

**Minnesota State University Moorhead
Assessment Plan Cover Sheet**

Note: All programs will complete this form as part of their biennial assessment report.

Degree Program: BS Physics

Department: Physics and Astronomy

College: CSNS

Is this a new assessment plan or a revision of an existing plan? New Revision

1. Name(s) of Department Assessment Coordinator and/or Assessment Committee Members

Rich Lahti, coordinator
Linda Winkler, department chair

2. List of All Student Learning Outcomes. (List all outcomes, placing an asterisk (*) by the outcomes you are assessing in this two-year reporting cycle.)

- 1.* Demonstrate basic knowledge of experimental and theoretical physics.
2. Apply analytical thinking, mathematical analysis, and computational techniques to the solution of problems.
3. Reach both quantitative and qualitative conclusions from experimental and observational data.
4. Apply analytical thinking, instrumentation skills, and computer techniques to perform experiments.
- 5.* Design and carry out an independent research.

3. Explain how the student learning outcomes are appropriate to department or program goals, as identified in your most recent Quality Improvement Plan.

From 6-year report, 2004: The Department of Physics and Astronomy prepares students for a wide variety of careers based on an undergraduate degree and also prepares students who plan on attending graduate or professional schools (goals 1 and 5). The major strengths of the physics program include its emphasis on active learning using computers as tools for data collection and analysis (goals 2, 3, and 4), opportunities for undergraduate research (goal 5), and internship opportunities.

4. Signatures

Department Chair or Program Director

Dean or Director

Required Attachments:

1. Assessment Planning Forms
2. Records of department meetings when Assessment Plan was discussed and approved.

For SLOAC Use:

SLOAC Hearing Date:
Rejected

SLOAC Decision: Approved

Suggestions to Department (see attached)

**Minnesota State University Moorhead
Assessment Planning Form**

Instructions: Complete and print a copy of this page for each student learning outcome being assessed during the following two year period.

Academic Program: BS Physics

1. Identify Student Learning Outcome in the box below:

GOAL 1: Demonstrate basic knowledge of experimental and theoretical physics.

2. Which MSUM mission goals are addressed by this learning outcome? (check all that apply)

<input checked="" type="checkbox"/> Knowledge/content <input checked="" type="checkbox"/> Intellectual development <input type="checkbox"/> Talents <input type="checkbox"/> Critical thinking <input type="checkbox"/> Oral communication <input type="checkbox"/> Written communication <input type="checkbox"/> Mathematics <input type="checkbox"/> Multiculturalism/diversity	<input type="checkbox"/> Information literacy <input type="checkbox"/> Lifelong learning <input type="checkbox"/> Service <input type="checkbox"/> Citizenship <input type="checkbox"/> Responsibility and ethics <input type="checkbox"/> Global understanding <input type="checkbox"/> Other: <input type="checkbox"/> Other:
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3. How is this learning outcome addressed in the program’s curriculum? Identify the courses or extra-curricular opportunities that address this outcome.

1st year: PHY 200/201

2nd year: PHY 202/322

3rd and 4th year: PHY 330/PHY 370/PHY 399/PHY 430

Students receive both an introductory and more advanced treatment of: mechanics, electricity and magnetism, thermodynamics, and modern physics.

4. What methods of assessment will be used for this outcome? (Specify instrument and submit electronically plan.)

Major Field Test in Physics:

This is a multiple-choice test administered online by Educational Testing Service, which:

1. tests students' grasp of fundamental principles through their ability to solve applied problems;
2. probes mastery of the first three years of undergraduate physics study;
3. provides subscores for six topic areas (Classical Mechanics, Electricity and Magnetism, Thermodynamics, Quantum physics, Special topics such as nuclear physics, and miscellaneous areas such as computational/mathematical physics).

5. Who is assessed? When are they assessed?

Seniors graduating in May, 2006.

The test will be administered in late April (target date=4/22/2006).

6. Who is responsible in the department for this assessment?

Chairperson administers major field test: Linda Winkler

7. What is level of student performance is expected for this outcome?

Each student will achieve 80% or better in each subtopic tested.

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Assessment Planning Form**

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Academic Program: BS Physics

1. Identify Student Learning Outcome in the box below:

GOAL 2: Apply analytical thinking, mathematical analysis, and computational techniques to the solution of problems.

2. Which MSUM mission goals are addressed by this learning outcome? (check all that apply)

<input checked="" type="checkbox"/> Knowledge/content <input type="checkbox"/> Intellectual development <input type="checkbox"/> Talents <input checked="" type="checkbox"/> Critical thinking <input type="checkbox"/> Oral communication <input type="checkbox"/> Written communication <input checked="" type="checkbox"/> Mathematics <input type="checkbox"/> Multiculturalism/diversity	<input checked="" type="checkbox"/> Information literacy <input type="checkbox"/> Lifelong learning <input type="checkbox"/> Service <input type="checkbox"/> Citizenship <input type="checkbox"/> Responsibility and ethics <input type="checkbox"/> Global understanding <input type="checkbox"/> Other: <input type="checkbox"/> Other:
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3. How is this learning outcome addressed in the program’s curriculum? Identify the courses or extra-curricular opportunities that address this outcome.

1st year: PHY 200/201
 2nd year: PHY 350
 3rd and 4th year: PHY 330, PHY 370, PHY 430

4. What methods of assessment will be used for this outcome? (Specify instrument and submit electronically plan.)

PHY 350--computational assignment evaluated using a departmentally approved rubric. A mathematically rigorous problem assigned in PHY 330 OR PHY 370 OR PHY 430 evaluated using a departmentally approved rubric. These rubrics are under development, and will be available by Spring 2007.

5. Who is assessed? When are they assessed?

Spring 2007: all physics majors in PHY 350
 Spring 2007 or Fall 2007 or Spring 2008: all physics majors in PHY 330 OR PHY 370 OR PHY 430

6. Who is responsible in the department for this assessment?

Instructor of record for PHY 350

Instructor of record for PHY 330 OR PHY 370 OR PHY 430

7. What is level of student performance is expected for this outcome?

All physics majors will receive an Acceptable or higher rating for each category on the rubric.

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Assessment Planning Form**

Instructions: Complete and print a copy of this page for each student learning outcome being assessed during the following two year period.

Academic Program: BS Physics

1. Identify Student Learning Outcome in the box below:

GOAL 3: Reach both quantitative and qualitative conclusions from experimental and observational data.

2. Which MSUM mission goals are addressed by this learning outcome? (check all that apply)

<input type="checkbox"/> Knowledge/content	<input checked="" type="checkbox"/> Information literacy
<input type="checkbox"/> Intellectual development	<input type="checkbox"/> Lifelong learning
<input type="checkbox"/> Talents	<input type="checkbox"/> Service
<input checked="" type="checkbox"/> Critical thinking	<input type="checkbox"/> Citizenship
<input checked="" type="checkbox"/> Oral communication	<input type="checkbox"/> Responsibility and ethics
<input checked="" type="checkbox"/> Written communication	<input type="checkbox"/> Global understanding
<input checked="" type="checkbox"/> Mathematics	<input type="checkbox"/> Other:
<input type="checkbox"/> Multiculturalism/diversity	<input type="checkbox"/> Other:

3. How is this learning outcome addressed in the program's curriculum? Identify the courses or extra-curricular opportunities that address this outcome.

1st year: PHY 200/201
2nd year: PHY 305/306
4th year: PHY 455

4. What methods of assessment will be used for this outcome? (Specify instrument and submit electronically plan.)

PHY 306: student presentation will be evaluated according to the PHY 306 rubric attached.

5. Who is assessed? When are they assessed?

Physics majors in PHY 306, once during the semester in Spring 2009 and Spring 2010.

6. Who is responsible in the department for this assessment?

All possible department faculty will be present at the seminars in which experiments are presented. Each faculty will be responsible for submitting the agreed upon department rubric to the PHY 306 instructors. PHY 306 instructors are responsible for summarizing the individual rubrics and submitting a summary for archive.

7. What is level of student performance is expected for this outcome?

All physics majors will receive an Acceptable or higher rating in each category of the rubric pertaining to the goal.

**Minnesota State University Moorhead
Assessment Planning Form**

Instructions: Complete and print a copy of this page for each student learning outcome being assessed during the following two year period.

Academic Program: BS Physics

1. Identify Student Learning Outcome in the box below:

GOAL 4: Apply analytical thinking, instrumentation skills, and computer techniques to perform experiments.

2. Which MSUM mission goals are addressed by this learning outcome? (check all that apply)

<input type="checkbox"/> Knowledge/content	<input checked="" type="checkbox"/> Information literacy
<input type="checkbox"/> Intellectual development	<input type="checkbox"/> Lifelong learning
<input type="checkbox"/> Talents	<input type="checkbox"/> Service
<input checked="" type="checkbox"/> Critical thinking	<input type="checkbox"/> Citizenship
<input checked="" type="checkbox"/> Oral communication	<input type="checkbox"/> Responsibility and ethics
<input checked="" type="checkbox"/> Written communication	<input type="checkbox"/> Global understanding
<input checked="" type="checkbox"/> Mathematics	<input type="checkbox"/> Other:
<input type="checkbox"/> Multiculturalism/diversity	<input type="checkbox"/> Other:

3. How is this learning outcome addressed in the program's curriculum? Identify the courses or extra-curricular opportunities that address this outcome.

1st year: PHY 200/201
2nd year: PHY 305/306

4. What methods of assessment will be used for this outcome? (Specify instrument and submit electronically plan.)

PHY 306: student report will be evaluated according to the PHY 306 rubric.. .

5. Who is assessed? When are they assessed?

Physics majors in PHY 306, once during the semester in Spring 2007 and Spring 2008.

6. Who is responsible in the department for this assessment?

PHY 306 instructors are responsible for summarizing the individual rubrics and submitting a summary for archive.

7. What is level of student performance is expected for this outcome?

All physics majors will receive an Acceptable or higher rating in each category of the rubric pertaining to the goal.

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Assessment Planning Form**

Instructions: Complete and print a copy of this page for each student learning outcome being assessed during the following two year period.

Academic Program: BS Physics

1. Identify Student Learning Outcome in the box below:

GOAL 5: Design and carry out independent research.

2. Which MSUM mission goals are addressed by this learning outcome? (check all that apply)

<input checked="" type="checkbox"/> Knowledge/content	<input checked="" type="checkbox"/> Information literacy
<input type="checkbox"/> Intellectual development	<input checked="" type="checkbox"/> Lifelong learning
<input type="checkbox"/> Talents	<input type="checkbox"/> Service
<input checked="" type="checkbox"/> Critical thinking	<input type="checkbox"/> Citizenship
<input checked="" type="checkbox"/> Oral communication	<input checked="" type="checkbox"/> Responsibility and ethics
<input checked="" type="checkbox"/> Written communication	<input type="checkbox"/> Global understanding
<input type="checkbox"/> Mathematics	<input type="checkbox"/> Other:
<input type="checkbox"/> Multiculturalism/diversity	<input type="checkbox"/> Other:

3. How is this learning outcome addressed in the program's curriculum? Identify the courses or extra-curricular opportunities that address this outcome.

2nd or 3rd and 4th year: PHY 342, PHY 455

4. What methods of assessment will be used for this outcome? (Specify instrument and submit electronically plan.)

PHY 455--departmentally approved senior project rubric

5. Who is assessed? When are they assessed?

All graduating seniors--PHY 455 at end of project

6. Who is responsible in the department for this assessment?

All possible faculty will evaluate the senior project according to an approved rubric. The faculty supervising each project will summarize results and submit for archive.

7. What is level of student performance is expected for this outcome?

All physics majors will receive an Acceptable or higher rating in each category of the rubric.

ASSESSMENT RUBRIC
Senior Project

Scoring

SCORE	SIMPLE DESCRIPTOR	DESCRIPTOR
5	Excellent	Shows conceptual understanding, all essential elements in place, exhibits depth
4	Very good	Shows conceptual understanding, all essential elements in place
3	Acceptable	Shows conceptual understanding, but quantitative analysis is incomplete or incorrect
2	Unacceptable	Misunderstands key concepts and quantitative analysis is incorrect or incomplete
1	Failing	Missing key elements, incomplete or incorrect on a large scale

Components scored, oral presentation:

Component	Score	Comments
Background		
Methods		
Results		
Conclusion		
Understanding		

ASSESSMENT RUBRIC
PHY 306: GOAL 3

Scoring

SCORE	SIMPLE DESCRIPTOR	DESCRIPTOR
5	Excellent	Shows conceptual understanding, all essential elements in place, exhibits depth
4	Very good	Shows conceptual understanding, all essential elements in place
3	Acceptable	Shows conceptual understanding, but quantitative analysis is incomplete or incorrect
2	Unacceptable	Misunderstands key concepts and quantitative analysis is incorrect or incomplete
1	Failing	Missing key elements, incomplete or incorrect on a large scale

Components scored, oral presentation:

Component	Score	Comments
Presentation of results		
Error analysis		
Quantitative comparison of theory and experiment		
Interpretation of results		

ASSESSMENT RUBRIC
PHY 306: GOAL 4

Scoring

SCORE	SIMPLE DESCRIPTOR	DESCRIPTOR
5	Excellent	Shows conceptual understanding, all essential elements in place, exhibits depth
4	Very good	Shows conceptual understanding, all essential elements in place
3	Acceptable	Shows conceptual understanding, but quantitative analysis is incomplete or incorrect
2	Unacceptable	Misunderstands key concepts and quantitative analysis is incorrect or incomplete
1	Failing	Missing key elements, incomplete or incorrect on a large scale

Components scored, report:

Component	Score	Comments
Methods/ instrumentation		
Analysis of results		
Overall experimental skill		
Overall analytical thinking		