CNM ANNUAL STUDENT LEARNING ASSESSMENT REPORT

Due to the Student Academic Assessment Committee by October 15

Central New Mexico Community College

PART 1: REPORT INFORMATION

Report Year and Contact Information

Academic Year	Contact Person	CNM Email	CNM Office Extension
2018-2019	Erica Voges or Barbara Gilbert	evoges@cnm.edu or bgilbert4@cnm.edu	X52680 or x53014

Subject of this Report

MSE--PHYSICS_AS--Physics Degree

PART 2: CONTEXT IN WHICH THE ASSESSMENT TOOK PLACE

Program/Area Highlights and Successes (Wherever applicable, include course completion rates, job placement outcomes, and licensing examination pass rates. See the program information dashboard at https://livecnm.sharepoint.com/sites/Dashboards/SitePages/Program%20Information%20Dashboard.aspx (access restricted to CNM employees) and other reports at https://www.cnm.edu/depts/opie.)

We have faculty that are passionate about student success and a strong physics curriculum that emphasizes problem solving and analysis.

Changes Implemented During the Past Year in Support of Student Learning

Faculty increased the amount of problem-solving happening during physics lectures.

PART 3: REPORT ON ASSESSMENT OF STUDENT LEARNING

Assessment Method	Type of Assessment Tool	Population or Course(s) Assessed	Graduate Learning Outcome(s) Assessed	Mastery Level (E.g., "Minimum score of 3 on a rubric scaled 0-4" or "Minimum score of 75%")	Targeted % Achieving Mastery	Outcome
Final exam question.	Direct & Internal	PHYS 1710	Construct a free body diagram, apply Newton's Laws, solve the equations, describe the relationships between physical quantities in the equations, and conduct dimensional analysis.	Minimum score of 5 on a problem scored 0 – 10.	59%	Target met
Final exam question.	Direct & Internal	PHYS 1710	Use the principles of work, conservation of energy, and/or conservation of momentum to solve a Newtonian mechanics problem; describe the relationships between physical quantities in the equations; and conduct dimensional analysis.	Minimum score of 5 on a problem scored 0 – 10.	58%	Target met
Final exam question.	Direct & Internal	PHYS 1810	Use the first and/or second law of thermodynamics to interpret heat, work, and internal energy; describe relationships between physical quantities in the equations; and conduct dimensional analysis.	Minimum score of 5 on a problem scored 0 – 10.	51%	Target met

Group observations.	Direct & Internal	PHYS 1792	Collaborate respectfully and effectively with peer group using basic laboratory equipment safely to conduct experiments, collect data, and/or analyze data via graphs/equations.	Minimum score of 3 on an observation rubric scored 0 – 4.	86%	Target met
Final exam question.	Direct & Internal	PHYS 2710	Use the principles of ray optics, wave optics, or quantum mechanics to solve an equation and conduct dimensional analysis.	Minimum score of 5 on a problem scored 0 – 10.	86%	Target met
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Summary of Assessment Findings

Each of the SLOs addressed within the physics lectures was a multi-part SLO, containing a problem set-up, solution, and analysis of the results. Although each of the these pieces were awarded separate points, the final score for each problem was the sum of the scores on each individual piece. This allowed us to acknowledge success when, for example, a student did not get the correct final answer, but did successfully set up the problem and manipulate the equations.

In our lecture courses for our physics and engineering majors, we require a minimum score of 50% on the cumulative final exam for a student to pass the course. The student learning outcomes (SLOs) that we addressed in our lecture courses this year were assessed with problems assigned on the final exam. Therefore, for our lecture courses, it made sense to set a minimum of 50% on the assessment problems as the minimum score to pass the assessment.

In PHYS 1710 (Calculus-based Physics I), we assessed two student learning outcomes (SLOs), as indicated in the table above. Both were assessed during the final exam. Seventy-three students were assessed. For the first SLO, the average score was a 5.7 out of 10 points, and 59% of the students met the target score of at least 5/10 points. For the second SLO, the average score was a 5.4 out of 10 points, and 58% of the students met the target score of at least 5/10 points.

In PHYS 1810 (Calculus-based Physics II), we assessed one SLO, as indicated in the table above. The SLO was assessed during the final exam. Forty-three students were assessed. The average score was a 5.1 out of 10 points, and 51% of the students met the target score of at least 5/10 points.

In PHYS 1792 (Calculus-based Physics I Laboratory), we assessed one SLO, as indicated in the table above. The SLO was assessed during the 10th week of the semester, during an in-class experiment. The SLO was assessed through faculty observation of groups working together during the experiment. Seven groups were assessed on four skills essential to successful collaboration and given a score of 0 – 4 for each skill. The average score for the four skills for the seven groups was 3.6 out of 4, and 86% of the groups met the target score of at least 3/4 points.

In PHYS 2710 (Calculus-based Physics III), we assessed one SLO, as indicated in the table above. The SLO was assessed during the final exam. Eighteen students were assessed. The average score was a 7.4 out of 10 points, and 86% of the students met the target score of at least 5/10 points.

Interpretation of Assessment Findings

Overall, our lecture students did well solving complex, multi-part physics problems. At each level, at least 51% of the students met or exceeded our target minimum score. In Physics III, a significantly larger percentage of the students passes, and we attribute this to two things: a more straight-forward assessment question, as well as a student population that is further along in its physics degree.

Action Plan in Support of Student Learning (Describe changes to be made that are based at least in part on the assessment interpretation. If the assessment did not yield useful information, describe changes to be made in the assessment methodology and/or criteria.)

Our students are currently doing a good job mastering the content of the first two years of the physics major. We hope that with our continued emphasis on problem setting, problem solving, and problem analysis, our students will continue to grow in these areas.

Please select all of the following that characterize the types of changes described in the above action plan:

- ☐ Assessment criteria revision
- ☐ Assessment methodology revision
- ☐ Assignment revision
- ☐ Budgetary reallocation
- ☐ Change in teaching approach
- ☐ Course content revision
- ☐ Curricular Revision
- ☒ Faculty training/development
- ☐ Process revision

Recommendations, Proposals, and/or Funding Requests	Budget Needed
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PART 4: REMAINING YEARS IN CURRENT ASSESSMENT CYCLE PLAN (including any revisions) **– OR -- UPCOMING ASSESSMENT CYCLE PLAN** (if this was the final year)

Years of Full Cycle	**Next Year's Assessment Focus** (Describe how the next planned assessment is expected to provide information that can be used toward improving student learning.)
Fall 2019-Spring 2025	The next planned assessments will provide information regarding our students' mastery of fundamental physics problem solving skills.

Graduate Learning Outcomes to Be Assessed	Years in which Assessment Is Planned	Population/Courses to Be Assessed	Planned Assessment Approach
Construct a free body diagram, apply Newton's Laws, solve the equations, describe the relationships between physical quantities in the equations, and conduct dimensional analysis.	Fall 2021 – Spring 2023	Physics 1310	Final exam question
Use the principles of work, conservation of energy and/or conservation of momentum to solve a Newtonian mechanics problem, describe the relationships between physical quantities in the equations, and conduct dimensional analysis.	Fall 2019 – Spring 2021	Physics 1310	Final exam question
Use the first and/or second law of thermodynamics to interpret heat, work and internal energy, describe relationships between physical quantities in the equations, and conduct dimensional analysis.	Fall 2021 – Spring 2023	Physics 1320	Final exam question
Use Ohm's Law and Kirchoff's Laws to find currents in circuit branches and voltage drops across circuit elements.	Fall 2019 – Spring 2021	Physics 1320	Final exam question
Collaborate respectfully and effectively with peer group using basic laboratory equipment safely to conduct experiments, collect data, and/or analyze data via graphs/equations.	Fall 2023 – Spring 2025 Fall 2023 – Spring 2025	Physics 1310L Physics 1320L	Instructor laboratory observation coupled with peer evaluation.
Use the principles of ray optics, wave optics, or quantum mechanics to solve an equation and conduct dimensional analysis.	Fall 2023 – Spring 2025	Physics 2310	Final exam question
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