

# Academic Degree Programs Assessment

## Guidelines and Template



**Northern Illinois  
University**

Submitted to the University Assessment Panel

AY 2020-2021

College of Liberal Arts and Sciences

Department of Physics

Master of Science

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## 1. Introduction

The physics department has been a unit within the university since before WWII. Physics was originally located in Davis Hall and moved to Faraday in 1964 and La Tourette (then Faraday West) in 1995. The Department has a long time emphasis in condensed matter physics, initiated a high energy physics group in 1986 in response to the commissioning of the Tevatron at Fermilab and established a beam physics program at the turn of the century. In the 1990's NIU began an active involvement with the new Advanced Photon Source at Argonne National Laboratory, and became one of the founding members of the consortium of advanced radiation sources (CARS). The PhD program in physics began in 2000. The department currently has around 50 students in the undergraduate program and approximately the same number of students in the M.S. and Ph.D. programs combined.

The discipline of physics examines the fundamental properties of the physical world; space, time, matter, and energy, and applies analytic reasoning towards an understanding of the laws of nature which govern these phenomena. A primary goal of the department, as a discipline within the college of liberal arts and sciences, is to provide an opportunity for students to explore focused study of a single subject; specifically the reach and power of analytic reasoning in science, one of the critical insights which have led to the modern scientific age.

Another central goal of the department is to prepare students for careers after college. Depending on their long term goals, students have the opportunity to train in one of three emphases; professional physics, physics secondary education, or applied physics. The professional physics emphasis is chiefly designed to train students for further graduate studies in physics or a closely related discipline with the eventual goal of contributing to the creation of new knowledge. Such students are anticipated to eventually work as university faculty, or as scientists in government or industrial research laboratories. The physics secondary education emphasis is intended to lead towards a certification as a high school physics teacher so that students can teach physics in the public schools. The applied physics emphasis trains students in practical applications and problem-solving and prepares students for a broad range of careers in disciplines which require knowledge of physics such as medicine, engineering, chemistry, ecology and the military.

At the graduate level the department trains students in the details of the profession. Students collaborate with faculty in the creation and dissemination of new knowledge. The ultimate goals of our graduate program are to increase our understanding of the world around us, provide technological breakthroughs to improve life, and train a workforce of physical scientists who can serve the state, the nation and society at large.

## 2. Student Learning Outcomes (SLOs)

Graduates of the program will be prepared for successful professional careers in physics by:

1. Knowledge of the basic principles of physics beyond that associated with baccalaureate study of physics.
2. Ability to use complex experimental or theoretical techniques to pose and solve problems related to those basic principles.
3. Tenacity, diligence, and use of specific methodology for the practice of physics

### 3. Program-by-Baccalaureate Student Learning Outcomes Matrix

This third section of the assessment plan is an alignment of your degree program student learning outcomes with the university baccalaureate student learning outcomes. **This applies only to undergraduate degree programs.**

### 4. Curriculum Map

| Course   | 1. Knowledge of the principles of Physics | 2. Ability to use complex theoretical and experimental techniques | 3. Use of specific methodology for the practice of Physics |
|----------|---|---|--|
| PHYS 600 | P   | P   | D  |
| PHYS 660 | P   | P   | D  |
| PHYS 670 | P   | P   | D  |
| PHYS 699 | P   | P   | P  |

## 5. Assessment Methods

The following chart lists the methods to be used, as well as a description of each method, a timeline for implementation, the person responsible, and the objectives each method addresses.

| <b>Method</b>                     | <b>Description</b>  | <b>Student Level Target</b>   | <b>Program Level Target</b>   | <b>Timeline</b>   | <b>Person Responsible</b>     | <b>Objectives Addressed</b> |
|-----------------------------------|---|---|---|-------------------|-------------------------------|-----------------------------|
| M.S. qualifier exam.              | Before graduation each master's candidate must pass the M.S. qualifier exam. At least 50% of all candidates attempting the exam at a given sitting will pass the exam.  | Students taking the MS qualifier should score greater than 50% on the exam.   | The department's goal is that 50% of students pass the MS proficiency exam.   | Before graduation | Director of graduate studies. | 1                           |
| Theses or final paper evaluation. | Students prepare a Master's dissertation thesis. Some students in the teaching emphasis may substitute two papers for the thesis. A selection of theses will be sent to external reviewers for comment.                     | Students working towards a MS degree should prepare a dissertation containing original research which they can defend in front of an appropriate committee. | The department goal is that 75% of MS students should successfully defend an MS thesis containing original contributions to research within 3 years of beginning the program. | Before graduation | Master's thesis committee     | 2,3                         |
| External Review of Theses         | A selection of Master's dissertations will be sent out for external review in order to have an additional assessment of their quality. least 75% of such theses should be deemed of high quality by the external reviewers. |   | At least 75% of the MS dissertations sent out for review should be deemed of high quality by  | Every five years  | Assistant Chair               | 1,2,3                       |

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|--------------------------------|---|-----------------------------|---|-------------------|---------------------------|-----------------------------|
|                                |   |                             | external reviewers.   |                   |                           |                             |
| Survey of alumni and employers | Alumni and employer surveys on the effectiveness of the preparation of graduates. |                             | Insight into how well the program prepares graduates for their professional needs and how the curriculum could be improved. | Every second year | Assistant Chair           | 1,2,3                       |

#### **ASSESSMENT METHODS-BY-OUTCOMES MATRIX**

|                         | <b>Entry Exams</b> | <b>Qualifying Exam</b> | <b>Thesis</b> | <b>Alumni and Employer Survey</b> |
|-------------------------|--------------------|------------------------|---------------|-----------------------------------|
| 1. Knowledge            | X                  | X                      | X             | X                                 |
| 2. Experimental ability |                    |                        | X             | X                                 |
| 3. Attitudes            |                    |                        | X             | X                                 |