Program Assessment Plan

American University

Academic Program: CAS: Physics - BS

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Contact Person for Assessment: Teresa Larkin
Unit's Primary Department: Physics
COLA Reader -1: Brian Yates
COLA Reader -2: Melissa Becher

Learning Outcome: Understanding of the Foundations in Physics

Students will be able to demonstrate their understanding of the foundations in physics (classical mechanics, computational physics, electricity and magnetism, modern physics, waves and optics, and quantum mechanics) by demonstrating competence in the major through appropriate homework assignments and examinations, particularly in their upper-level physics courses. Homework assignments within this learning outcome refer specifically to more traditional forms of mathematical and problem solving activities common to all physics classes (including lower-level introductory classes).

Outcome Year: 2010-2011
2011-2012
Start Date: 11/01/2010
Outcome Status: Active Learning Outcome

Assessment Plan

Assessment Measure	Target	Schedule/Cycle	Active
Measure 4 (Direct): Review of students' written research papers and oral presentations in Senior Capstone Seminar course. **Measure Type:** Final Paper/ Final Project	Scores on faculty-developed rubric for research paper. Scores on faculty-developed rubric for oral presentation.	Data reviewed on a bi-annual basis, Rubric analysis conducted by a minimum of two physics faculty members.	Yes
Measure 1 (Direct): Samples of student work (including homework, exams, papers, and/ or projects) from selected 300-level and above physics courses obtained form student portfolios. **Measure Type:** Written Assignment	Scores on faculty-developed rubrics for final exams, papers, and/ or projects. Chronological grade distribution of homework scores (i.e. do individual student's homework scores show improvement from semester to semester?)	Data collected every other semester a given course is offered. Data is reviewed annually by a committee consisting of at least 50% of the physics faculty.	Yes
Measure 5 (Direct): Review of students' written laboratory work and oral presentations in Experimental Physics (PHYS-440). **Measure Type:** Written Assignment	Scores on faculty-developed rubric for written laboratory report. Scores on faculty-developed rubric for oral presentation.	Data reviewed on a bi-annual basis. Rubric analysis conducted by a minimum of two physics faculty members.	Yes
Measure 6 (Indirect): End of semester student knowledge/communication skills survey in selected upper-level physics classes. **Measure Type:** Survey	Surveys will reveal a positive response from a majority of student respondents.	Data reviewed semi-annually by all physics faculty.	Yes
Measure 7 (Direct): Conceptual Assessment surveys in selected upper-level physics classes. **Measure Type:** Survey	Students score above the means that have been reported at the national level. (Note: The target will vary depending on the assessment and data available.) Students show comparable or	Data collected each semester a given course is offered. Data is reviewed bi-annually by a committee consisting of at least 50% of the physics faculty.	Yes

Assessment Plan			
Assessment Measure	**Target**	**Schedule/Cycle**	**Active**
	better success than the expected success from the papers.		
Measure 8 (Direct): Obtain data on national standardized physics subject tests that our students take. **Measure Type:** Quiz/ Exam	Students score in the 75% percentile or higher nationally.	Data will be collected semi-annually and reviewed during a faculty meeting where at least 75% of the faculty is present.	Yes

Learning Outcome: Problem Solving

Students will be able to competently solve appropriate problems in upper level physics courses using increasingly important computational and mathematical tools, such as Mathematica. Specific courses include: PHYS-365 (Waves and Optics), PHYS-430 (Classical Mechanics), PHYS-450 (Electricity and Magnetism), and PHYS-470 (Introduction to Quantum Mechanics).

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2011-2012
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Outcome Status: Active Learning Outcome

Assessment Plan			
Assessment Measure	**Target**	**Schedule/Cycle**	**Active**
Measure 1 (Direct): Samples of student work (including homework, exams, papers, and/ or projects) from selected 300-level and above physics courses obtained form student portfolios. **Measure Type:** Written Assignment	Scores on faculty-developed rubrics for final exams, papers, and/ or projects. Chronological grade distribution of homework scores (i.e. do individual student's homework scores show improvement from semester to semester?)	Data collected each semester a given course is offered. Data is reviewed annually by a committee consisting of at least 50% of the physics faculty.	Yes
Measure 6 (Indirect): End of semester student knowledge/ communication skills survey in selected upper-level physics classes. **Measure Type:** Survey	Surveys will reveal a positive response from a majority of student respondents.	Data reviewed semi-annually by all physics faculty.	Yes
Measure 8 (Direct): Obtain data on national standardized physics subject tests that our students take. **Measure Type:** Quiz/ Exam	Students score in the 75% percentile or higher nationally.	Data will be collected semi-annually and reviewed during a faculty meeting where at least 75% of the faculty is present.	Yes

Related Courses

- PHYS-365 - Waves and Optics
- PHYS-430 - Classical Mechanics
- PHYS-450 - Electricity and Magnetism
- PHYS-470 - Introduction to Quantum Mechanics

Learning Outcome: Experimental Design

Students will be able to demonstrate competency in experimental design and scientific data collection and analysis.

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Assessment Plan			
Assessment Measure	**Target**	**Schedule/Cycle**	**Active**
Measure 1 (Direct): Samples of student work (including homework, exams, papers, and/ or projects) from selected 300-level and above physics courses obtained form student portfolios. **Measure Type:** Written Assignment	Scores on faculty-developed rubrics for final exams, papers, and/ or projects. Chronological grade distribution of homework scores (i.e. do individual student's homework scores show improvement from semester to semester?)	Data collected each semester a given course is offered. Data is reviewed annually by a committee consisting of at least 50% of the physics faculty.	Yes
Measure 5 (Direct): Review of students' written laboratory work and oral presentations in Experimental Physics (PHYS-440). **Measure Type:** Written Assignment	Scores on faculty-developed rubrics for final exams, papers, and/ or projects. Chronological grade distribution of homework scores (i.e. do individual student's homework scores show improvement from semester to semester?)	Data reviewed on a bi-annual basis. Rubric analysis conducted by a minimum of two physics faculty members.	Yes
Measure 6 (Indirect): End of semester student knowledge/ communication skills survey in selected upper-level physics classes. **Measure Type:** Survey	Surveys will reveal a positive response from a majority of student respondents.	Data reviewed semi-annually by all physics faculty.	Yes

Learning Outcome: Scientific Information

Students will be able to demonstrate competency in their understanding of scientific information, both orally and in writing.

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2011-2012
Start Date: 11/01/2010
Outcome Status: Active Learning Outcome

Assessment Plan			
Assessment Measure	**Target**	**Schedule/Cycle**	**Active**
Measure 1 (Direct): Samples of student work (including homework, exams, papers, and/ or projects) from selected 300-level and above physics courses obtained form student portfolios. **Measure Type:** Written Assignment	Scores on faculty-developed rubrics for final exams, papers, and/ or projects. Chronological grade distribution of homework scores (i.e. do individual student's homework scores show improvement from semester to semester?)	Data collected each semester a given course is offered. Data is reviewed annually by a committee consisting of at least 50% of the physics faculty.	Yes
Measure 4 (Direct): Review of students' written research papers and oral presentations in Senior Capstone Seminar course. **Measure Type:** Final Paper/ Final Project	Scores on faculty-developed rubric for research paper. Scores on faculty-developed rubric for oral presentation.	Data reviewed on a bi-annual basis, Rubric analysis conducted by a minimum of two physics faculty members.	Yes
Measure 5 (Direct): Review of students' written laboratory work and oral presentations in Experimental Physics (PHYS-440). **Measure Type:** Written Assignment	Scores on faculty-developed rubric for written laboratory report. Scores on faculty-developed rubric for oral presentation.	Data reviewed on a bi-annual basis. Rubric analysis conducted by a minimum of two physics faculty members.	Yes

Assessment Plan			
Assessment Measure	**Target**	**Schedule/Cycle**	**Active**
Measure 6 (Indirect): End of semester student knowledge/ communication skills survey in selected upper-level physics classes. **Measure Type:** Survey	Surveys will reveal a positive response from a majority of student respondents.	Data reviewed semi-annually by all physics faculty.	Yes

Learning Outcome: Integrate Knowledge and Skills

Upon taking the foundational courses in physics (classical mechanics, computational physics, electricity and magnetism, modern physics, waves and optics, and quantum mechanics) students will be able to integrate competently the knowledge and skills acquired in the major and have adequate preparation to succeed in post-undergraduate studies or in a professional career.

Outcome Year: 2010-2011
2011-2012
Start Date: 11/01/2010
Outcome Status: Active Learning Outcome

Assessment Plan			
Assessment Measure	**Target**	**Schedule/Cycle**	**Active**
Measure 1 (Direct): Samples of student work (including homework, exams, papers, and/ or projects) from selected 300-level and above physics courses obtained form student portfolios. **Measure Type:** Written Assignment	Scores on faculty-developed rubrics for final exams, papers, and/ or projects. Chronological grade distribution of homework scores (i.e. do individual student's homework scores show improvement from semester to semester?)	Data collected each semester a given course is offered. Data is reviewed annually by a committee consisting of at least 50% of the physics faculty.	Yes
Measure 2 (Indirect): Email departmental survey of graduating seniors and recent alumni. **Measure Type:** Survey	Surveys reveal a positive response from a majority of respondents.	Email surveys sent on an annual basis. Survey summaries are reviewed annually by all physics faculty.	Yes
Measure 3 (Indirect): Telephone interviews with students in graduate school. **Measure Type:** Alumni Feedback	Interviews reveal a positive majority response.	Telephone interviews conducted on an annual basis. Interviews summaries are reviewed annually by all physics faculty.	Yes
Measure 8 (Direct): Obtain data on national standardized physics subject tests that our students take. **Measure Type:** Quiz/ Exam	Students score in the 75% percentile or higher nationally.	Data will be collected semi-annually and reviewed during a faculty meeting where at least 75% of the faculty is present.	Yes
Measure 4 (Direct): Review of students' written research papers and oral presentations in Senior Capstone Seminar Course. **Measure Type:** Presentation	Scores on faculty developed rubrics for research paper and oral presentation. Summary survey administered at end of semester.	Results to be reviewed at the end of each fall term the course is offered.	Yes

Related Courses

- PHYS-365 - Waves and Optics
- PHYS-370 - Modern Physics
- PHYS-430 - Classical Mechanics

- PHYS-450 - Electricity and Magnetism
- PHYS-470 - Introduction to Quantum Mechanics