

Assessment Findings and Curricular Improvements Department of Physics

Undergraduate Programs:

**Bachelor of Science in Physics
Bachelor of Arts in Physics
Bachelor of Science in Chemical Physics**

Because the three programs differ only in courses taken outside the Physics Department, and because the total number of students is small, we make no distinction between the programs in the discussion below. (The majority of students are enrolled in the B.S. in Physics program.)

Assessment Measures

The Department of Physics uses the following measures to assess departmental learning outcomes:

Direct Measures

Senior Seminar (Physics 451-452)
Senior Comprehensive Examination

Indirect Measures

Grades and course evaluations for Senior Seminar – evaluations were not consistently tracked during this period – regarding grades, see below.
Grades and course evaluations for intermediate courses
Grades and course evaluations for introductory courses
Student surveys
Job and graduate school placement

Assessment Findings

Senior Seminar

Attachments 1 and 2 show the enrollment in the two semesters of Senior Seminar (Physics 451 and 452) from Fall 2008 through Spring 2013, as provided by CPIT. During that period, the number of graduating seniors varied between 1 and 3. It has not been the policy of the Physics Department to grade the work done in Senior Seminar, so the grades of A recorded here are simply acknowledgement of attendance.

The primary activity in the Senior Seminar is a structured review of the physics curriculum in preparation for the Senior Comprehensive Examination, which is given in the spring semester. The seniors take turns presenting summaries of the important concepts studied in the required physics courses. Other (non-senior) physics majors are invited to participate informally in the seminar, and may ask questions,

In most cases, the seniors initially have difficulty standing in front of an audience (however small and familiar to them) and expressing themselves clearly. This condition improves considerably with experience, and is good preparation for the Comprehensive Examination, which is an oral examination administered by a committee of faculty members.

We have not typically distributed course evaluation forms in Senior Seminar. If we choose to do so in the future, the form will have to be specially designed to fit the special nature of the seminar, in which preparation and teaching are done primarily by the seniors themselves, and not by the nominal instructor.

Senior Comprehensive Examination

The Senior Comprehensive Examination is a two-hour oral examination, administered by a board of three or four faculty members. The student stands at the blackboard and solves problems based primarily on the material covered in required physics courses. No formal grades are awarded, only “pass with honors,” “pass” or “fail.”

From 2009 to 2012 (Attachment 3), all 8 of the seniors have passed their Senior Comprehensive Examination on the first attempt.

The performance of the students on the examination usually displays acceptable mastery of the physical concepts and methods needed, but often reveals discomfort with (or even fear of) speaking in public, despite the mandatory practice obtained by participation in the Senior Seminar. For this reason, we feel that the oral format of the examination and the preparation in Senior Seminar are important learning opportunities for our students, who appear to have little other experience in oral communication.

Intermediary Course Discussion

Required intermediary course in physics are

506	Introduction to Modern Physics
511-512	Mathematical Physics I, II
525	Thermodynamics and Statistical Physics
531-532	Quantum Theory I, II
535	Analytical Mechanics
536	Electricity and Magnetism

In addition to the undergraduate physics majors, most of these courses also have some graduate students who need additional preparation before taking the corresponding course at 600 level. Physics 511 through 536 are typically taught every second year.

Physics 506 is taught every year, and is the gateway course for physics majors and minors. The enrollment in Physics 506 is made up primarily of physics majors and minors, sometimes with a few graduate students and a few students from the School of Engineering. Attachment 4 presents grade and course evaluation data for Physics 506. The mean grades for physics majors are roughly the same as those for all students, hence we did not list them separately.

Introductory Course Discussion

Acceptance into the undergraduate physics program requires satisfactory performance in the following courses:

215-216	University Physics I, II
225	Introductory Mechanics Lab
226	Introductory Electricity Lab

These courses also serve as service courses for students in engineering, mathematics and chemistry, so the enrollment is much larger than for any other physics courses taken by majors. Thus the statistics for these courses are not particularly relevant for the physics major programs. A prospective physics major must maintain a B average in these courses.

Perceptions of Outcomes by Physics Majors

We are in the process of revising our method for obtaining program feedback from recent physics graduates. This will involve a written evaluation of their undergraduate experience at CUA, with special emphasis on the Senior Seminar and Comprehensive Examination as components of a capstone experience.

Job and Graduate School Placement

Most of our recent graduates have continued their education, the majority of these working toward masters degrees or doctorates in physics or related disciplines. Where known, the original destinations are given in the following list.

2013

M.S. program, medical physics, SUNY Buffalo
PhD program, physics, University of Illinois, Champagne-Urbana
PhD program, Electrical Engineering, Virginia Tech

2012

MS program, Earth and Planetary Science, Boston College

2011

PhD program, Physics, University of Arizona (now teaching ESL in Korea)

2010

civilian employee (analyst), U.S. Air Force

2009

commissioned officer (nuclear reactor specialist), U.S. Navy

Curricular Improvements

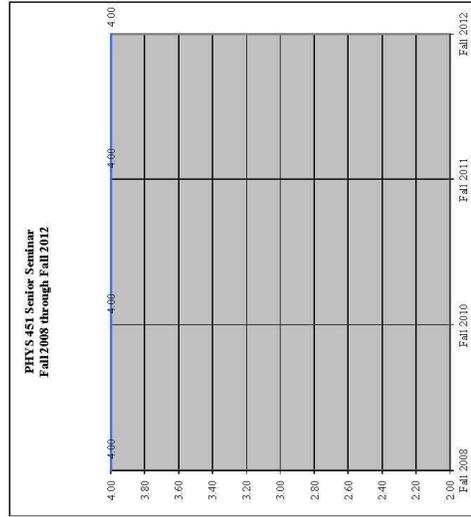
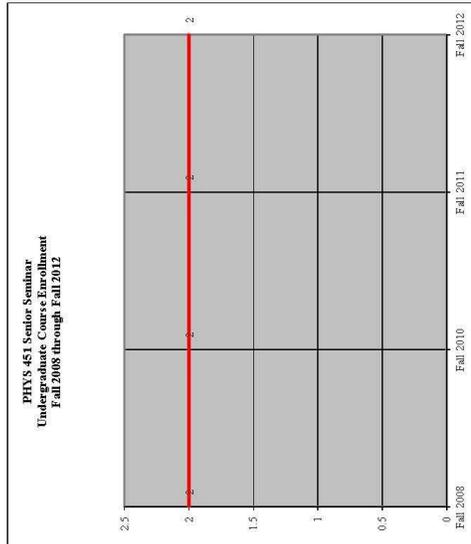
The faculty has discussed adding a course in Wave phenomena (to follow PHYS216), likely to be offered in Spring 2015. The department is assessing the state of laboratory equipment for PHYS225/226; some new purchases (oscilloscopes, power sources) have been made. The Chair reads all course evaluations carefully, and makes recommendations to individual faculty members when appropriate.

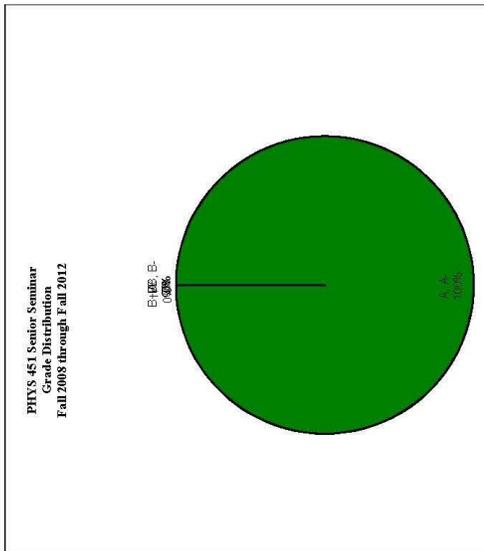
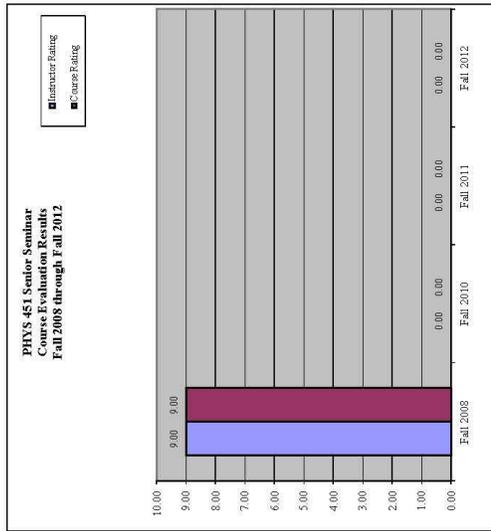
List of Attachments

1. Physics 451 (Senior Seminar I) statistics (from CPIT)
2. Physics 452 (Senior Seminar II) statistics (from CPIT)
3. Senior Comprehensive Exam statistics (from CPIT)
4. Grade and Course Evaluation Statistics – Physics 506 (Introduction to Modern Physics)

THE CATHOLIC UNIVERSITY OF AMERICA
 Planning, Institutional Research, Student Learning Outcomes Assessment
 COURSE SUMMARY DATA: DEPARTMENT OF PHYSICS
 PHYS 451 Senior Seminar

Term	Undergraduate Course Enrollment		Course Grade					Grade Distribution					Course Evaluation Results		
	Avg.	SDDev.	A, A-	B+, B, B-	C	D	F	W	I	#	%	Avg.	SDDev.	Avg.	SDDev.
Fall 2008	2	4.00	0.00	2	2	0	0	0	2	100.00%	9.00	0.00	9.00	0.00	
Fall 2010	2	4.00	0.00	2	2	0	0	0	2	0.00%	0	0.00%	0	0.00%	
Fall 2011	2	4.00	0.00	2	2	0	0	0	2	0.00%	0	0.00%	0	0.00%	
Fall 2012	2	4.00	0.00	2	2	0	0	0	2	0.00%	0	0.00%	0	0.00%	

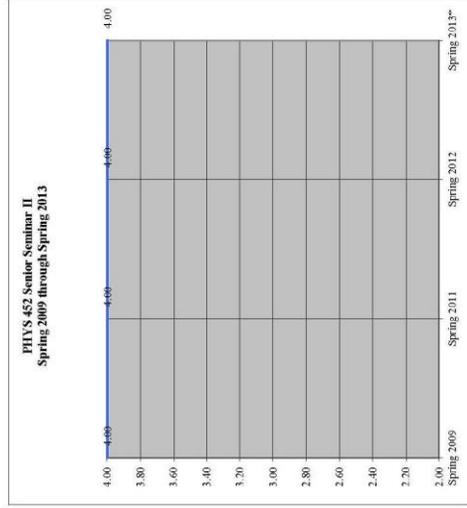
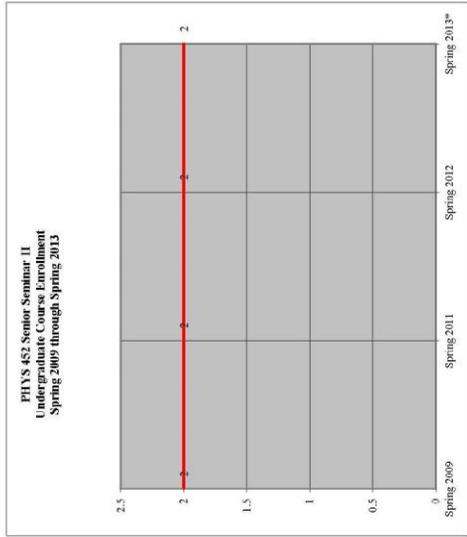


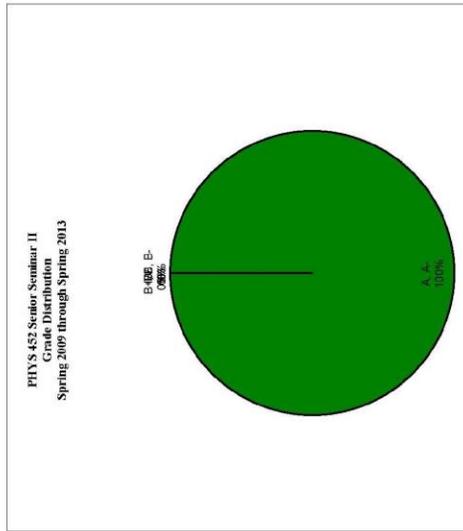
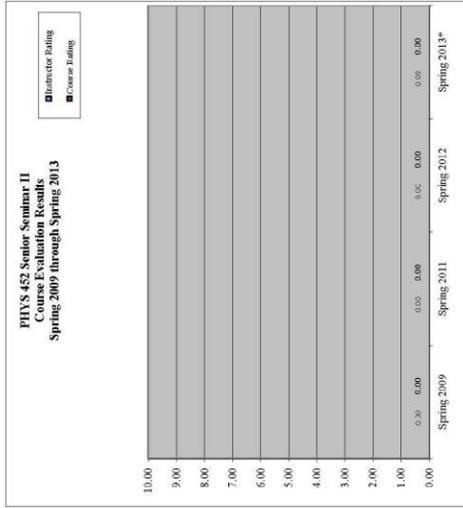


THE CATHOLIC UNIVERSITY OF AMERICA
 Planning, Institutional Research, Student Learning Outcomes Assessment

COURSE SUMMARY DATA: DEPARTMENT OF PHYSICS
 PHYS 452, Senior Seminar II

Term	Undergraduate Course Enrollment		Course Grade		Grade Distribution					Course Evaluation Results						
	Enrollment	Avg.	Avg.	SDDev.	A, A-	B+, B, B-	C	D	F	W	I	Course Eval. #	%	Instructor Rating Avg.	Course Rating Avg.	SDDev.
Spring 2009	2	4.00	4.00	0.00								0	0.00%			
Spring 2011	2	4.00	4.00	0.00								0	0.00%			
Spring 2012	2	4.00	4.00	0.00								0	0.00%			
Spring 2013*	2	4.00	4.00	0.00								0	0.00%			





*Spring 2013 was using a new evaluation form where instructor and course ratings were based on a 7-point scale

THE CATHOLIC UNIVERSITY OF AMERICA
 Planning, Institutional Research, Student Learning Outcomes Assessment

UNDERGRADUATE COMPREHENSIVE EXAMINATION RESULTS
SCHOOL OF ARTS AND SCIENCES
DEPARTMENT OF PHYSICS
AY2008-2009 to AY2012-2013

	Fail		Pass		High Pass		Pass w/Honors		TOTAL
	#	%	#	%	#	%	#	%	
AY2008-2009		0.00%	2	100.00%		0.00%		0.00%	2
AY2009-2010		0.00%		0.00%		0.00%		0.00%	0
AY2010-2011		0.00%	2	100.00%		0.00%	0	0.00%	2
AY2011-2012		0.00%	2	100.00%		0.00%	0	0.00%	2
AY2012-2013	0	0.00%	2	100.00%		0.00%	0	0.00%	2
TOTAL	0	0.00%	8	100.00%	0	0.00%	0	0.00%	8

Note:

- 1) Milestone outcomes were included in the categories High Pass and Pass with Honors if these designations were explicitly indicated in the students' milestone record.
- 2) Category "High Pass" includes both "High Pass" and "Pass with distinction".
- 3) The count in this table is based on the exam outcomes of all attempts in an academic year.

Attachment 4

Grade and Course Evaluation Statistics -- Physics 506 (Introduction to Modern Physics)

		All students	
Semester		Number of students	Mean grade
Spring	2009	7	3.50
Spring	2010	4	3.50
Spring	2011	5	3.86
Spring	2012	7	2.94
Spring	2013	9	3.20

Course evaluations

		All students	
Semester		Number of evaluations	Teacher average (of 10)
Spring	2009	7	8.9
Spring	2010	4	8.8
Spring	2011	5	9.0
Spring	2012	7	8.7
Spring	2013	9	9.6