Instructional Program Review 2018/19 (Comprehensive)

Physical Sciences

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General Information (Instructional Program Review 2018/19 (Comprehensive))



2018/19 Instructional Program Review

Program Review Data and Resources

Submission Information (REQUIRED)

Lead Writer: Irena Stojimirovic

Liaison: Jonathan McLeod

Department Chair: Donald Barrie

Manager/Service Area Supervisor: Dean Susan Topham

√ Faculty/staff (REQUIRED)

- Number of T/TT Faculty for Astronomy 0 for Physical Sciences 0. In the Fall of 2018 ten sections of ASTR classes were shared between 1 TT and 4 adjunct faculty. Astronomy does have a full time faculty (me) but most of my load is in physics, and thus I am counted as part of the physics faculty. In the Fall of 2018 physical sciences discipline had 5 adjunct faculty and zero TT.
- Number of Adjunct Faculty for Astronomy 4 for Physical Sciences 2.
- Number of sections taught by T/TT Faculty for Astronomy 38--25% for Physical Sciences 33%.
- Percent of FTEF taught by T/TT Faculty for Astronomy 41-23% for Physical Sciences 10%.
- Number of Pro-Rata Faculty for Astronomy 0 for Physical Sciences 0.

Program Mission (REQUIRED)

The primary mission of the Physical Sciences program area (including all of its courses in the disciplines of Astronomy and Physical Science) is equivalent to that of the Physical Sciences Department: to provide curriculum designed to prepare students for transfer to higher-level institutions and lead students to a basic understanding of concepts and principles that will help them make informed decisions regarding issues they will face as responsible citizens.

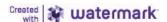
Program Overview (REQUIRED)

Form: 2018/19 Comprehensive Program Review Instructional Program Overview Section (See appendix)

Curriculum (REQUIRED)

Form: 2018/19 Comprehensive Program Review Instructional Curriculum Section (See appendix)

Outcomes and Assessment (REQUIRED)



Form: "2018/19 Comprehensive Program Review Instructional Program Overview Section"

Created with: Taskstream

Participating Area: Physical Sciences

(REQUIRED) Program name

Physical Sciences

(REQUIRED) Program strengths

Discuss strengths of the program.

Physical sciences program includes the disciplines of astronomy and physical sciences. Therefore I will discuss successes of each of these disciplines separately and I will focus on the challenges for the program overall and each discipline.

Successes of the Astronomy Discipline

The greatest success of the discipline was that we were approved to hire a new faculty per our last year's program review. The job add should go out in a month and we are looking forward to hiring a new person that should focus to the Observatory and its integration into lab curriculum. Also we will work together to develop resources students can use to boost their success rates.

We are still waiting for the new course ASTR 101 "Explorations of The Solar System" to be approved for teaching. This course will expand our program's general education offerings for transfer and will serve as a second semester astronomy course. Enrollment in astronomy discipline shows slowdown, with roughly 10% lower enrollment this academic year compared to previous (903 students this academic year vs. 1030 students last year). With ASTR 102 we hope to further boost enrollment in our discipline, as many students are seeking second semester astronomy class.

Astronomy program continuous to do well in providing research opportunities for our students (Astronomy Research Seminar) and reaching out to the community via education outreach events (star parties, Astronomy Nights, STEM Lecture Series Events).

Astronomy Night is organized once per semester and we initiated this in the Spring of 2017. Astronomy Nights are education outreach events aimed at SDCCD community. During Astronomy Night visitors are invited to our observatory and we also set up telescopes on the grounds of Mesa college where visitors can take a peak at the stars and planets. Astronomy Night starts with a lecture about current events in the sky. For each of our Astronomy Nights we had more than hundred visitors and this semester we hosted 250 visitors. At this point we are reaching the caacity of how many people we can handle on the roof in few hours.

Starting with December 2015 I launched monthly Star Parties at the Mesa's rooftop observatory. Star Parties are events open to all astronomy, geology, physical sciences students. At some nights we had up to 70 students that came and looked through telescopes at beautiful celestial sites (planets, Moon, nebulae, stellar clusters). The goal of star parties is to provide more inclusive hands on experience for all students currently enrolled in physical science courses (Mesa's Strategic Direction 1). These activities advance the delivery of our courses by using technology to advance student's learning (Mesa's Strategic Direction 5) and build a sense of community that nurtures learning by providing opportunities for faculty and students to interact outside of the formal classroom setting (Mesa's Strategic Direction 2). Astronomy Nights similarly build and sustain a sense of community across campus. Visitors have great time and for many this is the first time to peak through the telescope (Mesa's Strategic Direction 4). The interdisciplinary nature of astronomy sparks many discussions during these events such as the geology of the features on the Moon, gravity, the physics of light and

matter interaction, spectra. Events like these provide an opportunity to promote interest in science, technology, computer science, engineering.

As the only physical sciences and astronomy contract faculty I am the co-organizer of STEM Lecture Series events where I plan the events and invite regularly speaker that can give engaging talks about current topics in astronomy. Presence of these experts on our campus provides for a great professional development opportunities for faculty and excellent opportunities for our students to interact with these top notch scientists. I personally try to recruit at least one female astronomer to give a talk every semester. Women represent an important minority group in STEM-related fields. Female speakers serve as an important role models to our female STEM student population.

In the Spring of 2017 I have piloted Astronomy Research Seminar (ARS) that trains community college students to produce work of scientific significance. Placing greater emphasis on faculty/student research partnerships is an effective way to improve the quality of undergraduate education (e.g., Gregerman et al.,1998; Castillo and Estudillo, 2015, Lopatto 2010). Such partnerships led to deeper student engagement, improved student retention and success, and both personal and professional benefits. Students who have participated in undergraduate research report growth in self- confidence, independence of thought, and a sense of accomplishment (Lopato 2006). Research shows that we learn my doing, and the idea of ARS is to encourage learning science by doing science. Here are some of the accomplishments of the ARS program:

The astronomical research that I did with students was presented at the international astronomical meeting in Hawaii during summer of 2018. Many students that participated in the seminar were further selected to spend a week at NASA headquarter and one of the students Naylyn Tanon also landed summer internship at Caltech. Therefore the major impact this research has on our students is motivate them to pursue other opportunities beyond Mesa and certainly stay on the STEM track. I provided great detail about this research in the last year's review and I will not repeat that here.

I continue to work with Classroom Tutor program and with the tutoring center to recruit good tutors that can further help our students succeed in astronomy courses. Three years ago there was no astronomy tutor available. Today we have an astronomy tutor and classroom tutor. For the next semester I am working on providing a classroom tutors for our adjuncts, myself and more astronomy tutoring hours in the tutoring center. I promote these resources to our students daily and work with Mark Manasse to find the optimum hours for astronomy tutors.

In the last three years with the support of BARC we have upgraded our rooftop observatory telescopes to be computer controlled and this lead to re-introduction of the ASTR 109 (Practice in Observing) course. We have also acquired additional equipment to enhance instructional delivery in this astronomy laboratory courses. This course is always was fully enrolled, fills first and is becoming very popular within student population. This semester we are offering two sections of ASTR 109. Our upgraded observatory ensured more effective learning environment in the astronomy laboratory, by making observational experience more inclusive (increased number of telescopes and cameras) and mainstream (computer controlled telescopes) for our students. Spending more time working on the telescope keeps students engaged in learning activities and our CLO assessment in this course demonstrated 100% of students achieving assigned task.

Successes of physical sciences discipline

We have just finished interviewing the faculty candidates for this position and will be having new TT faculty joining our department in January. This will be the first faculty in this discipline and we are looking forward to the changes this will bring. The new physical science courses that've been developed in the last three years: PHYN 105: Physical Science for Elementary Education (actively being taught) and PHYN 114: Weather and Climate (CIC-approved, waiting for state approval)

The major course in physical sciences discipline that we teach is the PHYN 100: Survey of Physical Science and laboratory course PHYN 101. The lecture and lab courses are separate courses often taught by separate instructors and not taken in combination. The labs sometimes compliment content from the course and sometimes supplement. The lecture course PHYN 100 is an introductory survey of the fundamental concepts of astronomy, geology, chemistry and physics. In this multi-disciplinary course emphasis is placed on the scientific thought and process and the ways in which the physical sciences affect modern life.

We expanded the course offerings for physical sciences starting with the Spring of 2018. A special course has been designed for students interested in pursuing certification as an elementary school teacher, PHYN 105. This course is incorporated in teacher education program/pathway here at Mesa and it was developed in cooperation with faculty from San Diego State University. The course has been revived recently in response to renewed interest from the teacher education department. The course is team-taught by members of the Physics and Chemistry faculty such that students will get expertise from both departments. Team members have consulted with SDSU faculty and the course is intended to mimic the content of a similar course at the university so that Mesa students interested in teacher education can transfer seamlessly into the program at SDSU. In addition, SDSU Faculty works closely with faculty at California State University San Marcos where similar curriculum is used. All courses (SDSU, CSUSM, and Mesa) have been updated to use the Next Generation Science Standards (NGSS) as a focus of the course. NGSS has been adopted by the State of California as the standards for K-12 science education. The standards employ an emphasis on Disciplinary Core ideas, Science and Engineering Practices and Cross-cutting concepts. The Disciplinary Core Ideas are similar to the content-based objectives of past standards, except that the standards utilize performance-based objectives meaning that they declare what a student should be able to do, rather than what they should know. The Science and Engineering practices make evidence- based thinking a priority and are combined into the performance objectives. Finally, Cross-Cutting concepts are ideas that are used across the science curriculum and are designed to tie together different disciplines.

Another promising program development includes a new course offering, Physical Science 114, Weather and Climate. Developed through collaborative efforts by Mesa, Miramar, and City faculty, this course will expand our program's general education offerings for transfer and will serve as an introduction to atmospheric science for students interested in this exciting field. This course is currently in the process of being reviewed and approved in Curricunet. According to the U.S. Bureau of Labor Statistics, the career outlook for atmospheric scientists is expected to grow 12 percent by 2026; the 2016 median pay in this field exceeds \$92,000/year, making this an attractive employment sector for STEM students. Another reason this new course represents an important addition to the program's list of courses is that our students will now be able to learn about the scientific principles that govern climate change, both in the past and also in the present.

(REQUIRED) Program challenges

Discuss challenges to the program.

The major challenge in our program is the lack of contract faculty. The whole program has a single astronomy faculty, responsible for all administrative tasks, teaching, outreach events, research opportunities and vision for growth. Physical sciences course are all taught by adjuncts for the last four years. Per our last program review we were approved to hire one astronomy and one physical sciences faculty. We have finished interviews for the physical sciences position and will be interviewing for the astronomy position. Once these faculty are in place we hope to be able to report on positive shifts in the department, outreach activities and student success.

Low student success rates in ASTR lecture courses. All of our courses are physics based, and most of our students (non-science majors) had no physics exposure in their K-12 education and lack basic math skills (confirmed by our CLO assessments). As always the situation is more dramatic for minority

students, K–12 schools largely attended by minority students have higher proportions of incompetent instructors and have limited course offerings.

In Astronomy much work remains to be done to improve low student success rates and we need more support from college in terms of additional contract faculty. Across our program retention rates are good and go between 82% and 92%. However the success rates are not good in Astronomy and they remain below 71% which is Mesa College average. For example using dashboard we can see that in the Fall of 2017 and Spring of 2018 the success rates are 67% and 63% respectively and that our five year average success rate is around 67%. Latinx students are right on our overall average in the Spring 2018 and slightly below in the Fall 2018. We have small number of African-Americans students and their success rates vary between 44% in the Spring of 2018 and 69% in the Fall of 2017.

Our laboratory courses are driving the success rates up (above 90%) while the distance education is driving the success rates down (below 50% success rates). On campus lecture course ASTR 101 has success rates around 60% in the last five years based on the PR provided data. Again, our student population is mostly non-science majors and they need a lot of support to succeed in college level classes and to transfer prepared. In the past we had two contract faculty in place. For a while there was no contract faculty in the whole physical sciences program and then I was hired three years ago for astronomy discipline.

(REQUIRED) External influences

Discuss external influences (Collegewide and beyond).

External influences include a strong economy, promising employment trends for teachers, and an increase in online course offerings at Miramar College. With regard to the economy, it's long been recognized that among many programs (ours included) a strong economy correlates with declining enrollment. During the spring 2018 semester, enrollment as of census was 399 students and in the Fall 2017 it was 411. Between these two semsters the trend is constant, but this Fall we only see 334 students, which is nearly 20% less compared to the last Fall.

Although it's difficult to know what drove the fall 2018 enrollment decline in our program, two possibilities include a strong economy and an increase in online astronomy course offerings at Miramar College. In a strong economy, more people tend to seek gainful employment rather than pursue an education. In addition, Miramar College has been expanding its astronomy offerings lately, particularly its online offerings. Although very small fraction of students suceed in online classes, among students there may be a perception that they're easier than on-campus courses, the result being that with more online course offerings available, more students can be served. Our program typically offers one or two online astronomy sections each semester; however, program faculty feel that our student population is much better served in on-campus setting and that onlone instruction is only suited for minority of our students who are mature and self-motivated learners.

A more promising external influence affecting our program is that the teaching profession is showing signs of growth again. Discussions with teacher education faculty at Mesa College and SDSU indicate that more students are seeking to become teachers. This is a promising trend for our program because we offer course PHYN 105 specifically geared toward elementary, middle-school, and high school teachers.

(REQUIRED) Areas of Focus

Describe one or more areas that your department is focusing on. You will refer to this response in the Program Analysis Section.

We focus on education outreach events aimed at creating sense of community across Mesa and inspiring our students to either persue science careers or at least become science literate adults.

The Following Questions are for CTE Programs ONLY.

Enter "not applicable" if your program is not CTE.

(REQUIRED) Describe how the program's industry partners (including advisory committee) assist with program improvement including curriculum advice, obtaining equipment, providing internships and finding or providing other funding (limit 500 characters) (P.N. 1.b.). Please upload Advisory Committee minutes from the last year here.

Enter "not applicable" if your program is not CTE.

No answer specified

(REQUIRED) Describe how your program connects to High Schools, Universities and Continuing Education, creating career pathways in your field. Include articulation, specific projects, collaboration with teachers/professors, etc. (limit 500 characters) (P.N. 3)

Enter "not applicable" if your program is not CTE.

No answer specified

Form: "2018/19 Comprehensive Program Review Instructional Curriculum Section"

Created with: Taskstream

Participating Area: Physical Sciences

(REQUIRED) Program Name

Physical Sciences

(REQUIRED) What degrees and certificates are offered?

Certificate of Achievement and Associate of Science degree

(REQUIRED) How many of each degree and certificate have been earned in the past 4 years?

10? (not sure that I read this correctly from the dashboard).

(REQUIRED) If you have no (or very few) degrees/certificates, what other paths do you offer? (for example, GE, transfer)

GE - most of our courses are for GE requirement.

(REQUIRED) Have you developed any new courses in the past 4 years? Please give details.

Here are the new physical science courses that've developed in the last three years:

PHYN 105: Physical Science for Elementary Education (actively being taught)

PHYN 114: Weather and Climate (CIC-approved, waiting for state approval)

ASTR 102: Solar System course (waiting for state approval)

(REQUIRED) Have you made other curricular changes? (for example, renumbering, sequence change, co-reqs or pre-reqs)

Some of the advisory math courses were dropped for ASTR 101 and new ASTR 102.

The Following Questions are for CTE Programs ONLY.

Enter "n	ot applicable"	if your	program is	not CTE.	

(REQUIRED) List any licensure and/or accreditation associated with your program.

Enter "not applicable" if your program is not CTE.

No answer specified

(REQUIRED) Indicate the program TOP codes for your AA, AS, COA and COPs.

Please find TOP Code Link in the Directions.

Enter "not applicable" if your program is not CTE.

No answer specified

(REQUIRED) Indicate the SOC codes and title associated with your program's AA, AS, COA and COPs.

Please find SOC Code Link in the Directions.

Enter "not applicable" if your program is not CTE No answer specified

(REQUIRED) Select the sector associated with your program.

Link to sectors list: In process of being developed

• No answer specified

Form: "2018/19 Comprehensive Program Review Instructional Outcomes and Assessment Section"

Created with: Taskstream

Participating Area: Physical Sciences

(REQUIRED) Program name

Physical Sciences

(REQUIRED) We are halfway through our 6-year cycle. Is your department/program on target to complete CLO assessment by Spring 2022? Please attach your schedule for CLO assessment, with explanations as needed.

Refer back to Direction #3 on how to attach documents.

I have uploaded this as attachment.

CLO #1 (Critical Thinking): Students will display the ability to use proportional reasoning and graphical analysis to establish and analyze relationships between measured quantities.

CLO #2 (Communication): Students will display the ability to clearly communicate scientific principles, experimental results, and their implications.

CLO #3 (Problem Solving): Students will display the ability to apply conceptual and mathematical tools to correctly predict the future state of physical systems.

(REQUIRED) Please list your PLOs.

PLO #1 (Transfer): Program courses foster scholarship and facilitate the successful transfer of students from Mesa College to other educational institutions.

PLO #2 (Scientific Literacy): Program courses develop students' understanding of the scientific process and thereby enhance scientific literacy.

PLO #3 (Scholarship and Lifelong Learning): Program courses develop students as scholars and encourage lifelong learning by exposing the students to new concepts and by allowing them to apply those concepts to gain a deeper understanding of the physical world.

(REQUIRED) What progress have you made in your PLO assessment? Please attach your schedule, with explanations as needed.

Refer back to Direction #3 on how to attach documents.

Scheduled attached

(REQUIRED) What have your completed assessments revealed about your courses or program?

These assessment reveal a great challenge (students lacking basic math skills and often no prior physics knowledge) that we need to overcome to maintain the college level instruction

in our courses and this is especially through in lecture courses ASTR 101 and PHYN 120. For example in astronomy carefully reviewing of CLO assessment revealed that nearly half of our students are not capable of doing very simple math task such as raising a number to a fourth power. From Mathematics Content Standards for California Public Schools we see that exponents are first introduced in 5th grade for factoring and they should be mastered by seventh grade. Therefore our student population lacks basic math skills that precede high school math curriculum and in many cases even middle school math curriculum. It is very obvious to faculty that students cannot read numbers and cannot compare numbers especially if they are written in decimal form or scientific notation. These issues are not unique to Mesa college. Across the USA science experts are debating these issues and how we should approach them and this was a hot topic at the last NASA sponsored Center For Astronomy Education Workshop that I attended earlier this year. Some people option out of using any language of math in astronomy setting. However we agree that students should be required to use some math thinking in science classes, as a chance to improve their quantitative skills. This aligns with the ILO number 3: Cultivate the skills necessary for lifelong learning.

Research suggests that K-12 schools largely attended by minority students have higher proportions of instructors teaching subjects they were not trained to teach and this is most prominent in hard subjects such as physics, where across the nation there is a shortage of the qualified physics K-12 teachers. This implies that student population that we work with, comes to Mesa with this pre-existing equity gap. We fear that we will not be able to close this equity gap in minority students achievements because we don't have institutional support in terms of contract faculty. Currently program has one time full time faculty, FTEF of more than 3.5 and six adjunct faculty. Laboratory classes have better success rates. With ASTR 109, laboratory course we see that Mesa's investment in the upgrades to the observatory has lead to the goals we had in mind when proposing for it. With the support from BARC funding in the last two years, we have upgraded the MS building rooftop telescopes to be computer-controlled. We have also increased the number of telescopes so that there are fewer students per telescope. These upgrades have provided for more effective teaching and inclusive learning. By creating more individual stations for work, we provided students with more hands on time per telescope. This has lead to students building confidence and skills that they need to master the CLOs. All of our ASTR 109 students met the CLO expectations.

(REQUIRED) If issues or problems were identified, what is your plan for implementing change?

All of our courses teach science to non-science majors. We will continue to focus on conceptual understanding of physical laws rather than requiring students to do math involving calculations. These results highlight the need to place more emphasis on simple, quantitative math and science skills across our disciplines. But also need to continuously bringing innovation in our teaching and curriculum improvements. With the increase of TT faculty we hope to be able to build resources that wil be shared across department and implemented across all courses. So far we over-rely on adjunct instructors to teach our courses and adjuncts are often unable to dedicate the same investment as a contract faculty to important tasks such as curriculum development and instructional improvement. No systemic instructional improvements and/or new pedagogies have been experimented within the disciplines for a decade. It is beyond the scope of our courses to fill in these gaps in math knowledge that students bring to Mesa so this should be a joint effort across departments at Mesa. If math department is offering some review workshop/seminars for

these basic skills, our students could be encouraged to attend. Tutoring opportunities (classroom tutors, tutors in the tutoring center, STEM center etc.) should be promoted to students continuously during a semester so that student can get more one-on-one help. What can we do: start a semester with the math review that should include review on how to read numbers in scientific notation, comparing number, how to raise number to a power etc. I also work with my classroom tutors to encourage them to conduct these type of reviews in the first week or so. All adjuncts should be encouraged to recruit classroom tutors for their course sections.

(REQUIRED) Based on your assessments, have you identified resource needs?

Faculty

Please provide any other comments.

We were approved to hire faculty, but they still didn't join the department. Therefore I hope with new faculty we will be able to tackle these problems. Therefore whatever id reported here is similar to what was reported last year becuase we didn't see any changes in human capital over the last year that would allow us to proceed with more systemic changes across program.

Form: "2018/19 Comprehensive Program Review Instructional Program Analysis Section"

Created with: Taskstream

Participating Area: Physical Sciences

(REQUIRED) Program name

Physical Sciences

(REQUIRED) Using the data dashboards, discuss how students are doing in your program. Please refer to indicators of success, retention, persistence, etc.

Success: Mesa overall 72%

Astronomy: 67% (Fall 2017); 63% (Spring 2018); Including summers we get to the average success rate of 67%. Female student lower success rate: 57% in average. Latinx student 54%

The average success rates in lecture course ASTR 101 is around 60% while labs have success rate of 92% success in average.

Physical Sciences: have higher than Mesa average success rates. Although this is good news, it should be taken with the grain of salt.

These courses serve the same student population like ASTR 101 and yet success rates are significantly higher. No TT faculty teaches these classes.

Retention: Mesa overall 87%.

Astronomy: 85% average retention rate (83% for only ASTR 101) and we see improvement within last several years in retention trends. This may mean that students are encouraged by all the support we give, but still need more to do on their end to boost the success rates. There is only so much we can do, as learning is the two-way process. Female student lower retention rate: 82% in average. Latinx student 81%. these two minority groups keep up with the retention averages but are lagging behind in success rates.

Physical Sciences: have higher than Mesa average retention rates (88%).

GPA: Mesa average 2.74

ASTR 101: 2.26; Astronomy program 2.36

Physical Sciences: GPA 3.03. In some semesters the GPA is even around 3.8!

Per managers recommendation if I am to provide more narrative here, the only conclusion that I could add is that Astronomy program both in terms of success rates and retention is slightly below but pretty close to Mesa average rates in both categories. The GPA is slightly

lower than average meaning that students pass class, but most grades given out are Cs. On the other side physical science data look like an outlier to Mesa's overall data.

If I analyze individual courses the PHYN 100 has vide range in distribution of success rates. In 2016 success rates were around 80% and then 2017 dropped to 63% and then in 2018 to 47%. Along the time line the enrollment also dropped to half value of what it was in 2016. Also, PHYN courses include labs PHYN 101 and PHYN 120 and physical sciences course for science teachers PHYN 105. Both of these have higher success rates. In the labs we help students more and they usually score better. PHYN 105 may be attracting more mature students and is activity based rather than lecture.

Having two new full-time faculty work on these courses would certainly help to make sure we maintain both college standards and expectations across all of these courses, and help students where needed (PHYN 100).

(REQUIRED) How does your program help to prepare students for success beyond your classrooms?

If properly taught physical sciences courses offer an excellent domain to help students develop critical thinking and problem-solving skills while at the same time help students improve their communication skills.

All these skills are transferrable skills to any career of 21st century.

As discussed elsewhere in this program review document, the astronomy program continues to engage students beyond the classroom via Astronomy night, star parties other education outreach events. .

Mesa's STEM Lecture Series is another way our program offers enrichment opportunities beyond the classroom.

These events offer students the opportunity to learn first-hand about all the exciting research opportunities in astronomy, physics and geology.

Mentoring of research students is a growth area for our program and this has an inspirational effect on our students as they are able to secure internships beyond Mesa.

(REQUIRED) Given your stated area(s) of focus in your program overview section, has your program introduced new or different actions that may have affected changes in these indicators? Please describe.

There are opportunities to expand on the research efforts we are conducting here at Mesa, through which we mentor students and help them build sense of belonging into scientific community.

However, with a single faculty in-charge of all administrative tasks, teaching and outreach activities, we need more TT faculty to be able to build on these.

Few cycles down the road hopefully there will be more to report.

Education outreach events are promoting well science to on-campus crowds. Maybe in the future with more human power, we can also reach out to area-high schools.

(REQUIRED) Has your program introduced any new actions specifically focused on issues of equity? Please describe.

We have introduced additional department meetings that focus on equitable teaching. We discuss student-centered pedagogies that work for HSI student population as well as more inclusive classroom environment.

I have collaborated with few adjunct faculty (Jen Snyder; Gary Howel) in observing each other's lectures and giving feedback to each other about improvements that could be made.

(REQUIRED) Describe the trends in enrollment for your program. What changes might you foresee in the next 2-3 years?

For Astronomy during the spring 2018 semester, enrollment as of census was 399 students and in the Fall 2017 it was 411. Between these two semesters the trend is constant, but this Fall we only see 334 students, which is nearly 16% less compared to the last Fall.

Although it's difficult to know what drove the fall 2018 enrollment decline in our program, two possibilities include a strong economy and an increase in online astronomy course offerings at Miramar College. This was discussed elsewhere.

We hope that this overall lower enrollment trends can be offset by new courses that we will introduce across the program both in astronomy and physical sciences.

(REQUIRED) Are there any data sets that are not already provided in the dashboards that you could use to inform your program?

(REQUIRED) In what ways can the college support your program in our effort to encourage major and career exploration early on in a student's college experience?

We should have more connection with similar programs at SDSU and UCSD and with the local industries.

The Following Questions are for CTE Programs/Services ONLY.

Enter '	"not applicable"	if your program/service is not CTE.

(REQUIRED) For CTE programs ONLY: Provide specific labor market information showing: 1) Number of jobs available or projected in San Diego County 2) Number of other institutions offering the program 3) How many Mesa students

completed the program in the last three years 4) The pay rates for those in the industry (limit 500 characters) (P.N.2.A)

Enter "not applicable" if your program is not CTE.

No answer specified

(REQUIRED) For CTE Services ONLY: How are CTE students identified and tracked for service? (limit 500 characters) (P.N.2.B)

Enter "not applicable" if your service is not CTE.

No answer specified

(REQUIRED) For CTE programs/services ONLY: Upload the report from Launchboard that includes at least three (3) of the following Strong Workforce metrics for your BASELINE year.

Please use the Cal-PASS Plus Launchboard Link available in the Directions.

Refer back to Direction #3 to #6 on how to attach documents.

Strong Workforce Program Metrics

- a. Number of Enrollments
- b. Number of students Who Got a Degree or Certificate
- c. Number of Students Who Transferred
- d. Percentage of Students Employed in Two Quarters After Exit
- e. Percentage of Students Employed in Four Quarters After Exit
- f. Median Earnings in Dollars Two Quarters After Exit
- g. Percentage of Students Who Achieved a Job Closely Related to Field of Study
- h. Percentage Change in Earrings
- i. Percentage Who Attended a Living Wage.

Enter "not applicable" if your program/services is not CTE.

No answer specified

(REQUIRED) For CTE programs/services ONLY Upload the report from the CCCO Perkins site for the College Aggregate Core Indicator Information by 6 digit TOP Code.

Please use the Core Indicator Reports Link available in the Directions.

Refer back to Direction #3 to #6 on how to attach documents.

Enter "not applicable" if your program/service is not CTE.

No answer specified

Form: 2018/19 Comprehensive Program Review Instructional Outcomes and Assessment Section (See appendix)

File Attachments:

1. CLO_PLO_Assessment_Sch_Fall_2018_PhySci_ProgRev (1).pdf (See appendix)

Program Analysis (REQUIRED)

Form: 2018/19 Comprehensive Program Review Instructional Program Analysis Section (See appendix)

Program Goals (REQUIRED)

Develop new Astronomy course (Solar System Astronomy)

Outcome

Outcome Mapping CA- Mesa College Strategic Directions Develop new astronomy course (Solar System Astronomy), 2016and Goals: Strategic Goal 1.1, Strategic Goal 1.2, Strategic Goal 1.4, Strategic Goal 2017 4.1 A new course, Solar System Astronomy, will be developed and added to the list of course offerings in the physical sciences program. Improve student success rates in **CA- Mesa College Strategic Directions** Astronomy 101 and Goals: Strategic Goal 1.1, Strategic Goal 1.2, Strategic Goal 1.4, Strategic Goal Data show relatively low rates of 1.5, Strategic Goal 2.1, Strategic Goal 5.1, student success in Astronomy **Revised Program SLOs Physical Sciences** 101. As a way to address low **Program:** Communication, Critical Thinking, success rates, astronomy faculty Problem Solving will engage in a dialogue specifically focused on strategies to improve success rates.

Equity

Goal

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Goal

Equity Strengthen the culture of completion by emphasizing and an equity mindset in support of successful outcomes for all students.

Mapping

CA- Mesa College Strategic Directions and Goals: Strategic Goal 1.1, Strategic Goal 1.2, Strategic Goal 1.3, Strategic Goal 1.4, Strategic Goal 1.5, Strategic Goal 1.6, Strategic Goal 2.1, Strategic Goal 2.3, Strategic Goal 2.4, Strategic Goal 3.1, Strategic Goal 3.2, Strategic Goal 3.3, Strategic Goal 4.1, Strategic Goal 4.2, Strategic Goal 5.1, Strategic Goal 5.2, Strategic Goal 6.2

Program success

Goal

Goal

Program success Increase long-term program (astronomy) success rate.

Mapping

CA- Mesa College Strategic Directions and Goals: Strategic Goal 1.1, Strategic Goal 1.2, Strategic Goal 1.3, Strategic Goal 1.4, Strategic Goal 1.5, Strategic Goal 1.6, Strategic Goal 2.1, Strategic Goal 2.2, Strategic Goal 2.3, Strategic Goal 3.1, Strategic Goal 4.1, Strategic Goal 4.2, Strategic Goal 5.1, Strategic Goal 5.2, Strategic Goal 6.2

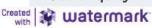
Action Plans for Non CTE Programs (REQUIRED)

Actions

Equity

Goal

Goal: Equity



Strengthen the culture of completion by emphasizing and an equity mindset in support of successful outcomes for all students.

▼ Action: Equity Action Plan

Describe the actions needed to achieve this objective:

Seek to create a culture of equity by keeping program faculty informed of equity-related campus trainings, conferences, and funding sources.

Who will be responsible for overseeing the completion of this objective:

Irena Stojimirovic

Provide a timeline for

the actions:

3-5 years

Describe the assessment plan you will use to know if the objective was achieved and effective:

Objective will have been achieved and will be considered effective when program success rates

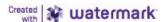
for various under-represented groups show long-

term (3-5 year) improvement.

List resources needed achieve this objective and associated costs (Supplies, Equipment, Computer Equipment, Travel & Conference, Software, Facilities, Classified Staff, Faculty, Other): Conference funding, supplies, equipment.

Program success

Goal



Increase long-term program (astronomy) success rate.

▼ Action: Provide Oversight Over PHYN 100 Success Rates

Describe the actions needed to achieve this objective:

PHYN 100 has vide range in distribution of success rates. In 2016 success rates were around 80% and then 2017 dropped to 63% and then in 2018 to 47%. Make sure we maintain both college standards and expectations in this course. Did the introduction of DE PHYN 100 drive the success rates down? Do we need to provide more resources for students to succeed.

Who will be responsible for overseeing the completion of this objective:

We just hired two new faculty Jen Snyder and Stephanie Colby. I hope to work with them so that we can evaluate the challenges in the course.

Provide a timeline for the actions:

Starting now. Monitor data trends and practices.

Describe the assessment plan you will use to know if the objective was achieved and effective:

good to have a TT faculty consistently teach this course for few semesters so that we can all work on standards that should be met in this course.

Data trends will be studies. Also it would be

List resources needed achieve this objective and associated costs (Supplies, Equipment, Computer Equipment, Travel & Conference, Software, Facilities, Classified Staff, Faculty, Other):

We just hired two faculty so that was our major request last year.

- Project Plan for CTE Programs Only (REQUIRED)
- **⋄** Closing the Loop (REQUIRED)

Form: 2018/19 Comprehensive Program Review Instructional Closing the Loop (See appendix)



Form: "2018/19 Comprehensive Program Review Instructional Closing the Loop"

Created with: Taskstream

Participating Area: Physical Sciences

(REQUIRED) Program name

Physical Sciences

(REQUIRED) Which one(s) of the following were received in past year?

- BARC
- Other:

(REQUIRED) How have these resources benefited your program and your students?

We have been approved to hire an astronomy faculty and physical sciences/physics faculty but this is still in process and we haven't seen the benefits yet.

Upgrades we achieved with the BARC support had led to the improvement in teaching capabilities at the observatory which led to us being able to teach more complex material while boosting the student success rates in Astronomy lab setting.

Also the upgrades to the observatory gave us the opportunity to reach out to Mesa community through star gazing and other outreach events.

Request Forms

- **BARC & Facilities Requests**
- Classified Position Request
- Faculty Position Request

Reviewers

Liaison's Review

Form: Instructional Program Liaison's Review 2018/19 (Comprehensive)

Manager's Review

Form: Instructional Program Manager's Review 2018/19 (Comprehensive)



Appendix

- A. 2018/19 Comprehensive Program Review Instructional Program Overview Section (Form)
- B. 2018/19 Comprehensive Program Review Instructional Curriculum Section (Form)
- C. 2018/19 Comprehensive Program Review Instructional Outcomes and Assessment Section (Form)
- D. CLO_PLO_Assessment_Sch_Fall_2018_PhySci_ProgRev (1).pdf (Adobe Acrobat Document)
- E. 2018/19 Comprehensive Program Review Instructional Program Analysis Section (Form)
- F. 2018/19 Comprehensive Program Review Instructional Closing the Loop (Form)

Course Learning Outcome (CLO)/Program Learning Outcomes (PLO) Assessment Schedule Physical Sciences Program San Diego Mesa College

CLO / PLO*	Fall	Spring								
	2015	2016	2016	2017	2017	2018	2018	2019	2019	2020
CLO #1: Critical Thinking					Х	Х				
CLO #2: Problem Solving			Χ	X			Χ	X		
CLO #3: Communication	Х	X							Χ	X
PLO #1 (Transfer)						X				
PLO #2 (Scientific Literacy)								Х		
PLO #3 (Scholarship, Lifelong Learning)										X

^{*}The same CLOs apply for all physical science courses; however, for each course, each CLO may be assessed differently, depending on the course.

CLO Descriptions

CLO #1 (Critical Thinking): Students will display the ability to use proportional reasoning and graphical analysis to establish and analyze relationships between measured quantities.

CLO #2 (Communication): Students will display the ability to clearly communicate scientific principles, experimental results, and their implications.

CLO #3 (Problem Solving): Students will display the ability to apply conceptual and mathematical tools to correctly predict the future state of physical systems.

PLO Descriptions

PLO #1 (Transfer): Program courses foster scholarship and facilitate the successful transfer of students from Mesa College to other educational institutions.

PLO #2 (Scientific Literacy): Program courses develop students' understanding of the scientific process and thereby enhance scientific literacy.

PLO #3 (Scholarship and Lifelong Learning): Program courses develop students as scholars and encourage lifelong learning by exposing the students to new concepts and by allowing them to apply those concepts to gain a deeper understanding of the physical world.