

# Program Review 2021-2022

**Biology**

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## General Information (Program Review 2021-2022)

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## 2021/22 Program Review

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### 2021/22 PROGRAM REVIEW FORM

**Form:** 2021/2022 Program Review (See appendix)

## Reference Section

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**MESA2030 COMPREHENSIVE MASTER PLAN**

**ROADMAP TO MESA2030: STRATEGIC PLAN 2021-2026**

**MESA DATA DASHBOARDS**

# Requests Forms

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REQUEST PORTAL

# Appendix

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A. **2021/2022 Program Review (Form)**

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# Form: "2021/2022 Program Review"

Created with : Taskstream

Participating Area: Biology

## 2021/2022 Program Review

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### (REQUIRED) Name of Lead Writer and Manager/Service Area Supervisor

Lead Writers - Anne Geller & Anar Brahmhatt

Dean - Paloma Vargas

### (REQUIRED) In what ways (if any) did changes to an online/remote modality due to COVID-19 impact student success and equity in your area/program? Please provide evidence.

The Biology department has traditionally experienced some of the highest enrollment numbers in the college (at or above 100%) and as we return this spring 2022 semester to fully in campus teaching, this trend continues. We teach our courses with rigor but are ever mindful of our diverse student population and the challenges that they face. Many of us in the department make regular modifications to our curriculum that might best serve our students, speaking to them and observing any changes in success rates. The change to the online/remote modality created a disproportionately higher equity gap overall in both the Black and LatinX student population when compared to student success prior to the COVID-19 impact. These student populations were already disproportionately affected prior to Fall 2020, and were far more negatively impacted as consequence of the online format than other student groups:

**Biology program (all classes) f2f (prior to fall 20)** - overall success rate 70.6%

highest performing groups by ethnicity: Asian (77.3%), white (77.7%), Filipino 71.4%)

disproportionate equity gaps by percentage point index: black - 14.1% gap Latinx - 9.6% gap

disproportionate equity gaps by 80% calculation: black -20.5% , no gap for Latinx

**Biology program (all classes) online synchronous (due to COVID-19)** - overall success rate 71.8%

Highest performing groups by ethnicity: Asian (82.9%), white (78.9%), Filipino (76.7%)

disproportionate equity gaps by percentage point index: black - 18.9% gap Latinx - 11% gap

disproportionate equity gaps by 80% calculation: black - 28.9% Latinx - 17.5%

### **Additional challenges/analyses:**

There was a significant increase in academic dishonesty (especially Sp2020 when we switched to remote instruction). For example, there was a 77% success rate in Bio 230 that semester vs. a historical average of 59% success rate prior to Fall 2020 (which seemed to be in part due to the inability of instructors to appropriately proctor exam-taking while virtual). There was also a significant rise in the number of students who had to be reported for academic dishonesty during the online/remote semesters in many of our courses. Based on the data supplied by Claudia Perkins (Student Rights and Responsibilities Coordinator in the Office of Student Affairs), her office saw roughly 12 academic sanctions forms per semester across the campus before the move to remote teaching (prior to Spring 2020). In the Biology department alone, the number of academic sanctions forms submitted to this office rose to unprecedented numbers (64 forms in the Spring 2020 semester, 42 forms in the Fall 2020 semester, and 12 forms (again for Biology alone) in the Spring 2021 semester). According to Claudia, this rise in academic dishonesty was so rampant that a Student Affairs Academic Advisory Committee was developed specifically to address this issue and find ways to work with students, instructors, and administration to remediate this problem.

Instructors also recognized that many of the students we taught in the fall 20/sp 21 semesters were not our usual Mesa students. Many were university students enrolled elsewhere that chose to take remote classes at community colleges instead of online instruction at their institutions. This is possibly another confounding variable that should be considered when drawing conclusions from data regarding success in remote vs f2f instruction.

Lab classes (especially 200 level for biology & allied health majors) were challenging for both faculty to create comparable lab experiences and for students to learn using remote modalities, therefore it necessitated the return to f2f classes asap. For lab based courses offered at the community college level in our district, there was no effective on-line equivalent substitute found in which microscopes, dissections, understanding of physiological principles and anatomical structures, and executing a multitude of hands-on laboratory procedures are inherent in biology laboratories. Additionally, there was significant concern that remaining remote in lab classes would jeopardize articulation and transfer, and since we normally have a high transfer rate for STEM & allied health majors, it would negatively impact all of our students if we continued to remain remote.

### **(REQUIRED) What practices has your area/program implemented since the last program review cycle that you would like to improve/continue? Identify impacts on student success and equity.**

Biology 107 is our largest offering in the biology department. This non-majors course is taken by students campus wide to fulfill general education requirements and to prepare our Allied Health Students for future classes in Anatomy, Physiology, and Microbiology. It was necessary for faculty to revamp the entire lab curriculum to be fully virtual during the COVID-19 pandemic. From this, there were some new activities developed that faculty felt would be able to transition to use within the face-to face lab. As one of the Biology CLOs involves Skills and technology, one main goal of the Biology 107 manual rewrite was to incorporate more data analysis and graphing. During the last CLO assessment approximately 25% of Bio 107 students did not successfully create graphs when assigned to do so at home, therefore it was imperative that enough computers for student use be made available for the face-to-face version of these lab activities. Currently, these lab rooms only

have a few laptops for demonstration purposes. Students need to be able to utilize Google Sheets and more importantly Microsoft Excel. Thus, we are requesting computers that are more sophisticated than Chromebooks (to eliminate the connectivity issues associated with Chromebooks that run through the cloud instead of the actual device). Lab courses allow for students to actively participate in their learning and to apply the concepts of the class to real-world, problem-based examples that enhance comprehension and retention. Lab courses also allow students to work in small groups, building classroom community and connecting with their instructors one-on-one as they explore new concepts and get personal feedback and attention, especially when delivered face-to-face. Classrooms that foster an active learning environment where students get personalized attention are essential to closing equity gaps and increasing success of historically excluded groups of students. In addition, the lab activities teach valuable technology skills that our students may use in the future careers, or at the very least that students may read about when trying to understand scientific literature and serve as informed citizens and voters. An on-campus version of the lab curriculum needs to be implemented and maintained in order to ensure student success and decrease these equity gaps. With the return to face-to-face laboratories, we will require new equipment to ensure that all students have equitable access to materials to complete the lab exercises successfully. The purchase of student laptops for the biology 107 classrooms will allow Bio 107 instructors to teach students important data analysis and graphing skills real time, rather than relying on them to figure these technology skills out on their own at home. Having at least one laptop per table allows all students to directly interact with the technology and analyze data alongside the instructor, which is more effective for their learning than simply having a classroom demonstration. In addition, the purchase of UV transilluminators will significantly increase the effectiveness and safety of our DNA technology lab in 107, thereby allowing our students to gain increased understanding of the techniques and underlying concepts and ultimately allowing them to perform better in the class overall. We are requesting these items in BARC in order to implement these positive changes/improvements for this course.

Individual instructors have been analyzing their own personal equity data and we have begun meeting regularly to discuss strategies for improvement. As a department, we have noticed equity gaps for Black/African American and LatinX students, similar to that which is seen in the college as a whole. Faculty have seen an increase in student success rates in our classes that have peer mentors (ie. F20/Sp21 Bio 210A) and imbedded tutors (bio 160/biol 230) versus those classes that do not, and an increase in individual student success for those who attend sessions with the peer mentor as compared to those who did not.

Additionally, we also analyzed Tutoring data from the STEM center and recognized that when students used the tutors, the equity gaps for these disproportionately affected groups closed. The biggest challenge we found was in actually getting the students utilize the tutoring services. In Fall 2020 only 37 biology students sought tutoring, and those in that group attended an average of 8 sessions. This evidence indicates that those who chose to seek out tutoring services felt it benefited them to continue attending. As a department we have been collaboratively strategizing ways to increase our students' use of tutoring, as we see a correlation between those students who attend tutoring sessions and increased student success. While some students find the Zoom sessions convenient, many students have commented that they prefer in-person tutoring, especially our anatomy students who benefit from using the models available to them in the STEM center. We would like to see perhaps, some type of hybrid system for tutoring in the future, including increasing tutoring hour availability in the evenings/weekends for those students who cannot attend during the day.

We would like to have more classes utilize the peer mentor and embedded tutor program, but we have difficulty finding students who are qualified, capable and willing to participate in these programs. Many of our strongest students take our classes and then transfer soon afterwards, and are therefore unavailable to work in these programs. Faculty will continue to request these resources and to recommend qualified students with the hopes of expanding these opportunities for our students.

After making changes to curriculum and procedures such as holding remote office hours, some faculty have decided to continue with some of these even after returning face to face. For example, some faculty are offering some face to face, and some virtual office hours to better accommodate student needs. Some instructors have utilized some of the materials they created during remote teaching due to COVID-19 such as pre-recorded lectures and interactive activities, to increase active learning during the face to face instruction time. We are hoping that these changes have a positive impact on student success and equity.

**(REQUIRED) What practices has your area/program implemented since the last program review cycle that you would like to change/discontinue? Identify impacts on student success and equity.**

Faculty recognized very quickly as we went into remote teaching and learning that even though we tried to come up with creative ideas and utilize various resources for our lab classes, such as student lab kits and 3D anatomy programs, remote instruction would not be viable for the long term and was not in the best interest for our biology students. We had an increased incidence of cheating in our classes, especially in the spring 20 semester, and without the ability to use Proctorio or some other program to limit a student's ability to utilize outside resources while taking exams, we had difficulty maintaining rigor and academic integrity. As an example, student success in Bio 230, historically one of our most challenging classes for students with an average student success rate of around 60% had a 77% success rate in Spring 20. One might simply look at the numbers and conclude that online education was successful for these students, however more careful analysis from individual instructors would demonstrate that specific students that were in the D or even F range prior to going remote, ended up with C, B or even low A's after going remote due to the ability to utilize additional resources while taking exams. This brings home the point that looking at data is important, but analysis of data can be skewed based on the interpretation of the individual conducting the analysis. Thankfully, we were able to schedule some of our most challenging courses face to face in the Fall 21 semester to better help with maintaining academic rigor, and additionally, ensuring that our lab classes would be transferable. Many of the nursing programs and graduate programs our biology students transfer into will not accept on-line laboratories, therefore returning to in person instruction especially in our 200 level courses was a huge priority. We are looking forward to bringing back 100% of our lab classes face to face in the Spring 22, as we continue to work on improving student success and equity.

Prior to COVID-19, some biology faculty began an initial discussion regarding the creation of a general biology (or human biology) course specifically for allied health majors. Since over 50% of our course offerings (by FTEF) are in the allied health track fields (Bio 230/235/205) and require a biology prerequisite, we believe that a biology course better tailored to prepare students for the rigors of these specific courses could contribute to higher student success and equity. This course could be tailored more to human biology with appropriate coverage of biological chemistry principles needed for the allied health students, with less or no coverage of principles of ecology/botany which do not correlate to topics covered in the allied health courses. There is already a precedent for the creation of allied-health specific courses within the Chemistry department, and we will be consulting with our chemistry colleagues and the articulation office to look further into developing this curriculum. A similar human biology course exists at neighboring San Diego community colleges (such as the Bio 100 course offered at Mira Costa Community College). Development of this course would also allow us to modify our current Bio 107 course to better meet the needs of

students requiring a lab science for transfer but who are not entering into fields of biology, which could contribute to increased student success and equity in the bio 107 course.

**(REQUIRED) What college-wide practices implemented since the last program review cycle have affected your area/program positively or negatively? Identify impacts on student success and equity.**

Additional grant money for STEM center was provided since the last Program review cycle, allowing for purchase of additional anatomy models which will have a positive effect on student success once the STEM center reopens.

Our Microbiology course (BIOL 205) has experienced a number of setbacks including the inability to obtain new autoclaves to replace the two unreliable autoclaves that we currently are trying to work with. Prior to the COVID pandemic, we had been approved for purchase of the new autoclaves, however, since that time, this decision has been reevaluated, temporary solutions have been implemented instead, including the servicing of the older equipment and purchasing of pre-made media (very costly and unsustainable), and we have been asked for repeated justification of our need for this equipment. Previously funds were not allocated for a service contract until recently and now even with the contract and the most recent repairs made, we are still having intermittent issues with the autoclaves, preventing us from effectively running this course and properly accommodating our laboratory needs. These periodic breakdowns and wait time for temporary repairs throughout each semester have prevented us from being able to adequately meet the needs of this course. This delay has caused a decrease in the number of sections that we can offer and has drastically affected laboratory prep. Autoclaves are used to sterilize media (food for the microorganisms that we grow and study in this course). They are also used to decontaminate biological waste created in our lab courses. These autoclaves support not only the BIOL 205 course but several other biology courses that rely on media preparation and waste decontamination. We have had to cancel lab activities or create alternative (sometimes only partial) lab activities in the absence of working autoclaves. We hope to obtain working autoclaves that we can rely on to counter the negative impact we've dealt with thus far.

We have not seen a sustained increase to our overall department budget in recent years, preventing us from confidently increasing our course offerings in these high demand courses without having to make cuts in other areas. There does not seem to be a transparent mechanism within the college as to how we should address our growing budgetary needs. We will need additional funding to our overall budget, as well as additional full-time faculty if we are to ever be able to expand our microbiology course offerings, one of our most highly impacted courses. Prior to the pandemic, we had scored very high on the faculty hiring priority list for our Microbiology faculty position request, however, due to the hiring freeze during the pandemic this positioning was lost and we have had to reapply. Time taken away from faculty for further curriculum development and student interactions has diminished in light of the additional time spent to reapply for this position and to provide justification again for other departmental needs, like the autoclaves. In addition to our request for an additional microbiology faculty member, we are requesting a full-time anatomy/physiology instructor as we have been unable to find qualified adjunct instructors (which has led to the cancellation of classes). We also require augmentation to our budget for our BIOL 210A course as faculty have recognized increased student success and a more equitable outcome when decreasing the number of students working together in lab groups from 4 to 2. Having students work in groups of 2 versus 4 provides them with a more

hands-on experience with tools/equipment (allowing them to become more proficient) and builds their STEM identity as they now have more ownership over their data/experiments. This comes at a significant cost increase, however, as the biotechnology kits required for these labs are expensive to begin with and modifying the lab structure will double the cost of each section. While there is an initial cost with this budget increase that we are hoping for, this is not a request that we ask for lightly but instead with careful consideration with the intention of providing additional resources to our students in the way of additional faculty and lab experiences that challenge students but are equity-minded.

Lastly, the district decision to limit reimbursement for conference travel to those states that discriminate against certain under-represented groups has negatively impacted faculty attendance at conferences that could contribute to the faculty's professional growth/learning regarding student success, equity and inclusion. While the decision is well-intentioned, perhaps some thought could be put into some alternatives or other forms of support for faculty to help with professional development. These conferences allow us to bring back information on cutting-edge technology and innovations that we share with our students as well as best practices in teaching. We would welcome a discussion to develop those alternatives to allow for growth and an opportunity for faculty to continue serving their students.