SAN DIEGO MESA COLLEGE

Program Review

Summary and Reflections with Unit Goals, Action Plans, and Updates

Instructional Program - Physics (PHYS)

Executive Summary

Describe the successes and challenges your unit has faced since the last comprehensive review.

The Physics faculty have built one of the most vibrant communities on campus during this past year. The discipline has seen some retirements and is in the process of hiring for a new full-time contract faculty. Current contract and adjunct faculty are highly visible participating in a number of different professional development and campus-wide initiatives to increase student success, reduce equity gaps, clear and define pathways, and ease transfer. The Peer Mentoring program has grown into something truly inspiring providing a space for physics students to work, exchange ideas and support each other. One needs only to walk by MS 118 at any time during the week to see (and hear!) the excitement surrounding our physics community.

Courses in the PHYS discipline are primarily on pathways for different programs (Engineering, Biology, Chemistry, Radiologic Technology, Architecture, etc..), but there are several students who complete the PHYS AA, AS, ADT, and certificates. Recently, the PHYS department updated its certificate and AS degree requirements. Faculty reviewed degree requirements with different transfer partners to create a certificate and AS degree with enough rigor and flexibility to prepare students for a number of different options moving forward. Physics Program Outcomes were recently updated to clarify learning outcomes and to include new language regarding technological proficiency. A proposal was submitted to add a Hybrid option for PHYS 100. None of the courses in the PHYS discipline have DE status based on concerns related to student success and transferability. However, the PHYS 100 student population and curriculum was chosen as an experiment to allow for a partially online delivery of physics content. Faculty also completed a proposal for a new course, PHYS 19. PHYS 19 will be a supplemental course to prepare students for PHYS 195, PHYS 180A, and PHYS 125. The course has strong support both within the department and with our colleagues at City and Miramar Colleges.

The Physics discipline has had two retirements between Spring 2021 and Spring 2022. This has caused the department to rely more heavily on its adjunct instructors. The department has hired three new additional adjunct instructors in the last year to handle the load. Our adjunct instructors are an integral part of department life, and their presence has had many benefits. However, reliance on part-time instructors has raised concerns about student success and equity. The lack of a contract instructor has left the department without leadership for the PHYS 100 course in particular. A search for a new PHYS instructor in the Fall 2022 semester resulted in a failed search that was reopened in Spring 2023. We hope for success to move our department forward and continue to close equity gaps. The PHYS department has also hired a part-time Instructional Lab Technician to support evening physical science labs. This NANCE hire joins our two full-time ILT’s to support the increased diversity of lab courses available to students.

This is an exciting time to be on campus with many new initiatives coming from the HSI-STEM grant and PHYS faculty have been active in all aspects of it. The Curriculum Workgroup has been tasked with clarifying STEM pathways. As a result of being service courses for many different disciplines, physics faculty have been integral to plans for Biology and Engineering pathways in particular. This work has involved aligning content with other STEM disciplines, especially Biology and Engineering. Physics faculty have been working to verify that Physics courses are relevant, necessary and have the appropriate prerequisites. Also, in coordination with the Math faculty, Physics faculty have been reviewing math prerequisites and verifying physics courses are assuming the appropriate coursework from the math courses.

The Physics department was one of the first disciplines to get a new “Studio” Classroom space. Desktop computers and desks were removed from the department computer lab and replaced with laptops and moveable tables (See Photo Right). Students now face each other in groups of four to work together during class on worksheets and computer simulations. This has had positive effects on community building, attendance, and student success.

Peer Mentoring is one of the most exciting programs in the Physics department. Peer Mentors hold sessions in a designated classroom near the Physical Science Office Suite and in the STEM Center. Students from PHYS 195,

Summary and Reflection

196, 197, 180A and 180B meet with Peer Mentors and each other to work on homework, reinforce ideas through supplemental worksheets, prepare for exams and have some fun interaction. In the Spring 2023 we had six mentors out of which three were female mentors, one being Latina. Significant fraction of all physics enrolled students participates in physics peer mentoring. This program has transformed the way we interact with students and has helped us build a vibrant community of physics learners that are supported by their peers and faculty outside of the classroom.

Physics faculty have also participated in Professional Development. Physics faculty have led and participated in Faculty Inquiry Groups (FIGs) on bringing culturally responsive practices to first-semester physics classes and on implementing mastery-based grading. Faculty have presented at national and local meetings associated with the American Association of Physics Teachers. A Physics Faculty member is working with other 2YC physics faculty through AAPT to produce a handbook for colleges to use to build, assess, and improve 2YC physics programs. Finally, a faculty member is working in collaboration with other professional science societies to increase participation of 2YC students and faculty in STEM programs.

If applicable, describe any major curricular or service changes your unit has engaged in and the impact of those changes since the last comprehensive review.
N/A

If applicable, describe the impact of any new resources (human, fiscal, etc) on the unit and/or action plan implementation.
N/A

If you assess OUTCOMES, please confirm that the outcomes have been reviewed for accuracy. If you do not assess Outcomes, skip this question.
Reviewed & Accurate

Related Documents for Charts and Graphs

Executive Summary Complete
Yes

Data Reflection

Trends observed in program/service area's data.

Courses in the PHYS department are primarily pathway courses for other programs, the largest being Biology and Engineering. The PHYS 100 course is populated by students interested in technical programs such as Radiologic Technology. The PHYS 125/126 and PHYS 180A/B sequences serve Biology programs and many pre-professional health science majors. Finally, PHYS 195/196/197 include Engineering and other Physical Science majors. Enrollment in PHYS courses as a whole decreased post-pandemic as can be seen in the Figure but is on its way back up to Spring 2020 Levels. One reason for this decrease could be a slight ebb in the pipeline feeding into our courses. All PHYS courses currently have math prerequisites that sometimes have prerequisites of their own. Students feeding into our courses may have been disrupted by preparation during the Pandemic. Another big reason for the variation in PHYS enrollment as a whole is due to the fluctuations of PHYS 100. As can be seen in the graph below, PHYS 100 enrollment has large fluctuations that do not seem to have been affected by the pandemic. This could be because PHYS 100 has a much lower-level math course prerequisite. Also, PHYS 100 enrollment is tied more closely to the Radiologic Technology program whose current cohort started in Spring 2022 which means that Fall 2022 was the last semester for students to complete the required PHYS 100 course (Spring 2020 was the beginning of the last cohort). What is concerning here is that enrollment did not pick up in Fall 2022 or Spring 2023. This may indicate a smaller potential cohort for the Rad Tech program or that students are taking their prerequisite courses elsewhere. See Chart 1

To see enrollment trends slightly more clearly, the following bar graph shows the total enrollment in PHYS courses for the past semesters. PHYS 180A/180B is not shown in the analysis because it is a fairly new offering whose trends are not apparent at this point in time. Enrollment for Spring 2023 is reaching Spring 2020 levels. Most of the blocks representing individual course enrollment do not change significantly from semester to semester. The only

other courses we take note of are PHYS 196 (blue) and 197 (green). These are the second and third semester courses in the PHYS 195 sequence. These have also seen some fluctuations post-pandemic that appear to be returning to their previous levels. Still, we will track these courses going forward. See Chart 2

In terms of Student Success, we focus on the introductory courses PHYS 125, PHYS 195 and PHYS 196 since they have lower success rates and are considered “gateway” courses (See graph below). Success rates for PHYS 100 hover around 80% which make them less of a concern. Although PHYS 196 is not the first course in a sequence it is traditionally one of the hardest courses in the Engineering curriculum. Each of these courses are prerequisites for other courses in the sequence and for courses in the Engineering Program. As such, having to repeat PHYS 195 or 196 can delay graduation and transfer for students and affect retention. Success rates for both PHYS 125 and PHYS 195 are rising since the disastrous Spring 2020 semester. We regret that the Data Dashboards are behind the Enrollment dashboards and do not include Fall 2022 because we are eager to see if this trend continues. Although success rates are on the rise, Success in PHYS 195 still hovers near 60%. This is also true for PHYS 196, which is deeply upsetting for a number of reasons. See Chart 3

Describe any equity gaps in the data. Are there differences and/or patterns observed by demographics (e.g.race/ethnicity, gender, age, etc.)

Within these low success rates, significant equity gaps for Black/African American and Latinx students also exist (See Tables below). Tracking of the equity gaps over time did not reveal any significant changes that would indicate trends resulting from interventions. However, we did notice that equity gaps for Black/African American students disappeared for some courses, but the reason for that was due to not having a B/AA population in the courses during that semester, which is disturbing for different reasons. Finally, no significant equity gaps due to gender differences were seen in the PHYS courses. However, we noted that although they weren’t significant, Female students mostly had lower success rates than Male students in the PHYS 195/196/197 sequence. This is interesting only because the reverse is true for Mesa College as a whole. Lastly, when gender differences were significant, it was due to lower success for Male students. See Chart 4, 5

Related Documents for Charts and Graphs
Chart 1.png;
Chart 2.png;
Chart 3.png;
Chart 4.png;
Chart 5.png

Describe the discussion(s) that took place about the unit's learning outcomes assessment data.

Discussions of SLO’s focused primarily on the skills that students bring into the classroom. Physics is not typically the first course that a student will take on their pathway. All physics courses currently have Math prerequisites and/or corequisites. Those math courses often have prerequisites of their own. Students do not usually come to us without some success in STEM courses. Still, learning physics is a challenge. In any discussion of PHYS courses in any High School, College or University, faculty will talk about students’ math skills. This discussion is not particularly new, but faculty have reported a decrease in math skills in terms of basic algebra and calculus. It is not clear if this is due to courses taken during the pandemic or impacts from AB1705 (more on this later). Something new is that faculty are reporting seeing problems with students’ reading skills. Often students need to read and identify information from problems descriptions with multiple sentences. It appears that students are having trouble focusing and extracting the information that they need. It appears to go beyond the expected problem of students having difficulty translating written language into mathematical formulas. These are big concerns for both our lecture and laboratory courses.

Data Reflection Complete
Yes

Practice Reflection

Describe current practices your program/service area has engaged in that you believe impact the above data trends and equity gaps.

PHYS faculty have been working hard to increase enrollment, increase success rates and decrease equity gaps. Enrollment in PHYS 100 has been troubling. Since enrollment is tied to the Rad Tech program, we are making connections with faculty in that program to see where we can improve in terms of preparation for their students. We have already changed the DE status of the course to allow for a hybrid offering. We hope that this will be popular as we offer it in the Summer and Fall semesters. In addition, we recognize that the Rad Tech program does not require the lab for PHYS 100. We are in the process of separating the lecture from the lab and creating two separate courses. This would also make the course more attractive to students who are looking for a General Education course in Physical Science. This has support from our peers at City College as well. Separating the lecture from the lab is not a decision that we take lightly. We recognize that having separate lectures and labs makes it easier for scheduling, but we feel strongly that it weakens the course in a pedagogical sense since our labs are often used to support the lecture topics. We discussed the advantages with faculty in Counseling and were advised to stick with separating PHYS 100 at this time.

Our PHYS 180 and PHYS 125 series are still struggling with their identity on different pathways. It can be very challenging for students and counselors to put students into the correct physics sequence. We know from our experience that several students get misplaced each semester which results in students dropping or repeating courses. We have reached out to Counseling, and we reach out to students at the beginning of every semester in order to clarify, but it remains a problem because the correct course sequence varies widely with our transfer partners. This is especially true in Pre-Professional Medical areas such as Pre-Med, Pre-Dental, and Veterinary programs. We are considering creating a master list of all programs that have PHYS prerequisites with the appropriate course number for students to refer. Currently, we have made up a new flier that we have available at the Advising workshops and other venues where students seek this type of information. We have also designed and implemented an entirely new laboratory curriculum for PHYS 181A that focuses on experimental techniques and topics that are relevant for life scientists and health professionals.

PHYS faculty have also been working at different outreach events such as Jump Start and STEM Success days to encourage students to continue their physics studies at Mesa College. Our faculty are working to make themselves approachable to students both before the course begins and during the semester. We have a culture in our department of encouraging students and being a partner in their success in the course. Students acknowledge that we care deeply for them and their learning, but we have gotten a bit of a reputation for running challenging courses. That may or may not be true, but we feel that being warm demanders shows respect to our students and their abilities. We continue to seek opportunities to connect with students both in and out of the classroom. Physics faculty are also mentoring a new Physics Club to help physics students get involved in outreach, and to help connect with them transfer institutions and industries. The club has conducted Tesla coil demonstrations in multiple classrooms and at the “Madison at the Mesa Day” event for Madison High School students.

Success rates are beginning to rise in PHYS 125, PHYS 195 and PHYS 196 courses. Over the last year, PHYS 125 courses have benefitted from the move back to on campus learning. Community-building and cooperative learning, some of the hallmarks of culturally responsive teaching, was difficult to enact online. Since being back on campus, students have returned to group work in the classroom and in the laboratory. First semesters back on campus were rocky since students were not used to interacting and were wearing masks and told to “socially distance” themselves. As pandemic restrictions began to lift, the students have been more able and willing to work together. Our classroom has been outfitted with new tables, chairs, equipment, whiteboards, and projection equipment to make interaction easier for students. It is very early days for the PHYS 125 course, but comparisons between mean scores on the first exam for Spring 2022 and Spring 2023 show gains between a mean score of 71% in Spring 2022 and 76% in Spring 2023. The same is true in comparisons between scores in Spring 2022 and Fall 2022 students for Exam 2. Exam 2 had a mean score of 67% in Spring 2022 (Exam 2 is consistently harder than Exam 1) and a mean score of 72% in Fall 2022. It is too soon to attribute increased success to this physical space, but it is something that we will continue to study. Lab assignments have been rewritten to allow for more group work and focus on science skills.

Summary and Reflection

Peer Mentoring is the most impactful intervention in the PHYS department in terms of student success, community building and student support. There aren't enough positive things to say about this program. The Peer Mentoring room is open M-F most of the day. Students congregate there to work on physics and support each other. During Spring of 2022, Peer Mentors saw 812 students (See Table below) which surpasses or equals the number of students in any other discipline and in the tutoring center. Also, students in Peer Mentoring are more successful in Physics courses than students who do not use Peer Mentoring (see Chart 6).

Based on the FIG that physics faculty participated in in fall of 2022, one Spring 2023 PHYS 195 section has implemented mastery-based grading. This is an alternative assessment scheme in which students are required to demonstrate mastery of each learning objective in the course, with their grade determined by how many objectives they master. This contrasts with traditional grading where students can acquire points through partial credit without ever demonstrating mastery of any single objective. Students are given multiple opportunities to demonstrate mastery of each objective and receive full credit regardless of how many tries they take. We look forward to seeing how this affects success rates and equity gaps in this section, and we plan to refine our implementation of mastery grading and expand it to more courses and sections.

What other factors (internal or external) might also impact the above data trends and equity gaps?

We expect that there will be strong implications on physics courses from AB1705. As discussed previously, physics courses rely heavily on math prerequisites. Any change in math curriculum will directly affect physics success. This is why physics faculty are working closely with math faculty. To clarify, this alliance is to ensure that math faculty understand what physics faculty expect students to know and for physics faculty to know whether those expectations are reasonable. Neither party expects to dictate curriculum to the other. Instead, the aim is to open communication for each to see the effect on student success. AB1705 adds ambiguity to this already difficult situation by altering the types of math prerequisites for some courses and the way that they are fulfilled. Our PHYS 195 sequence has calculus as a prerequisite, which is a pathway course for all the students who will enroll in the course. We don't expect AB 1705 to affect this prerequisite. However, PHYS 100 has a prerequisite of MATH 096 which must be removed. Both PHYS 125 and PHYS 180A have a prerequisite of MATH 116 (College Algebra). PHYS 180A also has co-requisite of MATH 121 (Applied Calculus). We are waiting for advice for what the math prerequisite for PHYS 100 should be. The course itself is conceptual and needs limited math. However, UCSD will not transfer the course without a MATH prerequisite. We are also waiting for clarification on the strength of having the MATH 116 prerequisite for PHYS 125 and PHYS 180A. It is not clear whether students can "opt out" of MATH 116 since Calculus is the pathway course. This would be disastrous for PHYS 125 but would be catastrophic for PHYS 180A. One can imagine a situation in which a student opts out of MATH 116 and jumps right into both MATH 121 (Applied Calculus) and PHYS 180A at the same time to find themselves unprepared to take either. When we consider student success in our courses, the biggest impact on that is the preparation of our students. Historically, students in our Physics courses were not very different from students in Physics courses at other colleges because all students would have had to complete some level of college math. This ensures that they understand math and have had some success at being college students. AB 1705 has the potential to remove this, making it not necessarily more difficult to teach the courses, but more difficult for students to succeed.

We will continue to work with our excellent colleagues in the math department to serve students better in our courses. We also intend to communicate more directly with colleagues at our sister campuses. It is expected that we will need to put in curriculum changes for our math prerequisites for most of our PHYS courses. We need to agree on what those should be. We need to do this as soon as possible to keep the level of the courses where they should be. We are hearing from faculty in other disciplines about how they can't teach all the curriculum because they need to slow down for underprepared students. Most of the physics faculty have done curriculum projects as a part of ESCALA, CEER or other culturally responsive teaching workshops. As part of this, we have all taken hard looks at what we teach and focused on what we need students to know to make it to the next level. None of us are in a position where we can cut any remaining topics. Before AB1705, we had begun to plan for a PHYS 19 course that students could take as a refresher for some basic algebra, graphing, trigonometry, and calculus concepts as they appear in the physics classroom. The PHYS 19 course is making its way through the curriculum process, and we hope to be able to offer it in Intersession 2024. As we offer this course, we will make a very clear assessment plan to make sure that it is working for students.

Summary and Reflection

As discussed previously, faculty are also reporting issues with students' ability to read and write. This problem appears widespread among the courses, but undefined. As with the difficulties with MATH, it is unclear where these problems are coming from and what their nature is. We plan to investigate this more fully in the coming year. Again, in relation to AB 1705, integration of basic skills into all coursework is more important than it was before. We intend to offer more opportunities for students to practice reading and writing skills.

We are currently interviewing for a new PHYS position. The PHYS hire is intended to take leadership of the PHYS 100 sequence. As discussed previously, this course has been having enrollment issues that need to be investigated. It is also in the process of being split into separate lecture and lab courses. The new hire will provide vision on how this change will affect curriculum. We also hope that the new PHYS hire will bring perspective that will increase discussion with faculty of all PHYS, PHYN, GEOL, ENGE, OCEA, and ASTR courses.

Related Documents for Charts and Graphs
Chart 6.png

Practice Reflection Complete
Yes

Mid-Cycle Updates

YEAR 2 Updates (2023 - 2024)

Provide any edits or updates to the prompts originally documented in the Executive Summary section for Year 2.
A new faculty member has been hired since the last Executive Summary. Joseph Martinez was teaching for us as an Adjunct Instructor as is now teaching as contract faculty. Joseph adds expertise to our PHYS 180 sequence and our PHYS 100 course.
Our faculty have become more involved in activities outside the department. Irena Stojimirovic and James Hinton have been strong participants in the HSI-STEM Curriculum Workgroup. This group is currently working on issues related to AB1705. Over the last few months, it has become clearer the strong effect that this legislation will have on Physics courses.
As of Fall 2023, PHYS 100 has lost its prerequisite math courses. We expect PHYS 125 and PHYS 180A to follow suit with the elimination of Pre-Calculus courses. We have submitted a proposal to have the current corequisite Calculus course to be the prerequisite for PHYS 180A. The proposal is currently waiting to be approved at CIC. The majority of students taking PHYS 180A have taken Calculus prior to taking the course and data has shown that students who take the course as a corequisite are less successful than students who take the course as a prerequisite. Physics is a very difficult course for many students and we feel that not allowing students to prepare properly is doing them a great disservice. We are seeing increasing stress levels which is not great for classroom environment. Finally, we are gravely concerned about the the impacts that the prerequisite changes will have on transfer. Unfortunately, all we can do at this time is wait and see.

Provide any edits or updates to the prompts originally documented in the Data Reflection section for Year 2.
No

Review Outcomes Report. Review the unit's outcomes assessment process for 2022 - 2023. Discuss connections to unit goals/action plans/resource requests.
Currently, faculty are reviewing the outcomes and working to rewrite/revise them in order to capture student learning better. A task force has been organized to work together on the most difficult courses first.

Provide any edits or updates to the prompts originally documented in the Practice Reflection section for Year 2.
No

Summary and Reflection

YEAR 3 Updates (2024 - 2025)

Provide any edits or updates to the prompts originally documented in the Executive Summary section for Year 3.

The physics program appears to be moving along. Our new Faculty member, Joseph Martinez, is acclimating well and also motivating change in the department. Professor Martinez has been a part of a two-years-long program with the Organization for Physics at Two-Year Colleges (OPTYCs) with the goal of creating a capacity-building learning community among two-year college physics-related teaching instructors to support efforts to improve student success by creating welcoming learning environments. This program began in January 2024 with a two-day workshop on diversity, equity, inclusion, and accessibility. During this program Joseph worked on implementing Universal Design for Learning practices in the assessment of lab skills. This was implemented during the Summer and Fall semesters of Physics 181B courses. In addition to this, Joseph also attended a full-day workshop through OPTYCs on sensor-based activities in physics labs to help develop a more updated approach to their teaching practices. As a part of this workshop, Joseph is committed to holding a seminar on sensor-based activities this Fall at the southern California section of the American Association of Physics Teachers alongside faculty from other colleges.

Irena Stojimirovic was on Sabbatical in Spring 2024. Professor Stojimirovic was working on designing worksheets for a PHYS 197 course. She plans on eventually having a schedule where students can take courses with her for three semesters starting with PHYS 195 and ending with PHYS 197. We have not had much luck in retaining students from Spring PHYS 196 to Fall PHYS 197. They may be going to other campuses or waiting until Spring to take their final course. We are hoping that students will want to stay with Irena for all of their physics courses.

We are currently working on revising CLO's to better reflect student outcomes, but to also bring faculty together to talk about how they approach learning in the different courses. Claude Mona has lead this charge with the PHYS 195/196/197 courses. Claude, Joseph Martinez and Jamie Hinton worked together in Spring 2024 to revise the CLO's to include skills that all students are expected to master. Now that Irena is back from sabbatical, they can continue that conversation and extend it to the other courses. Physics courses can be very difficult to differentiate from each other. We now have four sequences that have very similar content, but differ in their mathematical underpinnings. We intend to enter into discussions to further define and clarify how content and expectations look at various levels.

Irena has stepped down as the coordinator of the Peer Mentoring program and James Hinton has stepped up. Jamie Hinton is entering his 3rd semester as faculty coordinator for the STEM Peer mentoring program, a 0.3 FTE reassignment. During this time, Jamie has overhauled and expanded the training program for mentors. After shrinking from 24 to 20 mentors in Fall of 2024, the program has grown again in Spring of 2025 to 24 mentors serving 13 different courses in math, physics, chemistry, and biology. These 24 mentors work closely with 11 faculty liaisons to tailor their academic support to the specific needs of Mesa STEM students and faculty. Despite the decrease in the number of mentors in the Fall 2024, the program served more students than ever before, with 3400 session visits by 480 unique students. Further growth in attendance is expected in the Spring with the addition of a new supported course, CHEM 152.

Peer Mentoring continues to be important to the program in terms of community building and student success. Jamie is working in his capacity of the Peer Mentoring coordinator to find ways to institutionalize the program. We have strong concerns about the success of Peer Mentoring. We know from previous experience that Mesa Tutoring does not provide the same outcomes as Peer Mentoring does and we wish to continue the program. The new Mesa Center is housed next to our Peer Mentoring room and has been a welcome addition. Faculty regularly hold office hours in that space and students have felt comfortable working with faculty and with each other in the Mesa Center.

We are currently down to one ILT which has been impacting our scheduling, but we hope to have a second ILT hired soon.

Our faculty - Martinez and Aiken are developing computation based physics assignments using Python. Some examples include modeling rocket propulsion and simple harmonic motion. These activities aim on developing competencies and skills for entering or advancing in the workforce or internship programs. WBL is going on in our

classrooms.

Our faculty continue to be active in the curriculum workgroup and in advocacy against AB 1705.

Provide any edits or updates to the prompts originally documented in the Data Reflection section for Year 3.
AB 705/1705 continues to impact us. PHYS 100 success has rebounded after the pandemic slip and the loss of prerequisite math. Although we are constantly concerned, we have not had any trouble with our transfer partners over this change. PHYS 125 is set to lose its math prerequisites soon due to AB1705. Data shows that success in this course has risen dramatically since the pandemic. However, faculty report a dire need for tutoring in that course to keep this rise in success. PHYS 125 is not eligible for Peer Mentoring and Embedded tutoring has not been as responsive to the needs of the courses as we would hope. PHYS 195 success has been improving, but is still at a 60% success rate that we aim to improve. PHYS 196 has seen dramatic improvement in success and is at the highest it has ever been. PHYS 196 is a very challenging course, but success has risen from 60% to 70% in the last two years. This is amazing and we hope is due to the hard work that goes into community building and study skills in PHYS 195. PHYS 180A and 180B are still too new to post any trends.

The Peer mentoring (PM) data dashboard shows that in the Fall 2023 n=432 students attended peer mentoring and 91% were retained in the classes while 80% successfully passed the class. The control sample showed n=1,170 students attended peer mentoring and 86% were retained in the classes while 69% successfully passed the class. In the Spring 2024 n=471 students attended peer mentoring and 96% were retained in the classes while 88% successfully passed the class. The control sample showed n=1,191 students attended peer mentoring and 88% were retained in the classes while 75% successfully passed the class. The data dashboard shows that the greatest gain in retention and success is by Latinx and African American (AA) groups of students, where Latinx students attending PM had 77% success in the class compared to 58% in the control sample in Fall 2023 and 86% vs 64% in success in Spring 2024. Similarly AA students had success of 73%/77% if attending PM vs 50%/63% if not in Fall 2023/Spring 2024. Therefore the program seems to dramatically reduce equity gaps in advanced STEM classes.

Equity gaps in our courses for Latinx and Black/African American students remain for all of our first semester courses except for PHYS 180A and PHYS 180B. There are no equity gaps for Fall 2023 and Spring 2024 semesters in these courses. However, there are also no posted successes for any Black/African American students. Additionally, we find that there were no successes for Black/African American students in PHYS 196 for these semesters even though there were successes for PHYS 195. This is puzzling and requires further investigation. Please see "Practice Reflection" for more information.

Review Outcomes Report. Review the unit’s outcomes assessment process for 2023 - 2024. Discuss connections to unit goals/action plans/resource requests.
The goal of this year has been to revise the CLO's for all Physics courses. There have been two important reasons for this need. The first is that we have faculty who are interested in alternative forms of assessing students in class. As part of this journey, faculty have been discussing standards for all of the Engineering physics courses (PHYS 195/PHYS 196/PHYS 197). These discussions have resulted in the need for clearer versions of the CLO's for courses. This also ties into our resource request for classroom accessories to increase student engagement.

Secondly, as a result of previous outcome's assessment, there has been an increased interest in the need for more science skills based physics labs. Physics labs have always held the dual purpose of showing students how concepts in the course apply to real world situations and developing scientific inquiry skills. As physics lab equipment becomes simpler, more demonstrations can be done in class and the lab can be left to more open experimentation. Several faculty have been involved in increasing student's ability to create experimental questions, form hypotheses, analyze data, and draw conclusions. New CLO's reflect these science process skills. This also ties into our resource request for simpler lab equipment that is easier for students to set up and use.

Provide any edits or updates to the prompts originally documented in the Practice Reflection section for Year 3.
Although there isn't much data yet for PHYS 180A and 180B, the finding that there are no equity gaps for Latinx students is amazing. Since it is a small course, the faculty are more aligned in terms of their approaches to teaching. Professor Martinez has led the faculty in the use of equity-based practices and Professor Hinton has

been a strong co-conspirator in this. Professors Martinez and Hinton and other physics faculty have been working on increasing engagement in the classroom. Most faculty spend at least part of their class time allowing students to work on problems in groups. Moveable whiteboards spend time in transit from one classroom to the next where they are in heavy use. Faculty have also been using small scale classroom equipment and laptop computers to allow students to interact with physical phenomena or animations of mathematical models. We are proud to report that many faculty have moved to OER for their class materials and many are using worksheets in their classes to give students time to practice while under the guidance of instructors and with the company of their fellow classmates.

In response to our low success rates in PHYS 195, faculty designed a new PHYS 19 course to help students who need a bridge into the PHYS 195 course. Irena Stojimirovic create the course outline and moved it through the curriculum process. Jamie Hinton and Jen Snyder worked with faculty to create the course content and modules. The course is OER and uses interactive lessons where students are able to explore basic physics concepts and the application of mathematical concepts to physical systems. The course was offered in Summer 2024 with high enrollment. Faculty from across the district advertised the course to their students. Early evaluation of the course shows high student satisfaction, but these results need further reflection.

YEAR 4 Updates (2025 - 2026)

Provide any edits or updates to the prompts originally documented in the Executive Summary section for Year 4.

The 2024/25 year has seen significant turmoil for the PHYS program, but also many successes. The most significant change has been the loss of our contract faculty member, Joseph Martinez. Joseph was hired in Fall 2023. He provided leadership for our PHYS 100 course and also taught in our PHYS 180 series. He led efforts to close equity gaps and served on committees to improve diversity in STEM. He was a popular instructor and valuable member of our department. Professor Martinez was very happy at Mesa College and would have considered it as his permanent home. However, salary and compensation were not adequate for him to survive economically and he was able to get a similar position with significantly higher compensation to allow him to support a family. We wish him the very best, but the loss has been a significant blow to our growth as a department.

We have several excellent adjunct faculty members who teach in our physics department, but find ourselves in the position of needing to recruit, hire, and train new faculty. As a result, our current contract faculty are stretched by this need and some new faculty may not be getting the support that they should. During FALL 2025 and SPRING 2026, 64% of FTEF is staffed by adjunct instructors.

Additionally, our Engineering Program has been unraveling and PHYS faculty have been trying to hold the program together. The Engineering discipline is part of our department as a whole which makes us feel responsible for its health. The program is also essential to enrollment in physics courses. Physics courses are primarily service courses for other programs. We have physics majors, but they do not account for the majority of our enrollment. The Biology, Health Professional and Engineering programs provide the majority of our students. This year we had a small surge in PHYS enrollment due to the deadline for prerequisites for the 2026 Radiological Technology program. Otherwise, the majority of our physics courses serve the Engineering Program. The Engineering program currently has no contract faculty due to one recent retirement and one faculty member on indefinite leave. This has left that program in a similar position as PHYS in that there are several newly hired faculty who need support. The physics faculty have been picking up that slack. Our contract physics faculty are experts in the area of student development and classroom teaching, but they lack the expertise in Engineering to fully support these faculty.

We feel very confident about the potential of our new and long-serving adjunct faculty in both PHYS and ENGE. We are excited to work with them, but we are at a breaking point in our ability to do so. We need more contract faculty in both areas and will be putting in requests in this area.

The second area of concern for PHYS is in student support. Physics faculty have long been advocates for tutoring. Our faculty member, Dr. Irena Stojimirovic fought for and created the Peer Mentoring program at Mesa College. Dr. Jamie Hinton led that program last year as part of the HSI STEM grant. Prof. Claude Mona organizes the program for the Physics department at this time. Peer Mentoring has been extremely important to the success of our PHYS 190 and PHYS 180 series students and for building our robust Physics community. We feel strongly that this program has improved retention and student success in our courses and in the Engineering program as a whole. We are extremely concerned about the future of this program. We understand that the funding that supports this program is in jeopardy and we would like to be a part of finding ways to institutionalize the program.

Peer Mentoring provides support for our PHYS 190 and 180 series students, but our PHYS 125 and PHYS 100

level students are not part of that program. Faculty have been asking for embedded tutors for these courses with little success. These courses tend to attract students with more varying degrees of preparation in math. Dr. Jennifer Snyder reports that in her classroom she tries to support students with these backgrounds with moderate success. Support systems are built into the course, but many students need more individualized attention and more than one instructor can give. The course has a good success rate, but the number of students who drop or fail is still unsatisfactory. Dr. Snyder also points out that the students who drop out or fail are not random, most of the students who drop in the first few weeks are part of traditionally underserved groups. These are students who would benefit from very specific support that an embedded tutor could provide. It is frustrating that tutoring won't work with this course and also that they won't communicate with faculty.
Our current PHYS faculty are amazing and continue to be dedicated to student success in the classroom and in leadership positions. Dr. Irena Stojimirovic is our department chair. She has been tireless in her support of our students and faculty. Dr. Stojimirovic completed her sabbatical project that helps to improve the PHYS 197 course and has also made it her mission to improve faculty compensation due to the loss of Professor Martinez. Dr. Jamie Hinton was involved as the Peer Mentoring coordinator as part of the HSI-STEM grant. He worked on the leadership team and provided the team objective perspectives on their programs. Prof. Claude Mona is currently working as the Peer Mentoring faculty liaison and can often be found in MS 118 working with students and mentors alike. Dr. Jennifer Snyder is the Co-chair of the department. Dr. Snyder has finished creating a free homework system for PHYS 125 and 126, supported in part by the HSI-STEM grant. Dr. Hinton and Dr. Snyder completed the creation of the PHYS 19 course, which prepares students to take PHYS coursework. This course is directed at students who have never taken physics or who feel that they need preparation. The course has been offered four times and has been completely enrolled.

Provide any edits or updates to the prompts originally documented in the Data Reflection section for Year 4.
PHYS course offerings have started to return to their pre-pandemic levels. We have had a small bump in both FTEF and enrollment in the 2024/25 semesters due to our PHYS 100 course. Students who take this course need it for prerequisites for the Radiological Technology program. This program accepts cohorts every two years and requires coursework to be completed in the Fall semester. There were 8 sections of PHYS 100 in Fall of 2025 and all were completely enrolled. We will move back to 4 sections in Spring 2026 and ramp up again in Spring 2027 for the next cycle of Rad Tech students. We have been having trouble with enrollment of our PHYS 197 course and have moved to offering it in the Spring only. However, Spring 2026 saw a huge increase in interest in the course across all campuses. We will be meeting with our transfer counselors to delve more deeply into this phenomenon in order to make future plans. We hope to offer PHYS 197 in both Fall and Spring for the future. Our PHYS 195, 196, 125 and 126 courses continue to fill. We have increased offerings of PHYS 195 and hope to sustain this.
PHYS 180/181/A/B have found their footing at Mesa College. This was a new course at Mesa during this assessment cycle. The courses have had strong enrollment, but we are still working on placing the courses so that they don't overlap with other courses in the student's pathway. We will be working more closely with our partners in CHEM, BIOL, and MATH.
Course success and completion rates have been rising steadily in the post-pandemic landscape. Overall Success is up to 82% (from 69% in 2019/20) in PHYS as a whole and completion is up to 92% (from 79%). These are amazing results that are due to hard work on behalf of our faculty who have been working on a variety of student engagement strategies. However, Equity gaps remain for both our Latine and Black/African American students even in the last 3 years in which we have seen increases in success overall.
We have been experimenting with a Hybrid modality for the PHYS 100 that has mostly paid off. Completion and Success in this course is fairly high, but it is higher for students in the Hybrid modality than those in the On Campus. The Hybrid modality also has no equity gaps, whereas there are gaps for Black/African American students. We will continue to monitor this, but feel hopeful about these findings.
The most difficult course in our department continues to be PHYS 195. Course success rates are increasing and have hit an all-time high of 67%. The better news is that these courses have reduced the equity impacts for Black/African American students. Equity gaps completely disappear for among these students in our PHYS 196 courses. Although Female students only comprise 25% of enrollment in PHYS 195, equity gaps are more likely for our Male students.
Upon closer inspection, we notice that there are also no equity gaps for Black/African American students in our PHYS 125 and 180A courses in the last 2 years. Unfortunately, our PHYS 180A course shows NO Black/African American enrollment for 2023/24 and 2024/25. I am told that this is because the statistical program suppresses

data that is lower than a certain number. We can't track changes in our equity gaps or enrollment for this group, which is an issue. It is alarming to have such low enrollment for Black/African American students because PHYS 180A is a course for students interested in careers in Biology (or Pre-med, Pharmacy, Physical Therapy, etc..) who want to transfer to UC schools. It is possible that Black/African American students interested in these careers are opting to take PHYS 125 instead. Whereas this pathway will take students to where they need to go, it is a concern because we need to know more about why these students are not choosing to pursue transfer to UC schools. This will be a focus in our next assessment cycle.

Review Outcomes Report. Review the unit's outcomes assessment process for 2024 - 2025. Discuss connections to unit goals/action plans/resource requests.
All of the CLO's for all PHYS courses have been completed in this cycle. Most students met the Target in most courses. Students in PHYS 19, 125, PHYS 195, 196, and 197 missed targets in Critical Thinking or Communication. The PHYS 19 target is hard to explain. This course is a credit/no credit, non-transferable course that we are still working to evaluate. Now that the course has been offered for 4 semesters, we will complete a more thorough review. Faculty in PHYS 125, 195, 196 and 197 have more concerns about CLO's. Faculty are struggling with student reliance on AI for homework and lab work completion. They feel like it is leading to less critical thinking skills. They are also finding students unwilling to struggle with learning in general. Instead of accessing their own study skills, students appear to ask AI for help for most questions. Faculty are also noticing that students appear to be afraid of risk. They don't want to make mistakes, but unfortunately, they need to. Specifically, students are struggling with interpreting data in the lab and creating written and graphical analysis. Drawing conclusions using uncertainty is also a problem.
In response, faculty are prepared to emphasize these skills more prominently in both lecture and lab and to create an environment in class that encourages students to make mistakes and build personal thinking skills.

Provide any edits or updates to the prompts originally documented in the Practice Reflection section for Year 4.
This is the end of this Assessment Cycle. We are feeling confident about the health of the physics program. In the next cycle, we plan to take a deep dive into our data to create new goals and update the ones that we have currently. Our biggest concerns center on getting new Contract faculty in our area, sustaining our Peer Mentoring program and increasing opportunities for students to develop critical thinking and communication skills in our introductory PHYS courses. We also plan to reach out to our Biology and Counseling peers to investigate the enrollment (or lack there of) of Black/African American students in our PHYS 180A course.

YEAR 5 Updates (2026 - 2027)
Provide any edits or updates to the prompts originally documented in the Executive Summary section for Year 5.

Provide any edits or updates to the prompts originally documented in the Data Reflection section for Year 5.

Review Outcomes Report. Review the unit's outcomes assessment process for 2025 - 2026. Discuss connections to unit goals/action plans/resource requests.
Provide any edits or updates to the prompts originally documented in the Practice Reflection section for Year 5.

Unit Goals, Action Plans, and Updates

Goal 1: Increase Enrollment in PHYS 100

Unit Goal: Goal 1: Increase enrollment in PHYS 100 and second semester courses such as PHYS 196 and PHYS 197.

Goal Status: Active

Beginning Year: 2022 - 2023

Projected Completion Year: 2025 - 2026

Mapping

Mesa College Strategic Plan: Roadmap to Mesa2030:

- **Completion - Objective 3:** Design and promote programs and services that intentionally target a reduction in equity gaps in completion outcomes (✓)
- **Pathways and Partnerships - Objective 3:** Increase community engagement, experiential learning, integrated career planning, and workforce training to prepare students for future careers (✓)
- **Scholarship - Objective 2:** Evaluate and improve Diversity, Equity, and Inclusion practice in classroom environments, campus activities, departments, schools, and administrative units (✓)
- **Scholarship - Objective 3:** Assess impact of prerequisites and corequisites on student success and revise curriculum, as needed (✓)
- **Scholarship - Objective 4:** Expand the use of innovative and high-quality teaching, learning, and support practices that achieve equitable outcomes and increase student success (✓)

Action Plans	Updates
Action Plan Status: Active **Action Plan:** 1. Complete proposal for separate PHYS 100 lecture and lab 2. Continue to monitor success in PHYS 100 hybrid course 3. Participate in outreach events such as JumpStart and STEM Student Success and prepare written materials for advising events **Action Plan Cycle:** 2025 - 2026, 2024 - 2025, 2023 - 2024, 2022 - 2023	**Submission Date**: 01/16/2026 **Action Plan Update**: We have increased enrollment in PHYS 100. The proposal to separate PHYS 100 into lecture and lab is stalled. **Update Year**: 2025 - 2026 **Action Plan Progress**: Barriers Encountered **Submission Date**: 11/27/2024 **Action Plan Update**: The proposal for PHYS 100 is complete, but is waiting on action from City College which has programs that rely on the course. The PHYS 100 hybrid course continues to be successful and has high enrollment. New materials for Jump Start were created in Spring 2024. We will use them in Spring 2024. **Update Year**: 2024 - 2025 **Action Plan Progress**: Completed **Submission Date**: 01/12/2024

Action Plans	Updates
	Action Plan Update: This goal is in progress. The proposal to separate PHYS 100 into separate lecture and lab is in the curriculum review process waiting for program changes from City College. The PHYS 100 hybrid course has been offered for three semesters and has been an enrollment success. Faculty have been involved in outreach events, but need more visibility. **Update Year**: 2023 - 2024 **Action Plan Progress**: Barriers Encountered

Goal 2: Increase Student Success in PHYS 125, PHYS 195, and PHYS 196.

Unit Goal: Goal 2: Increase Student success in PHYS 125, PHYS 195, and PHYS 196.

Goal Status: Active

Beginning Year: 2022 - 2023

Projected Completion Year: 2025 - 2026

Mapping

Mesa College Strategic Plan: Roadmap to Mesa2030:

- **Scholarship - Objective 2:** Evaluate and improve Diversity, Equity, and Inclusion practice in classroom environments, campus activities, departments, schools, and administrative units (✓)
- **Scholarship - Objective 3:** Assess impact of prerequisites and corequisites on student success and revise curriculum, as needed (✓)
- **Scholarship - Objective 4:** Expand the use of innovative and high-quality teaching, learning, and support practices that achieve equitable outcomes and increase student success (✓)
- **Stewardship - Objective 3:** Increase student access and schedule efficiency by coordinating schedules among departments/disciplines (✓)

Action Plans	Updates
Action Plan Status: Active	**Submission Date**: 01/16/2026 **Action Plan Update**: Most of the action plan items are complete. Only action plan item 2. Expand Peer Mentoring Program continues to be an obstacle. **Update Year**: 2025 - 2026 **Action Plan Progress**: Barriers Encountered
	Submission Date: 11/27/2024

Unit Goals, Action Plans, and Updates

Action Plans	Updates
Action Plan: 1. Renovate classrooms to increase student collaboration. 2. Expand Peer Mentoring Program. 3. Continue work with the STEM Curriculum workgroup to explore Math prerequisites and connections to other disciplines and clear pathways for students. 4. Prepare curriculum proposals to change math prerequisites to PHYS 100, PHYS 125, PHYS 180A courses. 5. Prepare, present, and evaluate PHYS 19 course in Intersession 2024. **Action Plan Cycle:** 2025 - 2026, 2024 - 2025, 2023 - 2024, 2022 - 2023	**Action Plan Update**: We continue to request funds for classroom redesign, but have not been successful. Peer Mentoring continues to be a very successful program, but we have not been able to expand it to other areas due to funding and other constraints. We are on track with the STEM Curriculum workgroup. Math prerequisites have been created for PHYS 180A. PHYS 100 and PHYS 125 will not be changed at this time, but changes may occur due to AB1111. PHYS 19 has been successfully created and offered during Summer 2024. **Update Year**: 2024 - 2025 **Action Plan Progress**: Barriers Encountered **Submission Date**: 01/12/2024 **Action Plan Update**: This goal is in progress. One classroom has been renovated. We still hope for a second. Peer Mentoring continues to be popular and has expanded into the PHYS 180 series. Faculty have continued their work with the HSI STEM curriculum workgroup. Math prerequisites are problematic at this time due to AB 1705. Curriculum has been held up at district and outcomes of the legislation have left the fate of physics course prerequisites and transfer unclear. PHYS 19 has made it through the curriculum process. The course was not ready for Intersession 2024. We hope for it to be complete for Summer 2024. **Update Year**: 2023 - 2024 **Action Plan Progress**: Barriers Encountered

Goal 3: Decrease Equity Gaps in PHYS 125, PHYS 195, and PHYS 196.

Unit Goal: Goal 3: Decrease equity gaps in PHYS 125, PHYS 195, and PHYS 196.

Goal Status: Active

Beginning Year: 2022 - 2023

Projected Completion Year: 2025 - 2026

Mapping

Mesa College Strategic Plan: Roadmap to Mesa2030:

- **Completion - Objective 3:** Design and promote programs and services that intentionally target a reduction in equity gaps in completion outcomes (✓)
- **Scholarship - Objective 2:** Evaluate and improve Diversity, Equity, and Inclusion practice in classroom environments, campus activities, departments, schools, and administrative units (✓)
- **Scholarship - Objective 3:** Assess impact of prerequisites and corequisites on student success and revise curriculum, as needed (✓)
- **Scholarship - Objective 4:** Expand the use of innovative and high-quality teaching, learning, and support practices that achieve equitable outcomes and increase student success (✓)

Unit Goals, Action Plans, and Updates

Action Plans	Updates
Action Plan Status: Active **Action Plan:** 1. Identify more clearly reading and writing problems for students in PHYS courses. 2. Expand work on potentially impactful practices such as community building and mastery grading. **Action Plan Cycle:** 2025 - 2026, 2024 - 2025, 2023 - 2024, 2022 - 2023	**Submission Date**: 01/16/2026 **Action Plan Update**: Equity gaps still remain and will need to be reevaluated in the next cycle. The Action Plans items were completed. **Update Year**: 2025 - 2026 **Action Plan Progress**: Completed **Submission Date**: 11/27/2024 **Action Plan Update**: These action plans are still in progress, but on track. **Update Year**: 2024 - 2025 **Action Plan Progress**: On Track **Submission Date**: 01/12/2024 **Action Plan Update**: Plans are in progress. Practices in community building and mastery grading have been expanded and refined in PHYS 125, PHYS 195, and PHYS 196. Identification of reading and writing problems have taken a lower priority to problems that students are having with mathematics preparation due to AB 1705. **Update Year**: 2023 - 2024 **Action Plan Progress**: On Track

Lab Redesign

Unit Goal: Increase attainment of Communication CLO through innovative lab design

Goal Status: Active

Beginning Year: 2024 - 2025

Projected Completion Year: 2026 - 2027

Mapping

Mesa College Strategic Plan: Roadmap to Mesa2030:

- **Scholarship - Objective 2:** Evaluate and improve Diversity, Equity, and Inclusion practice in classroom environments, campus activities, departments, schools, and administrative units (✓)
- **Scholarship - Objective 4:** Expand the use of innovative and high-quality teaching, learning, and support practices that achieve equitable outcomes and increase student success (✓)

Unit Goals, Action Plans, and Updates

Action Plans	Updates
Action Plan Status: Active **Action Plan:** Attain new lab equipment that allows for greater student experimentation. **Action Plan Cycle:** 2024 - 2025	
Action Plan Status: Active **Action Plan:** Rewrite Lab activities to focus on science inquiry skills. **Action Plan Cycle:** 2024 - 2025	