

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

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

**Academic Program: B. S. Physics**

**Department: Physics and Astronomy**

**College: CSNS**

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

**Linda Winkler, department chair  
Rich Lahti, assessment coordinator**

**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.\* Conduct independent research.

**3. Signatures**

\_\_\_\_\_  
Department Chair or Program Director

\_\_\_\_\_  
Dean or Director

**Required Attachments:**

1. Assessment Reporting Forms
2. Records of department meetings when Assessment Report was discussed and approved.

---

*For SLOAC Use:*

SLOAC Hearing Date:                      SLOAC Decision:    Approved    Rejected

Suggestions to Department (see attached)

**Minnesota State University Moorhead  
Assessment Reporting 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. Learning outcome assessed.**

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

**2. Assessment measure used for this learning outcome.**

**Major Field Test in Physics**

**3. Expected Student Performance (from assessment plan)**

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

**4. Actual Results (attach additional information, if necessary)**

	<b>TOTAL</b>	<b>SEM</b>	<b>INTRO</b>	<b>ADVANCED</b>
<b>Student 1</b>	<b>138</b>	<b>5.5</b>	<b>39</b>	<b>37</b>
<b>Student 2</b>	<b>139</b>	<b>5.5</b>	<b>31</b>	<b>49</b>

**Total score is normalized to a score from 120-200, with a mean of 146.7 and a standard deviation of 15.6. Therefore, our students scored in the 30th percentile. When converted to a percentage correct, our students scored approximately 35-41% correct in each assessment indicator (see page 5 of attached score interpretation report) to achieve these scaled scores. Therefore, our initial expectations of students correctly answering 80% of the questions (when 50% correct places a student in the 95% percentile on two of the five assessment indicator areas) were too high.**

**NOTE: We are ineligible for scoring based on the 5 assessment indicators until we have a cohort of at least 5 students.**

**5. Proposed action in response to results.** (Please note if improvements can be made with existing department resources. If improvements cannot be made with existing department resources, consider applying for an Instructional Improvement Grant.)

**ETS cautions using the scores to reach conclusions about individual students. The above data represents our first attempt at having our students take the Major Field Test in Physics, and perhaps is best used as a "baseline" so we see where our students perform in the future. We have made several changes to improve our curriculum at especially the sophomore level, which our seniors this year did not benefit from. If scores improve, this may indicate the curriculum changes were appropriate.**

**In an informal way, we asked students who took the major field test for feedback. Student feedback from students #1 and #2 indicated less familiarity with advanced topics such as optics and quantum(wave) mechanics. It should be pointed out that this particular student cohort had not been sophomores the year we began a sophomore sequence (PHY 202 followed by PHY 322) emphasizing physical optics and its relation to modern physics. We would like to improve the experiments we perform in this sophomore sequence, so that students get more hands-on experience with the material. Improving the experimental sequence will require a boost in resources (please see attached Instructional Improvement Grant).**

**Minnesota State University Moorhead  
Assessment Reporting 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:** B. S. Physics

**1. Learning outcome assessed.**

**GOAL 5: Conduct independent research.**

**2. Assessment measure used for this learning outcome.**

**Approved Senior Project Rubric**

**3. Expected Student Performance (from assessment plan)**

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

**4. Actual Results (attach additional information, if necessary)**

**An Acceptable level was achieved in most areas by the two students who completed projects Spring 2006. The exception: student 1 was rated 2.8 (slightly unacceptable) in the Conclusions area. The average faculty ratings are attached for both presentations.**

**Faculty rated both students lowest in Results and Understanding. We see that we need to work with our students in analyzing data and relating the data to physics background.**

**5. Proposed action in response to results.** (Please note if improvements can be made with existing department resources. If improvements cannot be made with existing department resources, consider applying for an Instructional Improvement Grant.)

**Recently (Spring 2006) our experimental sequence PHY 305/PHY 306 went from 2 credits to 4 credits. Neither of the two seniors in this cycle could take advantage of the increase in credits, as the experimental sequence benefits sophomores. We believe this increase in credits will give our students more experience performing experiments in a wide array of physics topics. We also now require student presentations and submission of work to the Student Academic Conference as part of PHY 306, better preparing our students for the senior project presentation. In terms of resources, we are asking for some funding support to allow purchasing experimental equipment to improve the PHY 305/306 sequence. Strengthening this**

**sequence is important for goal 5, because it is this sequence that prepares students for independent experimental research.**

## ASSESSMENT RUBRIC

### Senior Project

Presenter: Senior Project #1 averages from 6 faculty present

Title:

Date: 5/1/2006

### Scoring

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

### Components scored, oral presentation:

<b>Component</b>	<b>Score</b>	<b>Comments</b>
<b>Background</b>	<b>3.9</b>	<b>Understanding present. Had especially difficult time relating classical idea to quantum mechanical.</b>
<b>Methods</b>	<b>3.5</b>	<b>Description of data missing or hard to follow</b>
<b>Results</b>	<b>3.25</b>	<b>Data/error analysis weak</b>
<b>Conclusion</b>	<b>2.8</b>	<b>Conclusion hard to follow, or missing key elements</b>
<b>Understanding</b>	<b>3.08</b>	<b>Qualitative understanding good, missing details</b>

## ASSESSMENT RUBRIC

### Senior Project

Presenter: Senior project 2 averages from 5 faculty present

Title:

Date: 5/1/2006

### Scoring

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

### Components scored, oral presentation:

<b>Component</b>	<b>Score</b>	<b>Comments</b>
<b>Background</b>	<b>3.6</b>	<b>Background could use some more detail</b>
<b>Methods</b>	<b>3.8</b>	<b>Good understanding of equipment</b>
<b>Results</b>	<b>3.6</b>	<b>Analysis weak in parts, not much depth</b>
<b>Conclusion</b>	<b>3.8</b>	<b>Solid conclusion, but not much data</b>
<b>Understanding</b>	<b>3.4</b>	<b>Struggles with questions, not very in depth</b>