally access our observatory for direct use of our telescopes.

Map Request to College Goals and Strategic Initiatives

Which of Cañada College's Goals does this resource request support?
Student Access and/or Success and/or Completion
Equity-Minded and Antiracist College Culture
Accessible Infrastructure and Innovation

Which of Cañada College's Strategic Initiatives does this resource request support?
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Support innovative teaching that creates more equitable and antiracist learning environments
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Better share what Cañada offers

Resource Requests

Be the best college choice for local high school students
Provide adequate access to technology

Personnel - Classified Staff (2024 - 2025)

Requested Year
2024 - 2025

Hiring Division/Department:
Science&Tech./Astronomy

Position Title:
Part-time laboratory technician (Observatory assistant)

Status
New Request – Active

Is this position permanent?
Yes

Position Type
Part-time

If Part-Time, what percentage of Full-Time is this position?
48

Provide # of months.
10

Program Goals this Request Supports
(Item #11 in program review): Goal 1: Continue to grow and adapt the accessibility of the delivery of our courses to students of all backgrounds, by advancing our technological resources, both in equipment and pedagogical delivery, to equitably prepare our students for their advancement in their majors, and transfer to universities.

Critical Question: How does this resource request support closing the equity gap?
See goal 1 above.

Critical Question: How does this resource request support Latinx and AANAPISI students?
See goal 1 above.

Justification

1. Describe the specific needs for the position requested and the duties of this position in a brief statement.
The observatory needs specialized, and regular maintenance of its telescopes, and related equipment.

2. Explain how this position aligns with and supports the mission and strategic goals of the college.
The observatory is a tool for equity, providing accessible science education for all students at their level, with up-to-date equipment.

3. Explain how adding this position will strengthen the department or division.
Currently only one person is fully qualified on our telescopes at our entire college. That person is a full-time faculty with already full schedule between academics, and administrative obligations. This creates a dangerous bottleneck in operations and maintenance. The position of a student assistant who helped out last year (23-24) has expired, and since then maintenance has lapsed.
We understand that other departments (e.g. CHEM, ENGR) are also in need of similar additional assistance. It is possible to combine the Astronomy position request with those departments.

4. Explain how this work will be accomplished if the position is not filled.
Operations would return to the full-time faculty's responsibility, that may see gaps, and maintenance will lag, to the point where more expensive replacement may be necessary.

Resource Requests

5. Critical Question: How does this resource request support closing the equity gap?

Our observatory is seeing increased use (see program review report), and we are trying to catch up to the same capabilities, and hence equity chances as CSM offers, who employ staff for the maintenance of their observatory.

6. Critical Question: How does this resource request support Latinx and AANAPISI students?

Our Latinx and AANAPISI students need the equity gap closed, and should be afforded the same opportunities of class/lab experience choice at Canada College as CSM offers. They should not need to commute to other colleges for the same laboratory experience we could easily offer here.

Map Request to College Goals and Strategic Initiatives.

Which of Cañada College's Goals does this resource request support?

Student Access and/or Success and/or Completion
Equity-Minded and Antiracist College Culture
Community Connections
Accessible Infrastructure and Innovation

Which of Cañada College's Strategic Initiatives does this resource request support?

Connect students to the academic program(s) and classes they need
Create and sustain an inclusive and/or antiracist and/or equity-minded campus culture
Better share what Cañada offers
Be the best college choice for local high school students
Help meet the basic needs of Cañada students and other community members

This position has been reviewed by the department or division and is recommended for hiring.

Dean/Director/Hiring Supervisor Name

Ameer Thompson

Date

11/01/2024