

Student Services Program Review Report Sierra College, 2019-2020

Department/Program Name: Astronomy Department, Sierra College

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Ideally, the writing of a Program Review Report should be a collaborative process of full-time and part time faculty as well as all other staff and stakeholders invested in the present and future success of the program at all sites throughout the district. The Program Review Committee needs as much information as possible to evaluate the past and current performance, assessment, and planning of your program.

1) Relevancy: This section assesses the program's significance to students, the college, and the community.

1a) To provide context for the information that follows, describe the basic functions of your area and/or program.

The Astronomy Department's Mission is to provide a challenging and exciting educationally effective opportunity for non-science majors to complete the science lecture and laboratory requirements for graduation/transfer.

This is accomplished specifically in the field of Astronomy, but includes elements of Physics, Chemistry, Earth Science, Biology and Mathematics.

1b) How does your program support the District Mission, Vision Statement, and Core Values, quoted below? Please include an analysis of how your program supports ISLOs (Institutional Student Learning Outcomes): Communication, Technology and Information Competency, Critical and Creative Thinking, and Citizenship?

Sierra College Mission

The mission of Sierra College is to provide an inclusive and safe educational environment where learners are supported while challenging themselves and achieving their goals.

Sierra College Vision Statement

Sierra College will be the preferred destination for higher education and training in our region while eliminating achievement gaps among our students.

Sierra College Core Values

The following core values will establish our ethical principles and will guide our institutional decision-making. Sierra College will:

1. Empower students in their education.
2. Strive toward student success and continuous improvement.
3. Be an inclusive and equitable community.
4. Be responsive to the education and workforce needs of our local community and businesses.
5. Demonstrate collaboration with all stakeholders in decision making.
6. Manage all resources in a manner that is sustainable and responsible.
7. Support and model excellence and innovation in teaching, learning, scholarship, and creativity.

The mission of the Astronomy Department is to provide the highest quality information and education, specifically in astronomy, and in general encompassing modern scientific methods and practices for students of Sierra College and the community.

This is accomplished through effective curriculum development and public outreach programs presented in a multimedia lecture format and multi format learning environments. This is complemented with a hands/eyes-on laboratory/observational experience.

Focusing on an open and accepting positive student and community experience as our highest priority, the Astronomy Department strives to maintain professional development and external partnerships, while utilizing the assets, resources, and faculty in the most effective, efficient and qualitative process possible.

1c) Please analyze your program's effectiveness in supporting the strategic goals with which your program aligns. Please provide evidence in support of this analysis, including service or student learning outcomes, equity data, or other measurements of success.

Goal 1: Achieve equitable access and increase student success, retention and persistence in order to increase the number of students who complete certificates and degrees or transfer to four year colleges and universities while maintaining high levels of academic integrity.

The Department does not offer an Astronomy degree. Rather, the courses apply toward the "Natural Science" degree as well as meeting the science lecture and laboratory unit requirements for GE graduation and/or CS/UC transfer.

The Department PAR has a goal of offering an AA in Astronomy degree in the future. With our current suite of classes, we are now well positioned to proceed in this goal.

Goal 2: Identify and close success and equity gaps amongst underserved and/or underrepresented student populations.

The Astronomy Department course offerings provide a very broad exposure to science and the scientific method. The subject covers nearly all areas of science such as physics, chemistry, earth science, biology and math. This provides a very diverse group of science topics for students to explore and for which they may become interested in.

Goal 3: Provide professional growth and develop a climate of inclusion in order to support highly effective and innovative teaching and learning, support services, operations, and collaboration.

Astronomy may be a student's first college level science course and therefore it is an ideal course to take for a general overview of science. This is also a factor in the success and retention measures.

Goal 4: Meet and exceed external standards through an outcomes-based framework for continuous quality improvement.

Astronomy courses provide students with an opportunity to meet the science requirement for GE graduation and CS/UC transfer. The Astronomy Department currently is part of the STEM guided pathways but does have a degree program. We support the fulfillment of the GE science requirement both in our lecture and lab courses.

Goal 5: Modernize, revitalize and develop new facilities and infrastructure based on the current Facilities and Technology Master Plans.

With the new Science Building scheduled to be constructed in a few years, the Astronomy department will have access to a new, modern planetarium. We also strive to maintain and replace equipment that is either worn from use or out-of-date from technological standpoint.

Goal 6: Expand community partnerships and funding opportunities to support strategic goals and leverage resources.

The subject matter itself, along with our outreach programs both at NCC and the Planetarium shows, provide personal development / enrichment as well as lifelong learning opportunity for re-entering students and the community.

1d) Optional Additional Data: Describe any other relevant contributions of your program to the district mission, goals, outcomes, and values not incorporated in the answers above. These may include but are not limited to contributions to diversity, campus climate, cultural enrichment, community ties, partnerships, and service. Please include specific data and examples when these are available and relevant to the analysis.

We have provided public outreach via planetarium shows to local schools and to the public for the last decade. In the last 4 years we have served about 1000 people per semester. Planetarium shows tend to be done on Fridays by reservation with schools throughout the area, although we also conduct shows during other special events that dovetail into larger Sierra College events, such as Dinosaur Day and other Sierra College Natural History Museum events. The shows are typically done in 3 parts: (1) A PowerPoint presentation about planets or stars/galaxies; (2) a demonstration of how astronomers analyze light; (3) a viewing of the planetarium – often to show tonight's sky. We often coordinate with the

Natural History Museum director and have schools do a combination planetarium/museum tours. Other planetarium shows are done with private groups such as cub scouts, local clubs, churches, and families.

Through Astronomy Department faculty, the planetarium (and related museum exhibits) is a cooperating member of the Jet Propulsion Laboratory (JPL) Museum Alliance, which gives the department connections with space exploration developments and unique JPL educational resources.

The Astronomy Club hosts public viewing nights several times a semester at on off-campus site for dozens of students and the general public per semester. These provide an opportunity for Astronomy students and others to enjoy view the night sky, or the day sky for events such as solar eclipses or planetary transits across the Sun. The Astronomy Club has also traveled to various schools and clubs to provide a night of observing. The club also provides assistance during Dinosaur Day at Sierra College when thousands of people come to college, including 300 who come to the planetarium.

Our faculty regularly gives presentations to local organizations, such as the Lincoln Hills Astronomy Group, the Auburn Rotary Club, and others.

Furthermore, our faculty has developed relationships and prominence with news outlets, and is regularly interviewed during astronomically significant events such as transits, eclipses and meteoric impacts.

2) Currency

2a) Service Outcomes and Student Learning Outcomes Assessment: Considering any relevant information, please describe and analyze your program's development and assessment of Service Assessment Outcomes and/or Student Learning Outcomes, including any relevant information regarding diversity and equity goals. Please describe any improvements or changes made to the program as a result of this analysis.

Outcomes and outcome data: The Astronomy Department reviews the SLO data each semester before classes start and discuss changes to the curriculum to help improve student learning.

Assessment of outcomes: We have made some minor adjustments to the questions asked in the pre and post-tests to better reflect what is taught in the classroom.

In the space below, please describe or attach any cycle you have developed for outcomes assessment.

Program Student Learning Outcomes Overview

- Each semester, we conduct pre-tests and post-tests in 100% of our classes, to monitor student comprehension and the effectiveness of our teaching modalities.

- Use the WEIGHTED AVERAGE of the CSLO pre vs. post test score for all Astronomy Department courses as the input data.
- The CSLO data will be rolled up into PSLO categories.
- These PSLOs will be examined to determine which topics within the Program need improvement. Then, the corresponding CSLO in each course is identified.
- The lectures/labs/homework etc. which are most closely related to the identified CSLO will be corrected/modified/improved by the Astronomy Department Faculty.
- As improvements are identified and implemented, the changes will be documented.
- Scores should show improvement in topic understanding as an INCREASE in the pre vs. post test score in future semesters.
- The OVERALL GOAL is to show improvement in ALL courses.

Criteria for selecting Course Student Learning Outcomes

- Test for knowledge of the topics covered during the course
- Select specific Course Student Learning Outcomes
- Easily measurable
- Common to other section
- Important topic in the course
- Use questions from previous quizzes and the midterm
- Conduct a Pre-Test in week one or two and a Post-Test before the Final in week 15

Review Cycle each semester

- The Astronomy Department will collect CSLOs for Astronomy 2, 5, 7, 11, 14 and 25 (that is, 100% of all sections, in all courses taught).
- The Astronomy Department will provide an overall set of Program PSLOs as well.
- The Astronomy Department course currency is 100% as of the Spring of 2018.
- The Astronomy Department has a complete and robust PSLO / CSLO program. We have been collecting, analyzing and taking corrective action on all of the courses in our program since 2008. By continually monitoring our student's levels of comprehension with tests during each semester, we take an adaptive approach to our teaching modalities, always ensuring the most effective delivery of course content.

2b) Professional Development: Describe how departmental activities serve to improve student service and student outcomes. Include flex activities, departmental meetings and activities, conferences, outreach to other colleges, research and implementation of best practices, changes in legislation, mandates from regulatory agencies, required faculty certifications, health and safety trainings or other factors. How do these activities contribute to your program's self-assessment and planning?

The Department continues to enhance the Quality and Currency (therefore student interest) of the courses by adding newer information and deleting dated material.

Sources for the Staff of this more recent information include literature review, Conference and Symposium attendance and maintaining close contact with a number of leading edge Astronomy focused organizations (UC Berkeley, SAS, IOTA, AAVSO, AAS etc.), JPL Museum Alliance, as well as our Corporate relationships.

Also, the Department meets at the beginning of each semester in a scheduled flex activity to review all aspects of the District, Division and Department details.

The typical Agenda involves District financials, budge, fill rate guidelines, program and student services updates, e-PAR review and input, PSLO/CSLO review and plan, course outline updates, future semester schedule updates, equipment status, observatory status, planetarium status, loads, tech staffing, trip schedules etc.

Updates from our community partners at various local astronomy clubs and community outreach activity are covered as well.

Please describe your staff development needs based on this analysis:

We still need a full time IA. Our current IA is half-time and cannot fulfill our needs for lab prep and improvements of equipment at the NCC campus and Blue Canyon. Our IA cannot finish several projects which are only partially finished because of the demands and limits of their time.

A modernization of the podium in the Planetarium to match what we have in our lab rooms would give better methods to teach our students witch more media at our disposal.

2c) Optional Additional Data: Provide any other information, not included above, that contributes to your program's success in supporting student service and student outcomes.

The Planetarium shows (as described in 1d) educate people (children and adults alike) not only in the familiarity and navigation of the night sky but also in current astronomical events. These shows provide schools with a supplement to their Astronomy unit and many schools have made it annual field trip.

Our public viewing nights provides students who are taking lecture courses in our department, other science departments, and others from the general public to look through a telescope and see the sky away from the city lights.

3) **Effectiveness:** This section assesses the effectiveness of the program in light of traditional measurements.

3a) Retention and Success/Service Outcomes: Please analyze your success in achieving your program goals using data that is relevant to your program, including service outcomes and/or student learning outcomes. Describe any changes you have made that have improved the effectiveness of the program as well as any barriers you may have encountered in making these or other changes. If you determine that you need to improve the program's performance in any way, please describe how you plan to achieve this goal.

Address separately the data for on ground and on-line services, as well as usage at the various centers when applicable

- Overall the success and retention rates have remained the same with a slight increase from Fall 2017 to Fall 2019 (72 to 75% and 87 to 90%, respectively).
- However, the overall numbers of students at census has dropped from 601 to 464 from Fall 2016 to Fall 2019. Some of the recent reduction of students has come from our offering fewer sections of online classes (the total number of online students dropped from 168 to 87 from Fall 2016 to Fall 2019) and on-ground classes (435 to 374 during the same time frame).

As relevant, please address your program's role in the development of Interest Areas and Guided pathways and the impact of these developments on program planning and assessment.

- The Astronomy Department currently is part of the STEM guided pathways but does not have a degree program. We support the fulfillment of the GE science requirement both in our lecture and lab courses.

3b) Usage Trends - Identify and analyze the usage trends relevant to your program for the last three years. Analyze these trends as well as any challenges experienced by the program in terms of providing timely and effective student service. If you determine that you need to improve the program's performance in any way, please describe how you plan to achieve this goal.

- Since the retirement of our colleague in 2017, we have decided to eliminate the online Astronomy lab course since we feel they do not provide the same experience as the hands-on we have here on campus. Because of dwindling attendance, we have offered 2 fewer sections of our night lecture classes and 2 fewer sections of our day lecture classes. This seems to be campus wide trend. We have noticed that in Spring 2020 that the numbers have risen which may encourage us to reopen previously canceled sections.

Address separately the data for on ground and on-line services, as well as usage at the various centers when applicable.

- Our on ground lecture classes have lost about 50 students since 3 years ago, and we currently have one less section of the online lecture class than 3 years ago, partially because one qualified instructor retired. However, in the case of the online lecture courses, we intend to add 1 or 2 more sections in the following year as we have found another qualified professor to teach these classes.

As relevant, please address any impact of the development of Interest Areas and Guided pathways on program planning and assessment.

- The Astronomy Department currently is part of the STEM guided pathways but does have a degree program. We support the fulfillment of the GE science requirement both in our lecture and lab courses.

3c) Equity: Analyze and evaluate your program's performance in promoting and/or achieving equity. Based on this analysis, describe any plans you have to sustain or improve the program's contribution to student equity as a central component of student success.

- In the last 3 years, the Astronomy Department has tried to find less expensive ways of getting class material, including publishing labs and handbooks locally, promoting the use of e-books over physical texts, and providing our own material instead of using an outside textbook.
- Low income students are a little less successful in our classes than our average by only a few percent in the last 3 years.
- From our efforts we have seen that over the last 3 years the success rate of the Af. Am./Black had increased from 30% in Fall 2017 to 69 % in Fall 2019
- We need to continue to work with students to provide them with materials that they can use in class if they cannot buy from the bookstore.

3d) Optional information: Please describe and evaluate any additional relevant information supporting the evaluation of your program.

3e) Analysis and Planning: Referring to the analysis in 3a-3d, your departmental planning document, and relevant information from section 2 above, please describe your program's plans to maintain or increase its effectiveness and analyze and evaluate your efforts to achieve these goals.

- At our next pre-semester department meeting, we shall make everyone aware of the continuing need of making sure that student have access to more materials at no or reduced cost.

4) Resources: This category assesses the adequacy of current resources available to the program and describes and justifies the resources required to achieve planning goals by relating program needs to the assessments above.

4a) Please describe the future direction and goals of your program for the next three years in terms of sustaining or improving program effectiveness, relevance, and currency. Please include any analysis of relevant performance assessments in your explanation and of any impacts on program planning and development related to Interest Areas, Guided Pathways, student equity, and student success.

- The Astronomy Department has had a plan in place to build toward an Astronomy Program since 2001 (see PAR archives). The elements still remaining for an AA are the addition of a full-time classified staff member, a few more lecture courses and possibly a lab.
- The completion of our Program development process is limited only by Staff availability for course development and **not** having a full-time classified IA and technician.
- See our Department ePAR for further details.

4b) Please describe and justify any projected requests for additional staff, new or augmented technology/equipment, and additional or remodeled facilities necessary to support these goals. Please incorporate any relevant data related to service outcomes/student learning outcomes, student success, and equity.

- **Equipment/Technology:** Within the Astronomy Department PAR is the detail for our PAR requests. Most of these requests are to update and expand and improve the current equipment set. See the Astronomy Department PAR requests for more details.
- From a long-term stand point, a new/larger planetarium and projection system and an additional dedicated Laboratory/3rd-hour room is our long term vision. This should be obtained with the completion of the new Science Building.
- **Facilities:** Because of our recent increase of enrollment, our growth plan has been to start adding classes to the Planetarium, including 8am sections for the courses these will require adding 3rd hour sections as well. We have successfully completed ALL these steps.
- **Staff:** The Astronomy Department's Faculty meet the current Department needs as of Fall 2019. However, one full-time faculty member at the end of Spring 2017, and is unlikely to be replaced. As a consequence, our program is likely to have to adapt significantly to a 33% reduction in full-time staff. Furthermore, the student help and classified support is entirely inadequate.
- The current level of classified staff is 1/2 of an IA. This is a slightly higher staffing level that the Department had in the mid 1980's. Since then, the Department has grown over **four times** in Staff, course offerings, enrollment and across **two** campuses, as well as in distance learning.

Course diversity has increased **five times** and the equipment and resource base (which needs to be maintained) has grown by a factor of **ten!**

- The Astronomy Department’s request for a full time IA and a part time technician (classified positions) *has been a #1 priority in the Division for the last decade*. We now have a ½ time classified position, but far more is required. We do not have a part time observatory technician at NCC, so our IA is stretched thin to fulfill his basic duties to the students. This lack of full time technical support places the department equipment and resources at risk as well as our community outreach by not filling these important supporting positions.
- This has negatively affected ALL areas of the Department, efficiency, enrollment, success, retention and completing the Astronomy Department Program development. The most concerning is that students are under-supervised in setting up equipment. This had led to damage and breakage and could result in a **safety issue** as well.

4c) Please check the appropriate boxes in the chart below indicating the general reasons for the resource requests described above (please check all that apply):

Function/Role	Maintenance	Development	Growth	Safety	Outcomes	Other success measures	No Requests
X	X	X	X	X	X		

5) Summary/Closing

5a) Based on the analysis above, briefly summarize the program’s strengths, weaknesses, opportunities/future directions, and challenges.

- The Astronomy Department’s *strength* resides in the fact that we have a very “Team Oriented Department” with a common and well understood Mission statement. We provide a very consistent, current, innovative, exciting and stimulating learning environment for the undergraduate who chooses to study science, and in particular, Astronomy. *Future* plans include additional courses and the offering of an AA Degree in Astronomy. Our popularity with students is high, and thus the department is growing in enrollment.
- An additional *strength* we have is a significant Community Outreach Program which is utilized by many organizations during the academic year. This Program provides a revenue stream for not only the District and Department, but the Foundation as well.
- In the past, the Department has demonstrated very high performance measures but have rebounded recently. Student requests for course additions have driven changes which have resulted in a slight reduction of those measures, however, as stated above, we have been showing improvement. The performance measures appear to have reached a state of slight increase, and are consistent with the other Departments within the Division. However

continuous improvement by focusing on the PSLO/CSLO data and analysis has been one of our most successful efforts.

- We currently have a very robust and complete PSLO / CSLO program which maps course topics to student learning. Each semester, we have been able to identify topics which need improvement, and will continue this process into the *future*.
- From a Staffing standpoint, the faculty needs (both full and part-time) can meet the enrollment numbers at this time. However, in terms of serving our students, there is a serious inadequacy when it comes to classified support which is without a doubt, the Department's greatest *weakness*. This has not changed from our previous Program Review in 2016.

5b) How has this report integrated the views and perspectives of stakeholders in the program?

- Please see 2b above. The Astronomy Department as a whole reviews our performance and develops improvement plans as a team. All members of the Department attend.
- Input for the PAR and Program Review are solicited at our semester kickoff meetings, integrated and then distributed to all members for review and critique.