

Degree:
2023-2024 Assessment Plan

	Student Learning Outcome #1	<p>SLO#1: Develop proficiency in critical thinking.</p> <p>Students will learn about basic concepts of quantum mechanics, Schrodinger's equation and wave functions (PHYS 4320, Quantum Mechanics), and about light-matter interaction; interference; diffraction; spectroscopy; photonics and lasers; fiber optics (PHYS 4480, Optics). These courses are used to assess SLO #1.</p>
PLAN	Assessment Method(s)	<p>The students will be tested, late in the semester, their written exams will be collected and copied before being returned to them. For each area investigated the results below are given in terms of how the student scores are distributed on the skill levels 1-4, with skill level 1 being the lowest and skill level 4 being the highest. Following skills are used in the assessment process:</p> <ol style="list-style-type: none"> I. Attaching the correct meaning to the given information with proper units. II. Identifying for what the physics problem is asking. III. Identifying the physics relationships that need to be used. IV. Correct application of mathematics and reaching the correct numerical solution. <p>Their distribution is indicated with percentages in the Rubric. In calculating the percentages, we used the following procedure: For each student in each skill investigated, we obtained scores by averaging those received from faculty members. Then, for each area investigated, we calculated the percentage of students that fall within each skill level.</p> <p>*Skill levels:</p> <p>Level 1: Unacceptable – 1 point. The student's answer is very poor.</p> <p>Level 2: Poor – 2 points. The student's answer is acceptable.</p> <p>Level 3: Acceptable– 3 points. The student's answer has minor deficiencies.</p> <p>Level 4: Well done – 4 points. The student shows command of the subject.</p>
	Proficiency	<p>We will use a 4-point rubric to assess SLO #1. The minimum acceptable score is 3 out of 4.</p>

DO	Benchmark	We aim at 86% of students scoring at or above skill level 3.																																																																								
	Results of Assessment	<p>Based on the above data, we reached our goal of 86% cumulative threshold at or above Level #3 for all skills I-IV. Thus, we consider that Outcome 1 is met. Since every year we test a relatively small number of students, it is more helpful to compare this year's results (combined) with the cumulative results of the past few years. Such cumulative results and combined results are as follows:</p> <table><tr><th>SKILL</th><th>LEVEL 1</th><th>LEVEL 2</th><th>LEVEL 3</th><th>LEVEL 4</th><th>TOTAL > 3</th></tr><tr><td>I</td><td>0.0%</td><td>0.0%</td><td>0.0%</td><td>100.0%</td><td>100.00%</td></tr><tr><td>II</td><td>0.0%</td><td>0.0%</td><td>22.2%</td><td>77.8%</td><td>100.00%</td></tr><tr><td>III</td><td>0.0%</td><td>0.0%</td><td>44.4%</td><td>55.6%</td><td>100.00%</td></tr><tr><td>IV</td><td>0.0%</td><td>0.0%</td><td>11.1%</td><td>88.9%</td><td>100.00%</td></tr></table>	SKILL	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	TOTAL > 3	I	0.0%	0.0%	0.0%	100.0%	100.00%	II	0.0%	0.0%	22.2%	77.8%	100.00%	III	0.0%	0.0%	44.4%	55.6%	100.00%	IV	0.0%	0.0%	11.1%	88.9%	100.00%																																										
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STUDY	Analysis of Results	<p>CUMULATIVE DATA FOR OUTCOME 1, 2009-2023 (156 Students)</p> <table><tr><th>CUMULATIVE 2009-2023</th><td>156</td><td></td><td></td><td></td><td></td></tr><tr><th>SKILL</th><th>LEVEL 1</th><th>LEVEL 2</th><th>LEVEL 3</th><th>LEVEL 4</th><th>TOTAL > 3</th></tr><tr><td>I</td><td>0.3%</td><td>2.4%</td><td>18.2%</td><td>79.0%</td><td>97.28%</td></tr><tr><td>II</td><td>1.0%</td><td>3.8%</td><td>24.0%</td><td>69.6%</td><td>93.54%</td></tr><tr><td>III</td><td>2.3%</td><td>5.0%</td><td>27.3%</td><td>64.2%</td><td>91.49%</td></tr><tr><td>IV</td><td>2.3%</td><td>10.1%</td><td>31.1%</td><td>54.1%</td><td>85.21%</td></tr></table> <p>COMPARATIVE DATA FOR OUTCOME 1, 2023-2024 vs. 2009-2023</p> <table><tr><th colspan="3">COMPARATIVE 2023-2024 VS 2009-2023</th><td></td><td></td><td></td></tr><tr><th>SKILL</th><th>LEVEL 1</th><th>LEVEL 2</th><th>LEVEL 3</th><th>LEVEL 4</th><th>TOTAL > 3</th></tr><tr><td>I</td><td>-0.34%</td><td>-2.39%</td><td>-18.24%</td><td>20.96%</td><td>2.72%</td></tr><tr><td>II</td><td>-0.98%</td><td>-3.80%</td><td>-1.73%</td><td>8.19%</td><td>6.46%</td></tr><tr><td>III</td><td>-2.26%</td><td>-4.97%</td><td>17.18%</td><td>-8.67%</td><td>8.51%</td></tr><tr><td>IV</td><td>-2.26%</td><td>-10.12%</td><td>-20.00%</td><td>34.79%</td><td>14.79%</td></tr></table> <p>The comparative data reveals an incremental improvement as shown in the last column, but due to poor statistics, this cannot be relied upon. We will continue to monitor comparative statistics for tracking purposes.</p>	CUMULATIVE 2009-2023	156					SKILL	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	TOTAL > 3	I	0.3%	2.4%	18.2%	79.0%	97.28%	II	1.0%	3.8%	24.0%	69.6%	93.54%	III	2.3%	5.0%	27.3%	64.2%	91.49%	IV	2.3%	10.1%	31.1%	54.1%	85.21%	COMPARATIVE 2023-2024 VS 2009-2023						SKILL	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	TOTAL > 3	I	-0.34%	-2.39%	-18.24%	20.96%	2.72%	II	-0.98%	-3.80%	-1.73%	8.19%	6.46%	III	-2.26%	-4.97%	17.18%	-8.67%	8.51%	IV	-2.26%	-10.12%	-20.00%	34.79%	14.79%
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<p>ACT</p>	<p>Improvement Plan for 2024-2025</p>	<p>This action plan was created in AY2020-2021 and targeted SLO #2 in PHYS-4370 and PHYS-4320, giving an additional assignment targeting the noted deficiencies. No further action plan was implemented in AY2023-2024 as all targets were met the previous AY. A similar plan has worked nicely in bringing up the scores in both courses in previous years. However, in AY2019-2020 a higher-than-desired number of students still scored on Level #4 for SLO #2 in PHYS-4370. In AY2023-AY2024 this target focused on the “logically structured presentation” of mathematical skills of our students; and we wanted to understand better how those skills developed, as the course progressed. We therefore implemented a tracking assignment, like what was done, in AY2020-AY2021, in PHYS-4370 and in PHYS 4320. We assessed for SLO #2 an assigned problem around the midway point of the semester in addition to a problem at the end of the semester. This allowed us to gauge the mathematical skills at two different points in the semester to track development. Hence our target was met in SLO #2 in AY2023-2024.</p> <p>*PHYS 4480 was not offered in AY2023-2024, so the data only consists of PHYS 4320 and PHYS 4370 students.</p> <p>While we met all our targets in AY 2023-2024, we will discuss additional plans with Physics faculty in Fall of 2024 and raise our goals for upcoming academic year for continued improvement. These plans will be revealed in our Action Plan in Fall 2024.</p>
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Degree:
2023-2024 Assessment Plan

	Student Learning Outcome #2	<p>SLO#2 Develop mathematical models and standard derivations in Physics.</p> <p>Students will learn about basic concepts of quantum mechanics, Schrodinger's equation and wave functions (PHYS 4320, Quantum Mechanics), and about crystal structure, crystal dynamics, energy bands in crystalline solids, semiconductors, magnetism, and superconductivity (PHYS 4370, Solid State Physics). These courses are used to assess SLO #2.</p>
PLAN	Assessment Method(s)	<p>The students will be tested, late in the semester, their written exams will be collected and copied before being returned to them. For each area investigated the results below are given in terms of how the student scores are distributed on the skill levels 1-4, with skill level 1 being the lowest and skill level 4 being the highest. Following skills are used in the assessment process:</p> <ol style="list-style-type: none"> I. Attaching the correct meaning to the given information with proper units. II. Identifying for what the physics problem is asking. III. Identifying the physics relationships that need to be used. IV. Correct application of mathematics and reaching the correct numerical solution. <p>Their distribution is indicated with percentages in the Rubric. In calculating the percentages, we used the following procedure: For each student in each skill investigated, we obtained scores by averaging those received from faculty members. Then, for each area investigated, we calculated the percentage of students that fall within each skill level.</p> <p>*Skill levels:</p> <p>Level 1: Unacceptable – 1 point. The student's answer is very poor.</p> <p>Level 2: Poor – 2 points. The student's answer is acceptable.</p> <p>Level 3: Acceptable– 3 points. The student's answer has minor deficiencies.</p> <p>Level 4: Well done – 4 points. The student shows command of the subject.</p>

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COMPARATIVE 2023-2024 VS 2009-2023

SKILL	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	TOTAL > 3
I	0.00%	-3.17%	-13.77%	18.52%	4.75%
II	-0.32%	-4.54%	-28.89%	33.51%	4.62%
III	-0.32%	-5.42%	-23.38%	28.91%	5.53%
IV	-0.32%	-6.23%	-8.98%	16.30%	7.33%

The comparative data reveals an incremental improvement as shown in the last column, but due to poor statistics, this cannot be relied upon. We will continue to monitor comparative statistics for tracking purposes.

ACT	Improvement Plan for 2024-2025	
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Degree:
2023-2024 Assessment Plan

	Student Learning Outcome #3	<p>SLO#3: Communicating Physics processes in writing.</p> <p>Students will learn about crustal structure, crystal dynamics, energy bands in crystalline solids, semiconductors, magnetism, and superconductivity (PHYS 4370, Solid State Physics), and about light-matter interaction; interference; diffraction; spectroscopy; photonics and lasers; fiber optics (PHYS 4480, Optics). These courses are used to assess SLO #3.</p>
PLAN	Assessment Method(s)	<p>The students will be tested, late in the semester, their written exams will be collected and copied before being returned to them. For each area investigated the results below are given in terms of how the student scores are distributed on the skill levels 1-4, with skill level 1 being the lowest and skill level 4 being the highest. Following skills are used in the assessment process:</p> <ol style="list-style-type: none"> Attaching the correct meaning to the given information with proper units. Identifying for what the physics problem is asking. Identifying the physics relationships that need to be used. Correct application of mathematics and reaching the correct numerical solution. <p>Their distribution is indicated with percentages in the Rubric. In calculating the percentages, we used the following procedure: For each student in each skill investigated, we obtained scores by averaging those received from faculty members. Then, for each area investigated, we calculated the percentage of students that fall within each skill level.</p> <p>*Skill levels:</p> <p>Level 1: Unacceptable – 1 point. The student’s answer is very poor.</p> <p>Level 2: Poor – 2 points. The student’s answer is acceptable.</p> <p>Level 3: Acceptable– 3 points. The student’s answer has minor deficiencies.</p> <p>Level 4: Well done – 4 points. The student shows command of the subject.</p>
	Proficiency	<p>We will use a 4-point rubric to assess SLO #1. The minimum acceptable score is 3 out of 4.</p>

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	Results of Assessment	<p>COMBINED DATA FOR OUTCOME 3*, 2023-2024 (3 students)</p> <p>The following table illustrates the results of our analysis for the 2023-2024 AY:</p> <table><tr><th>SKILL</th><th>LEVEL 1</th><th>LEVEL 2</th><th>LEVEL 3</th><th>LEVEL 4</th><th>TOTAL > 3</th></tr><tr><td>I</td><td>0.00%</td><td>0.00%</td><td>0.00%</td><td>100.00%</td><td>100.00%</td></tr><tr><td>II</td><td>0.00%</td><td>0.00%</td><td>0.00%</td><td>100.00%</td><td>100.00%</td></tr><tr><td>III</td><td>0.00%</td><td>0.00%</td><td>11.11%</td><td>88.89%</td><td>100.00%</td></tr><tr><td>IV</td><td>0.00%</td><td>0.00%</td><td>33.33%</td><td>66.67%</td><td>100.00%</td></tr></table> <p>Based on the above data, we reached our goal of 86% cumulative threshold at or above Level #3 for all skills I-IV. Thus, we consider that Outcome 3 is met. Since every year we test a relatively small number of students, it is more helpful to compare this year's results (combined) with the cumulative results of the past few years. Such cumulative results and combined results are as follows:</p>	SKILL	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	TOTAL > 3	I	0.00%	0.00%	0.00%	100.00%	100.00%	II	0.00%	0.00%	0.00%	100.00%	100.00%	III	0.00%	0.00%	11.11%	88.89%	100.00%	IV	0.00%	0.00%	33.33%	66.67%	100.00%																																										
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