

Physics Assessment 2006-2007 Report, College of Science
Date: November 30, 2007
From: Huong Nguyen, Physics Assessment committee

Marshall University
Program Review
November 2007

Program: _____ **BS in Physics** _____

College: _____ **Science** _____

Date of Last Review: _____ **2006** _____

I. Goals of Physics Program

The mission of the Department of Physics and Physical Science is to provide to our majors grounding in the core subfields of our discipline and to prepare them for graduate study. The completion of the B.S. in physics prepares the graduate for graduate school in physics or engineering, medical school, or other professional programs; or for direct employment in government or industrial laboratories, and other technically related fields. The Physics curriculum consists of background core and the advanced physics courses. The background courses of classical mechanics, quantum mechanics, electricity and magnetism, is still viewed as an essential foundation to the understanding of specialized topics within physics. New areas of research are addressed as special applications of material taught in intermediate and advanced courses.

The curriculum in physics provides a natural structure for the B.S. physics major:

- 1) A broad exposure to many topics General Physics in (PHY 211/213) in the first year, General Modern Physics and Modern Physics Laboratory (PHY 320 and PHY421), Mathematical Methods in Physics (PHY 445) in the second year,
- 2) Core courses in Electricity and Magnetism (PHY 300-302), advanced classical mechanics (PHY 330), statistical and thermal physics (PHY308), and quantum mechanics (PHY 442) in the junior and senior years.
- 3) For upper-level electives we offer courses as Optics (PHY 304), Electronics (PHY 314), Biomedical Physics (PHY 350), Nuclear Physics (PHY 462), Solid State Physics (PHY 425), Labview, and other special topic courses.

II. Assessment Outcomes and Related Curriculum Activities

We continue to implement an exit exam required for all graduating seniors. The national benchmark we have selected to use is the Educational Testing Service "Major Field Test in Physics II", which is used by schools and departments at more than 600 colleges and universities globally to measure undergraduate student academic achievement, level of comprehension and problem-solving skills in all of the core subfields in physics. The content of the Major Field Tests reflects the basic knowledge and understanding gained in the core undergraduate

curriculum. The tests are two-hour, multiple-choice examinations designed to assess mastery of concepts and principles as well as knowledge expected of students at the conclusion of a major in specific subject areas. This year we have only two graduates. For the category of "Introductory Physics" (see charts) , our student scored a mean of 47 (compared to 2003-2004 average (three students) of 37.3, the 2004-2005 (one student) average of 49 and 2005-2006 (5 students) average of 30) equal the national mean of 47. For the category "Advanced Physics", our student scored a mean of 37 (the 2003-2004 average was 48, the 2004-2005 average was 46 and the 2005-2006 average was 42), below to the national mean of 48.2. For the Total Score, this year's 2006-2007 student scored 142 (the 2003-2004 average was 142.3, and the 2004-2005 average was 148 and the 2005-2006 average was 135) below the national mean of average of 148.4. One reason for poor results in exit field exams was that our students did not review for the test or take it seriously. We have been making some changes to help motivate our students to study for the tests. Also, one important reason is several subfields in these exams belong to the courses that have been offered in our program as the "electives" for year due to the lack of faculty members. In this year we have made a change to our curriculum to add the two new courses to our required core for physics majors: Statistical and Thermal Physics (PHY 308) and Mathematical Methods in Physics (PHY 445). These two courses provide basics knowledge for our majors and are in core courses of many Physics program in the country. These course have been offered as our electives in our program, and it is our effort to make it as the core, for the benefit of our students. We believe that this will help to improve the result of the exit field exam of our program.

We also begin to add new courses to our curriculum, first as electives: Solid State Physics, Medical Physics, Introduction to Labview, Quantum Mechanics II. From the response of our students, we believe all these changes increase the qualities of our program. In the near future, we are going to make more changes to our program.

From the two students graduated last year, one is studying in the Ph.D. program at a Ph. D. Program at the University of California at San Diego.

III. Faculty

Our faculty have been active in research and publish regularly in professional journals, regularly attend workshops, present their works at regional and international meetings. Our faculty have been invited speakers, authors of book chapters, book coauthors and editors. Our faculty are also very active in pursuing federal and state funding for research. In the last year, our faculty have received grants from NSF Electrical and Communications Systems , NASA WV Space Consortium and NASA Research Enhancement. We are also giving the professional opportunity to our students:

- +Spring 2007, Dr. Oberly led a group of physics majors to visit the Physics Department at the Ohio State University.

- + Summer 2007 Dr. Wilson supervised a student, Daniel Verlaquez to do research. The work results in a presentation of the student at the APS meeting, Ohio section in Fall 2007.

- + During 2006-2007 academic year and summer 2007, Dr. Nguyen supervised two students, Justin Angus and Michael Price to do research. The works results in a presentation by Justin Angus at the APS March meeting 2007, a paper for publication and some research fellowship under SURE and REA for Justin.

We are having some changes in our faculty. During the last two years, we have two new tenure-track faculty (Dr. Babiuc and Dr. Nguyen) and two full-time temporary faculty (Dr. Fan and Dr. Richards) who hold impressive publication records and very active in research. We believe they will add strength to our course offerings as well as our research components and will provide more research opportunities to our students.

Appendix: Assessment Student Outcomes

Component / Course / Program Level					
Student Outcome	Person or Office Responsible	Assessment Tool or Approach	Standards/Benchmark	Results/Analysis	Action Taken
(1) Demonstrate Knowledge of Introductory Physics	Department	Educational Testing Service “Major Field Test Physics II” (Reporting Date: January 2004). Topics include: (I) Classical Mechanics; (II) Electricity and Magnetism; (III) Thermodynamics, Optics, and Waves.	Possible Score: 20-100; 35 questions selected from Topics: (I), (II), (III)	2 students, mean=47, national mean=47	Add new courses to physics core
(2) Demonstrate Knowledge of Advanced Physics	Department	(IV) Fundamental Concepts of Quantum Mechanics, (V) Special Topics	Possible score: 20-100; 32 advanced questions.	2 students, mean=37, national mean=48.2 -	Add new courses to physics major core, add new electives
(3) Total Test Score	Department		Possible Score: 120-200; Topics: (I- V)	2 students, mean=142, national mean=148.4	

Component / Course / Program Level					
Student Outcome	Person or Office Responsible	Assessment Tool or Approach	Standards/Benchmark	Results/Analysis	Action Taken
(4) Assessment Indicator for Topic (I)	Department	“	13 questions	NA. Minimum of 5 scores required for processing	
(5) Assessment Indicator for Topic (II)	Department	“	12 questions	NA. Minimum of 5 scores required for processing	
(6) Assessment Indicator for Topic (III)	“	“	13 questions	NA. Minimum of 5 scores required for processing	
(7) Assessment Indicator for Topic (IV)	“	“	16 questions	NA. Minimum of 5 scores required for processing	
8) Assessment Indicator for Topic (V)		“	12 questions	NA. Minimum of 5 scores required for processing	