Assessment Report
Physics Department
May 25, 2011

The Physics department is using the current version of its Assessment Plan, which was submitted in April, 2010. The plan is not separately identified on the assessment reports website, but was included in the department's 2010 Assessment Report. The plan includes the matrix that was suggested in the 2009 feedback and which is separately linked on the website. For completeness, the current Assessment Plan is submitted with this document.

The department's approach to curricular assessment thus far has been to use the nationally-recognized Force Concepts Inventory (FCI) and the Conceptual Survey of Electricity and Magnetism (CSEM) to measure student learning in the introductory Physics courses, and a locally-developed conceptual assessment test for introductory astronomy. It also uses the Major Field Test in Physics (MFT) for graduating seniors. While not yet a formal part of its assessment plan, the department conducted two pilot surveys this year; one for graduates and the other for alumni. The intent of these surveys was to determine the perceived value of courses in our curriculum, and perceived strengths and weaknesses in the program. The results of the surveys and student performance on the MFT were discussed at a recent department retreat.

Included in this document are our updated analysis of MFT results, the results of the FCI and CSEM surveys, and results of the astronomy survey. The alumni survey, the results of the alumni survey, the graduate survey, the results of the graduate survey, the results of recent graduates and a summary of the recent department retreat can be found in the appendix to this document.

MFT Results

Results of the Major Field Test in Physics, administered to the five students who graduated with physics majors in May, 2011, are shown on the next page. A sixth student, who graduated with a combined-course (dual-degree) major in Physics and who presently is pursuing an engineering degree at the University of Michigan, was unavailable to take this test. The average overall score of this year's graduates (149.4) was identical to the average score for the 2,755 examinees who took the test nationwide during the period February 2004 to June 2010. The average introductory level score for this year's graduates, 44.6, was slightly below the national average introductory score, 48.5, while the average advanced level score, 53.5, was slightly above the national average advanced score of 49.5, and both scores are consistent with scores of students who took the MFT at Albion in prior years. Because the average scores of Albion students are very close to national averages, it is difficult to draw any definitive statements about our curriculum other than that Albion students' performance on this test is consistent with the national average.

On the other hand, the results of the advanced-level assessment potentially point to areas in which our program could be improved. The results of the 2011 class show that Albion students performed above the national average in all areas except special topics (nuclear physics, solid-state physics, advanced mechanics, and advanced laboratory methods). The results is not surprising, because while we offer advanced coursework in mechanics, electromagnetism, and quantum mechanics, we have not offered our nuclear and solid-state physics course because of insufficient enrollment. When the average scores of all Albion students who took the MFT between the 2007 and 2011 are compared to national averages, we find that Albion student averages are higher than the national average in mechanics, electromagnetism, and quantum mechanics, very close to the national average in special topics, and slightly below the average in optics, waves, and thermodynamics. These results also are not surprising because the optics course (Phys 308) and the advanced thermodynamics course (Phys 384) also have not been offered in recent years because of minimum course enrollment requirements.

Name of Program ____Physics_(Spring 2011)_____ Date__May 26, 2011____

Ranked results of students who took Physics MFT between 2005-2011

Yr	Class	Introductory	Percentile	Advanced	Percentile	Overall	Percentile		Average intro	Average advanced	Average total
4	2004-2005	62	75	70	85	168	95				
4	2004-2005	36	20	22	1	129	5	2004-2005	**49.0**	**46.0**	**148.5**
4	2005-2006	75	90	67	80	174	90				
4	2005-2006	31	10	37	20	133	10	2005-2006	**53.0**	**52.0**	**153.5**
4	2006-2007	47	45	43	35	145	40				
3	2006-2007	34	15	47	45	135	15	2006-2007	**40.5**	**45.0**	**140.0**
4	2007-2008	73	85	85	95	181	95				
4	2007-2008	44	40	22	1	133	10				
?	2007-2008	31	10	31	10	130	5	2007-2008	**49.3**	**46.0**	**148.0**
4	2008-2009	55	60	46	40	151	55				
4	2008-2009	47	45	40	25	144	40	2008-2009	**51.0**	**43.0**	**147.5**
4	2009-2010	62	75	64	80	165	80				
4	2009-2010	47	45	55	60	151	55				
3	2009-2010	49	50	53	60	147	45				
4	2009-2010	36	20	43	40	139	25	2009-2010	**48.5**	**53.8**	**150.5**
4	2010-2011	60	70	67	80	165	80				
4	2010-2011	49	50	70	60	160	70				
4	2010-2011	47	45	64	75	156	65				
4	2010-2011	31	10	37	15	133	10				
4	2010-2011	36	20	31	5	133	10	2010-2011	**44.6**	**53.8**	**149.4**
	AVERAGE	**47.6**	**50**	**49.7**	**50**	**148.6**	**50**				
	NATL AVG	**48.5**	**50**	**49.5**	**50**	**149.4**	**50**				
		std dev	25.9		30.9						
		std dev mean	5.9		7.1						
		national std dev*	15.9		15.5						
		nat'l std dev mean*	0.3		0.3						

*National average and deviation for student who took the assessment between February 2004 and June 2010.

Name of Program ____Physics_(Spring 2011)_____ Date__May 26, 2011____

Recent average results, by content area, 2007-2011

Section #:	1		2		3		4		5	
Year	**Classical Mechanics / Relativity Average Score**	**Percentile***	**Electro-magnetism Average Score**	**Percentile***	**Optics/Waves Thermo-dynamics Average Score**	**Percentile***	**Quantum Mech., Atomic Physics Average Score**	**Percentile***	**Special Topics Average Score**	**Percentile***
2006-2007	57	75	33	5	42	50	31	1	33	25
2007-2008	57	75	67	95	46	70	47	50	50	90
2008-2009	57	75	53	70	31	10	48	60	28	5
2009-2010	48	55	58	85	36	20	44	40	45	75
2010-2011	44	25	40	25	43	55	59	85	37	40
weighted avg	**50.4**	**55**	**50.0**	**60**	**39.3**	**30**	**49.7**	**65**	**38.4**	**45**
National mean†	**48.1**		**46.6**		**41.4**		**46.8**		**38.5**	

* Percentiles represent cumulative percentiles published in year in which test was administered.

†National mean includes scores for exams taken between February 2004 and June 2010

Graduates who did not take the MFT exam

2004-2005	five engineering students from this class did not take this exam (Andrus, Grasley, Kroge, Pathak, and Sun)
2005-2006	one engineering student from this class did not take this exam (Brankovich)
2006-2007	one engineering student from this class did not take this exam (Dick)
2007-2008	four engineering students from this class did not take this exam (Ruddick, Palazollo, Owens, and Hashimoto) and one four-year student did not take the exam (Wilcox)
2008-2009	one four-year student did not take this exam (Solecki)
2009-2010	one three-year student took this exam (Walters)
2010-2011	on pre-engineering student did not take exam (Galante)

Comparative information taken from untitled document (Heading: "Major Field Test in Physics (form: 4AMF) Individual Students Total Score Distribution"), Downloaded from http://www.ets.org/s/mft/pdf/2010/physics4amf.pdf , May 9, 2011.

As noted ealier, the department discussed these results in the recent retreat (summary attached). It was noted that the new introductory curriculum, which was implemented in Fall 2008, does not incorporate significant sections in optics or in classical thermodynamics, so lower scores in optics and thermodynamics may persist in the future if course content and offerings remain unchanged. One way that we might begin to address the perceived content deficit in these areas, given limitations in resources, would be to replace the second-year mathematical methods half-courses (243/244), with a course in optics. The effect of this solution, however, could be the exchange one set of issues (reduced understanding of optics) for another (weakened mathematical skills due to the elimination of 243/244). The department also discussed including a more significant optics and thermodynamics component in the introductory course, but the existing content coverage will not permit the addition of additional topics without removing existing topic coverage. It may be possible to include more significant optics and thermodynamic topics in the advanced laboratory course, but the lack of previous preparation by students in these areas likely would be problematic. The department will consider ways to strengthen the curriculum in optics and thermodynamics during the coming year.

FCI and CSEM Results

The Force Concepts Inventory was administered to students in Phys 167 in the fall, and the results are shown on the next page. This year, the average scores on both the pre-test, and post-test were higher than in previous years. The average change, 1.8 points, was lower than in previous years, however. A quantity called the "gain factor", defined to be the ratio of the gain (the difference in average of post- and pre-test scores) to the possible gain (the difference between a perfect score and the average pre-test score) was 0.124, which is somewhat lower than in previous years.

The history of FCI scores at Albion is shown in the table below. Here the percent gain (the gain factor multiplied by 100) is reported. During this three-year period, pre-test and post-test scores have improved slightly and the gain factors are consistent with a study of gains in traditional college environments (see R. Hake, Am. J. Phys **66**, 64 (1998)). Sustained gain increases in excess of 20 percent have not yet been observed, despite institution of TabletPC pedagogy and adoption of a new curriculum that promotes interactive engagement.

Physics 167, FCI Results by Year

	Pre-Test	Post-Test	change	%change	PreAvg*	PostAvg*	%-Gain
Fall 2008	11.9	15.2	3.3	36.3	39.6	50.7	18.4
Fall 2009	13.2	16.8	3.6	40.0	44.1	56.1	21.4
Fall 2010	15.2	17.0	1.8	19.3	50.7	56.8	12.4

*Averages shown do not include contributions of students who did not take both pre-test and post-test

The department notes that large gain increases exist for some students and negative gain increases occur for others. This is a curious result. A possible explanation is that some students do not take the assessment seriously. We note that no credit toward grade is given for participating in the exam, so there may be less incentive for some students to take the test seriously. The department will consider incorporating the results of the FCI into the final grade for Phys 167 in the future. The FCI was not administered in Phys 115, General Physics I this academic year.

The department's conclusions derived from the MFT scores are included at the end of this report.

FCI Results, AY 2010-11
Physics 167, CRN: 2186

Student	Pre-Test	Post-Test	change	%change	
1	23			0.0	
2	10	18	8	80.0	
3		17			
4	10	19	9	90.0	
5	11	16	5	45.5	
6	27	26	-1	-3.7	
7	24	21	-3	-12.5	
8	14	19	5	35.7	
9	10	8	-2	-20.0	
10	22	19	-3	-13.6	
11	13				gone
12	13				
13	7	14	7	100.0	
14	14	16	2	14.3	
15	18				
16	14				
17	24	29	5	20.8	
18	16	19	3	18.8	
19	13	12	-1	-7.7	
20	18	18	0	0.0	
21	15	17	2	13.3	
22	12	9	-3	-25.0	
23	7				
24	11	12	1	9.1	gone
25	19				gone
26	6	6	0	0.0	gone
27	15	17	2	13.3	
28		15			
29	9	17	8	88.9	
30	18	13	-5	-27.8	
31	11	16	5	45.5	
32	13				gone
33	12				gone
34	18				
35	22	21	-1	-4.5	gone
36	8				gone
37	26	27	1	3.8	
Avg #	**15.2**	**17.0**	**1.8**	**19.3**	
Avg %	**50.7**	**56.8**			

Gain Factor: 0.124

The results of the Conceptual Survey in Electricity and Magnetism pre-test, administered in Phys 168, Analytical Physics II, early in the Spring 2011 semester are shown below. Unfortunately, the post-test was not administered, so these data are of little value. It is noted that the average score for this class (8.2) is lower than the pre-test average score previously reported for the 2008 class (11.0). This test has 32 questions, each worth one point, so the average score of 8.2 indicates that, on the average, students answered about one of every four questions correctly. The CSEM was not administered in Phys 116 this year.

The department's conclusions are included at the end of this report.

CSEM, Physics 168
(Spring 2010)
CRN: 9172

Student	Pre-Test
1	15
2	14
3	10
4	9
5	4
6	11
7	5
8	8
9	7
10	7
11	8
12	16
13	5
14	7
16	5
17	5
18	5
19	6
20	8
21	8
22	4
23	9
24	7
25	14
26	7
Average	**8.2**

Phys 105 Astronomy assessment

A history of results of the locally-developed assessment for astronomy, including the results from this academic year, is shown in the table below. The results from this year are consistent with those from prior years.

Physics 105, student learning assessment results, by semester						
Semester	# questions	Pre-Test		Post-Test		%-change
		Score	%	Score	%	
200610	15	8.4	56.0	11.7	78.0	39.3
200710	15	9.1	60.7	11.7	78.0	28.6
200730	15	8.3	55.3	11.4	76.0	37.3
200810	15	8.3	55.3	11.4	76.0	37.3
200830	16	8.8	55.0	13.1	81.9	48.9
200910	16	9.4	58.8	11.9	74.4	26.8
200930	16	9.1	56.9	12.0	75.9	31.9
201030	17	9.5	55.9	12.9	75.9	35.8
201110	17	9.4	55.3	13.5	79.4	43.6
Average			56.6		77.2	36.6

Alumni Survey

A survey of physics alumni was conducted in April and, to date, 62 alumni from graduating classes since the early 1960's have responded. A link to the online version of the survey was sent to all alumni for whom we had email addresses, and a printed version of the survey was sent to the others. No surveys were sent to current graduates because a separate survey, described below, was designed for them. Respondents were asked to identify the decade of their graduation year, and the decades were chosen to begin "on the eights", to collect responses from students who graduated about four years or more after the major curricular reforms that were implemented in 1974, 1984, 1994, and 2005. Copies of the alumni survey and a summary report are attached.

The department had a preliminary discussion of those results at the retreat, and it was noted that we have had a very uniform response across the decades chosen. The results show that approximately two of every three respondents having earned a major in physics, nearly one in four earned a "dual-degree" major with an engineering counterpart, and the remainder earned a physics major with secondary education certification, a mathematics/physics interdisciplinary major, or self-designed majors. It also was noted that responses were overwhelmingly positive; 93.6% of alumni felt that they were satisfactorily prepared (38.3%) or well prepared (55.3%) for their first career following graduation from Albion.

Of particular interest to the department were the answers to questions posed in the survey that asked about the perceived value of course work and the perceived strengths and weaknesses in the Physics program, especially for students who graduated during the periods 1998-2007, and 2008-present. Unfortunately, the "SurveyMonkey" web server that used to acquire this information does not automatically separate responses by decade. However, it has been possible to distill the individual

responses to determine the collective responses for students who graduated during these periods. The results of that data analysis are attached.

In the department's consideration of the recent survey responses, it was noted that none of the respondents indicated that felt that they were "not well prepared" for the next step in their career. Of the 20 recent respondents, 6 did not provide a response to this question. Those same respondents did not answer many of the other questions, either. The survey did not provide a "No opinion" or "Not sure" response option, which may be a reason that some did not respond.

It also was noted that some of the changes suggested by alumni already have been implemented (e.g. the suggestions "Have a professor that can teach engineering accredited classes," "provide some funding for student research," "add an advanced laboratory course", and "provide the opportunity to have more exposure to MATLAB " all have been addressed). Other suggestions have not yet been addressed (e.g. the suggestions "add a statistics course", "consider dropping the seminar requirement," "try to offer more upper level courses") have not yet been adopted. The department will further consider these responses, and the responses from other decades, during the coming semester.

2011 graduate survey

A survey of 2011 graduates was conducted in late April, 2011. This survey was very similar to the Alumni Survey, but had additional responses in the curriculum section (e.g. respondents could designate perceived course value as "typical"). A summary of the results is attached. Again, the comments are very positive, but the perceive preparedness was equally divided between the three respondents who chose to answer this question. As in the Alumni Survey, a response option of "No opinion" or "Not Sure" was not provided as an answer to the question on perceived preparedness. That may be the reason that one respondent commented that "I really don't know what to expect for my career at this point, so I just put something there to have an answer. I may end up being superbly prepared". Comments for improvement include the textbook used for introductory courses, classes getting off schedule, professor preparedness for homework questions, lack of advanced coursework options, and more research options.

Conclusions

MFT Test. The department believes that the evidence indicates that the existing upper-level program in Physics may not sufficiently address optics, thermodynamics, nuclear, and solid-state physics. The department will investigate ways to incorporate more of this material into existing courses and/or increase student demand for these courses so that enrollments will be sufficiently high that these courses may be offered. The department will consider ways to strengthen the curriculum in optics and thermodynamics during the coming year.

FCI and CSEM Tests. The department will consider incorporating either for the post-test score or the gain factor into the final grade the future. There are advantages and disadvantages to incorporating either score into the final grade, and further discussion on this will occur in the forthcoming months.

Astronomy Assessment. The recent results of the astronomy assessment are on a par with the results from previous semesters, and the department considers these results to be satisfactory. Prof. Zellner will be on sabbatical during the coming year, so no changes in the content coverage for Phys 105 are being considered at this time.

Alumni Survey. It is very satisfying to see that Physics alumni, and recent alumni, in particular, have very positive responses to the experience in Physics at Albion. The suggestions noted in the survey (e.g. the suggestions "add a statistics course", "consider dropping the seminar requirement," "try to offer more upper level courses") will be discussed in the coming semester. The department also seeks advice from the Assessment Committee on how to improve its Alumni Survey for future use.

2011 Graduate Survey. It is also very satisfying to see that recent Physics graduate generally gave very positive responses to their experience with the department at Albion. The number of responses is sufficiently low that no definitive conclusions can be drawn, however. Nonetheless, it is perceived that several years of data of this type could be very informative. No course was considered to be "of great value" by all three students who responded to Question 4. Student comments for improvement will be discussed in the fall.

Status and Other Actions. The department has worked to implement the suggestions made in the August, 2009 feedback from the Assessment Committee to the department, and has since separated its mission statement into two parts, incorporate informal exit interviews and formal alumni and graduate surveys as indirect measures of program assessment, and currently is looking at the education assessment plan, in conjunction with the first student in education that the department has had since the 1990s. The department has not yet developed a portfolio assessment, but has thought about longitudinal assessment, and concluded that we may wish to administer the MFT test to sophomore (fourth-semester) students as part of the longitudinal assessment, much as the Biology department purports to do with their first-year students. Additional feedback from the Assessment Committee on this matter will be helpful to us.

Assessment Report
Physics

Appendices

PhysicsAlumniSurvey

1.

The Physics Department at Albion College occasionally surveys its alumni to gain insight on how to improve our curriculum and program. Your answers to the following questions will be valuable to us in our attempts to improve our curriculum and to identify characteristics of our “typical” graduate. Answers to all questions are optional.

1. Graduation Year

- ◯ Before 1968
- ◯ 1968-1977
- ◯ 1978-1987
- ◯ 1988-1997
- ◯ 1998-2007
- ◯ 2008-present

2. What was your Physics-related major?

- ◯ Physics
- ◯ Physics with Secondary Education Certification
- ◯ Combined Course - Physics ("Pre-engineering")
- ◯ Combined Course - Math ("Pre-engineering")
- ◯ Combined Course - Other ("Pre-engineering") - Please check this option if unsure
- ◯ Mathematics/Physics Interdepartmental Major
- ◯ Self-designed

3. What other major(s) did you receive?

2.

4. What was your career path, including subsequent education, following graduation from Albion?

We are interested in your responses to the following curriculum-based questions, to the extent that you may remember. If you don't remember, please feel free to skip this question. For this question, the time frames were chosen to begin approximately four years after significant curricular reforms which were implemented in 1974, 1983, 1994, and 2005. Other curricular reforms occurred in 1981, 1991, 2000 and 2008.

5. From the long list below, please mark the Physics courses that you perceive to be of particularly little value or of particularly great value to you and your career path since your graduation from Albion (some upper-level courses may have been offered as tutorials). Skipped answers will be intepreted to be courses that were of "typical" value, not applicable, or courses that were not memorable. Comments may be entered in the question box that follows.

	Of little value	Of great value
102 Physics of Urban and Environmental Probs (1972-present)	◯	◯
105 Introductory Astronomy	◯	◯
137 Contemporary Physics (1974-1994)	◯	◯
167 Analytical Physics I (1994-present)	◯	◯
168 Analytical Physics II (1994-present)	◯	◯
169 Analytical Physics III (2000-2008)	◯	◯
191 Physics and Astronomy Seminar I (2006-present)	◯	◯
205 (old) Technical Physics I (1960s)	◯	◯
206 (old) Technical Physics II (1960s)	◯	◯
206 Astronomy and Astrophysics (2007-present)	◯	◯
215 Physics II (1960s)	◯	◯
220 Analytical Physics I (1974-1993)	◯	◯
221 Analytical Physics II (1974-1993)	◯	◯
222 Analytical Physics III (1974-1993)	◯	◯
241 Modern Physics (1994-2000)	◯	◯
242 Theoretical Methods in Physics (1994-2009)	◯	◯

243 Math. Methods I (1/2) (2009-present)	◯	◯
244 Math. Methods II (1/2) (2009-present)	◯	◯
245 Electronics (2005 - present)	◯	◯
250 Modern Physics (2010-present)	◯	◯
271 Artificial Intelligence and Robots (1989-1998)	◯	◯
280 Microcomputer Programming and Circuit Design (1982-1998)	◯	◯
291 Physics and Astronomy Seminar II (2006-present)	◯	◯
303 Electronics (1960s)	◯	◯
304 Advanced Electronics (1960s)	◯	◯
308 Optics (1994-present)	◯	◯
315 Physics III (1960s)	◯	◯
321 Modern Physics (1974-2009)	◯	◯
322 Nuclear and Solid State Physics (1974-present)	◯	◯
325 Theoretical Mechanics	◯	◯
336 Electricity and Magnetism (formerly 326)	◯	◯
345 Electronics (1961-2004)	◯	◯
346 Electronics (1960s)	◯	◯
355 Nuclear Physics (1960s)	◯	◯
361 Atomic Physics (1960s)	◯	◯
362 Nuclear Physics (1960s)	◯	◯
373 Fundamentals of Quantum Mechanics (1960s)	◯	◯
374 The Solid State (1960s)	◯	◯
375 Current Topics in Physics (1974-1980)	◯	◯
380 Mathematical Physics (1971-present)	◯	◯
384 Thermal Physics (1971-present)	◯	◯
385 Solid State Physics (1960s)	◯	◯
386 Solid State Physics (1971-1994)	◯	◯
386 Introduction to Research (1960s)	◯	◯

387 Quantum Mechanics (1984-present)	◯	◯
388 Quantum Mechanics (1969-1976)	◯	◯

6. Please enter here any comments that you may have with regard to the previous question.

7. If you found any other course(s) at Albion, in any discipline, to be of particular value to you and to your career, please list these course(s), or a synopsis of these courses, here.

8. How prepared do you perceive you were for your first career (including graduate school or engineering school) after your graduation from Albion? A text box for optional comments follows this question.

- ◯ Not well prepared
- ◯ Satisfactorily prepared
- ◯ Well prepared

9. Please feel free to enter comments that are relevant to the previous question here.

10. What do (or did) you perceive to be strengths of Albion's Physics program?

11. What do (or did) you perceive to be weaknesses of Albion's Physics program?

12. What changes would you suggest that we consider for improving Albion's Physics program?

13. Please provide any additional comments you may have on Albion's Physics program. If you have news to send for the department newsletter, please send it to Jackie Masternak, department secretary, at jmasternak@albion.edu .

14. Name (optional)

Thank you very much for your time in completing this survey. Dave Seely, Chair

1. Graduation Year

		Response Percent	Response Count
Before 1968		16.4%	10
1968-1977		14.8%	9
1978-1987		16.4%	10
1988-1997		**19.7%**	**12**
1998-2007		**19.7%**	**12**
2008-present		13.1%	8
		answered question	**61**
		skipped question	**1**

2. What was your Physics-related major?

		Response Percent	Response Count
Physics		**67.8%**	**40**
Physics with Secondary Education Certification		1.7%	1
Combined Course - Physics ("Pre-engineering")		18.6%	11
Combined Course - Math ("Pre-engineering")		3.4%	2
Combined Course - Other ("Pre-engineering") - Please check this option if unsure		3.4%	2
Mathematics/Physics Interdepartmental Major		3.4%	2
Self-designed		1.7%	1
		answered question	**59**
		skipped question	**3**

3. What other major(s) did you receive?

	Response Count
	37
answered question	**37**
skipped question	**25**

4. What was your career path, including subsequent education, following graduation from Albion?

	Response Count
	43
answered question	**43**
skipped question	**19**

5. From the long list below, please mark the Physics courses that you perceive to be of particularly little value or of particularly great value to you and your career path since your graduation from Albion (some upper-level courses may have been offered as tutorials). Skipped answers will be intepreted to be courses that were of "typical" value, not applicable, or courses that were not memorable. Comments may be entered in the question box that follows.

	Of little value	Of great value	Response Count
102 Physics of Urban and Environmental Probs (1972-present)	40.0% (2)	**60.0% (3)**	5
105 Introductory Astronomy	**80.0% (4)**	20.0% (1)	5
137 Contemporary Physics (1974-1994)	14.3% (1)	**85.7% (6)**	7
167 Analytical Physics I (1994-present)	0.0% (0)	**100.0% (13)**	13
168 Analytical Physics II (1994-present)	0.0% (0)	**100.0% (13)**	13
169 Analytical Physics III (2000-2008)	0.0% (0)	**100.0% (11)**	11
191 Physics and Astronomy Seminar I (2006-present)	40.0% (2)	**60.0% (3)**	5
205 (old) Technical Physics I (1960s)	0.0% (0)	**100.0% (5)**	5
206 (old) Technical Physics II (1960s)	0.0% (0)	**100.0% (5)**	5
206 Astronomy and Astrophysics (2007-present)	0.0% (0)	**100.0% (1)**	1
215 Physics II (1960s)	0.0% (0)	**100.0% (2)**	2
220 Analytical Physics I (1974-1993)	0.0% (0)	**100.0% (14)**	14
221 Analytical Physics II (1974-1993)	0.0% (0)	**100.0% (14)**	14
222 Analytical Physics III (1974-1993)	0.0% (0)	**100.0% (12)**	12

241 Modern Physics (1994-2000)	0.0% (0)	**100.0% (3)**	3
242 Theoretical Methods in Physics (1994-2009)	12.5% (1)	**87.5% (7)**	8
243 Math. Methods I (1/2) (2009-present)	**100.0% (1)**	0.0% (0)	1
244 Math. Methods II (1/2) (2009-present)	**100.0% (1)**	0.0% (0)	1
245 Electronics (2005 - present)	10.0% (1)	**90.0% (9)**	10
250 Modern Physics (2010-present)	0.0% (0)	0.0% (0)	0
271 Artificial Intelligence and Robots (1989-1998)	0.0% (0)	**100.0% (3)**	3
280 Microcomputer Programming and Circuit Design (1982-1998)	33.3% (1)	**66.7% (2)**	3
291 Physics and Astronomy Seminar II (2006-present)	**50.0% (1)**	**50.0% (1)**	2
303 Electronics (1960s)	0.0% (0)	**100.0% (4)**	4
304 Advanced Electronics (1960s)	0.0% (0)	**100.0% (1)**	1
308 Optics (1994-present)	0.0% (0)	**100.0% (1)**	1
315 Physics III (1960s)	0.0% (0)	**100.0% (3)**	3
321 Modern Physics (1974-2009)	10.0% (1)	**90.0% (9)**	10
322 Nuclear and Solid State Physics (1974-present)	40.0% (2)	**60.0% (3)**	5
325 Theoretical Mechanics	20.0% (4)	**80.0% (16)**	20
336 Electricity and Magnetism (formerly 326)	15.0% (3)	**85.0% (17)**	20
345 Electronics (1961-2004)	10.0% (1)	**90.0% (9)**	10
346 Electronics (1960s)	**50.0% (1)**	**50.0% (1)**	2
355 Nuclear Physics (1960s)	33.3% (1)	**66.7% (2)**	3
361 Atomic Physics (1960s)	40.0% (2)	**60.0% (3)**	5

362 Nuclear Physics (1960s)	**100.0% (1)**	0.0% (0)	1
373 Fundamentals of Quantum Mechanics (1960s)	**100.0% (2)**	0.0% (0)	2
374 The Solid State (1960s)	0.0% (0)	**100.0% (1)**	1
375 Current Topics in Physics (1974-1980)	0.0% (0)	0.0% (0)	0
380 Mathematical Physics (1971-present)	7.7% (1)	**92.3% (12)**	13
384 Thermal Physics (1971-present)	0.0% (0)	**100.0% (2)**	2
385 Solid State Physics (1960s)	33.3% (1)	**66.7% (2)**	3
386 Solid State Physics (1971-1994)	0.0% (0)	**100.0% (2)**	2
386 Introduction to Research (1960s)	0.0% (0)	**100.0% (1)**	1
387 Quantum Mechanics (1984-present)	25.0% (2)	**75.0% (6)**	8
388 Quantum Mechanics (1969-1976)	**100.0% (1)**	0.0% (0)	1
		answered question	**40**
		skipped question	**22**

6. Please enter here any comments that you may have with regard to the previous question.

	Response Count
	26
answered question	**26**
skipped question	**36**

7. If you found any other course(s) at Albion, in any discipline, to be of particular value to you and to your career, please list these course(s), or a synopsis of these courses, here.

	Response Count
	31
answered question	**31**
skipped question	**31**

8. How prepared do you perceive you were for your first career (including graduate school or engineering school) after your graduation from Albion? A text box for optional comments follows this question.

	Response Percent	Response Count
Not well prepared	6.3%	3
Satisfactorily prepared	37.5%	18
Well prepared	**56.3%**	**27**
answered question		**48**
skipped question		**14**

9. Please feel free to enter comments that are relevant to the previous question here.

	Response Count
	27
answered question	**27**
skipped question	**35**

10. What do (or did) you perceive to be strengths of Albion's Physics program?

	Response Count
	43
answered question	43
skipped question	19

11. What do (or did) you perceive to be weaknesses of Albion's Physics program?

	Response Count
	30
answered question	30
skipped question	32

12. What changes would you suggest that we consider for improving Albion's Physics program?

	Response Count
	24
answered question	24
skipped question	38

13. Please provide any additional comments you may have on Albion's Physics program. If you have news to send for the department newsletter, please send it to Jackie Masternak, department secretary, at jmasternak@albion.edu .

	Response Count
	8
answered question	8
skipped question	54

14. Name (optional)

	Response Count
	33
answered question	33
skipped question	29

Page 1, Q3. What other major(s) did you receive?		
1	BS of Civil Engineering from Michigan Technological University	May 15, 2011 6:30 PM
2	None	May 15, 2011 1:41 PM
3	Philosophy	May 14, 2011 8:24 AM
4	Math	May 13, 2011 12:23 PM
5	Computational Mathematics	May 12, 2011 5:35 PM
6	Computer Science	May 12, 2011 9:49 AM
7	Mathematics	May 8, 2011 11:43 PM
8	Mathematics	May 5, 2011 10:31 PM
9	Mathematics	May 4, 2011 9:42 PM
10	Music, Minor in Applied Mathematics.	May 4, 2011 8:56 PM
11	Computer Science	May 4, 2011 12:50 PM
12	None	May 4, 2011 6:54 AM
13	mathematics	May 3, 2011 9:23 PM
14	Mathematics	May 3, 2011 8:20 PM
15	Computer Concentration	May 3, 2011 7:58 PM
16	I did not receive my degree in Physics. I transferred to Univ of AZ and received my BSBA in Accounting.	May 3, 2011 6:47 PM
17	Math -- two majors, no minors	May 3, 2011 4:55 PM
18	Chemistry	May 3, 2011 4:43 PM
19	Mathematics	May 3, 2011 4:23 PM
20	Chemistry	May 3, 2011 3:29 PM
21	Mathematics	May 3, 2011 3:23 PM
22	None	May 3, 2011 3:08 PM
23	Economics and Business Administration	May 3, 2011 3:03 PM
24	History	May 3, 2011 2:51 PM
25	Mathematics	May 3, 2011 1:29 PM
26	Mathematics	May 3, 2011 12:59 PM
27	Industrial Engineering .... 3-2 Engineering Program (went to Purdue)	May 3, 2011 9:13 AM
28	None	May 2, 2011 2:01 PM

Page 1, Q3. What other major(s) did you receive?		
29	None	May 2, 2011 1:06 PM
30	None	May 2, 2011 12:06 PM
31	None	May 2, 2011 11:14 AM
32	math minor	May 2, 2011 11:14 AM
33	Mathematics	May 2, 2011 11:13 AM
34	Mathematics	May 2, 2011 10:35 AM
35	Mathematics	May 2, 2011 10:33 AM
36	Mathematics	May 2, 2011 10:33 AM
37	Mathematics	May 2, 2011 10:24 AM

Page 2, Q4. What was your career path, including subsequent education, following graduation from Albion?		
1	Gene was called up for the draft in "42 awaiting the call when he was notified to report to armour research institue in chicago. He had been recommended by a former albion prof. of his for this honor (armour became IIT) Whitl at armour he was part of the group working for the governoment hence his deferment for america's defencse adn attack program. He worked on very interesting programs relating to submarine warfare; pop-up lights in the ocean to guide airplanes to their bombiing destinations, etc. When the hydrogen bombs were detonated in the bikini atoll, Gene ws working for the Navy flying overhead observing and photographing and later landing and inspecting the destroyers.After the war Gene became a engineer. He helped W.R. Grace in developing Zonolite, an asbestos containing product unfortunatley asbestos became (and so W.R. Grace) much maligned, of course but that was yet to come. Gene retired in 1986 from a prestigious engineering firm in Northbrook, IL, WISS, JANNEY, ELSTERNER (WSE)	May 24, 2011 8:17 AM
2	Degree from MTU and then full time employment as an engineer and Project Manager. I taught high school math for several years and returned to engineering in 2004. I am currently the Operations Manager - Engineering for a materials testing company	May 15, 2011 6:35 PM
3	MS PhD Nuclear Engineering (Univ of Tennessee) Nuclear Engineer till ~1995 Software engineer (Engineering applications) since	May 15, 2011 3:07 PM
4	Grad School at University of Michigan-MS Industrial and Operations Engineering. Have worked in operations for Frito-Lay, Inc., for 22 years.	May 15, 2011 1:52 PM
5	M.S. Physics, U.Michigan, 1982 Ph.D. Physics, U. Michigan, 1987 Metrology Engineer, Ford Motor Co., 1989-2001 Optical/Metrology Engineer, J&J Vision Care 2001-present	May 14, 2011 8:38 AM
6	1. Additional course work in Math and CS 2. Internship 3. Professional Training and Certification 4. Employment in the field of Systems Administration	May 12, 2011 12:14 PM
7	Went to the University of Michigan and completed MS in Mechanical Engineering, then took a consulting position with Andersen Consulting.	May 8, 2011 11:00 AM
8	Pre-engineering, physics @ Albion BS Mechanical Engineering @ Michigan Technological University MS Industrial Engineering from Lamar University (Through Army Materiel Command Fellowship)	May 7, 2011 3:44 PM
9	BS-Electrical Engineering MS-Electrical Engineering Design Engineer-Hewlett Packard Engineering Supervisor-Ford Motor Company Consultant-Exponent Consultant-Design Research Engineering	May 5, 2011 10:50 PM
10	Albion, 1961 Univ. of Pennsylvania, MS 1963 Pennsylvania State Univ. Ph.D. 1968 Research Physicist, NIST, 1968 to 2008; currently contractor at NIST for 10 months of the year, on a year-by-year basis.	May 5, 2011 12:29 PM
11	MS in Industrial and Operations Engineering at UM, employed by Jet Propulsion Laboratory, Pasadena, CA	May 4, 2011 9:52 PM
12	BSME from U of M. Currently Mechanical Engineer at Puget Sound Naval Shipyard.	May 4, 2011 9:06 PM
13	M.Arch -- Miami University Design Professor & Practicing architect	May 4, 2011 4:21 PM

Page 2, Q4. What was your career path, including subsequent education, following graduation from Albion?		
14	MS in physics, beginning a PhD program in biophysics in 2011	May 4, 2011 8:48 AM
15	master's degree in physics, Ph.D. in physics worked at a biotech startup company in Atlanta for ~ 6 onths, then joined the federal government as a physicist in 2002. Still working for federal gov't as a engineer.	May 3, 2011 9:50 PM
16	M.S. and Ph.D. in Applied Mathematics from Northwestern University, then teaching for a year, then government work.	May 3, 2011 8:42 PM
17	MA history of science MS science education Science teacher	May 3, 2011 8:34 PM
18	Help Desk Support, National Computer Technical Support, Help Desk Manager, IT Project Manager.	May 3, 2011 8:05 PM
19	I transfered after my sophmore year, so I did not graduate from Albion	May 3, 2011 6:54 PM
20	Ph.D. program in Physical Chemistry	May 3, 2011 5:09 PM
21	hired by IBM, had classes conducted by IBM and worked on computers for several employers, retiring in 2001	May 3, 2011 5:02 PM
22	MS, PHD- University of Illinois Nuclear Research Institute in Julich Germany 1973 - 1976 Argonne National Laboratory 1976 - 2006 (Scientist, Senior Scientist, Group Leader, Associate Division Director) Currently: Editor, Nuclear Instruments & Methods B Associate Editor , Applied Physics Letters	May 3, 2011 4:35 PM
23	Currently in graduate school pursuing a doctorate degree in physical chemistry.	May 3, 2011 4:01 PM
24	MS in EE om Univ.of Illinois 36 years as a Communiction Systems Engineer at GTE/General Dynamics (Defense Electronics)	May 3, 2011 4:00 PM
25	Career - Information Technology Subsequent education - MS, Computer & Information Science	May 3, 2011 3:23 PM
26	Law School - JD Business School - MBA associate at a law firm for one year SVP, Assistant General Counsel and Assistant Secretary National City Corporation - 30 years SVP, Assistant Counsel and Assistant Secretary FirstMerit Corporation - 1.5 years	May 3, 2011 3:17 PM
27	B.S. Mechanical Eng Michigan Tech, M.S. Statistics Oakland U, Ph.D. Applied Math U of Maryland. I've worked 20+ years mostly doing engineering data analysis connected with automotive testing, durability and reliability.	May 3, 2011 3:04 PM
28	Graduate work at WMU (Grad Teaching Assistant); High School Physics Teacher (1967-2000), West Ottawa HS, Holland, MI; Physics & Calculus Teacher (2001-2006); IMG Bolleterri Sports Academy, Bradenton, FL; Certified Flight Instructor, Tulip City Air Service, Holland, MI; Deputy Sheriff and Accident Investigator, Marine Division, Allegan Co. Sheriff Dept., 1983-2000	May 3, 2011 1:50 PM
29	3-2 Engineering to Purdue for Industrial Engineering, to Ford Motor Co for 2 years then to U of Michigan for MBA then to Eli Lilly for past 20 yrs.	May 3, 2011 10:02 AM
30	MS & PhD, Applied Physics, Stanford Option trading	May 2, 2011 4:10 PM
31	BS Mech Engineering. Auto safety engineer. Gas turbine combustion design engineer.	May 2, 2011 3:40 PM

Page 2, Q4. What was your career path, including subsequent education, following graduation from Albion?		
32	I'm currently at Columbia University completing a BS in Biomedical Engineering. Afterward I plan on pursuing a graduate degree before working in industry.	May 2, 2011 2:32 PM
33	I am a PhD track graduate student in the University of Toledo's Department of Physics and Astronomy.	May 2, 2011 2:24 PM
34	8 Years with IBM in computer sales 38 in real estate brokerage, sales and training	May 2, 2011 2:09 PM
35	Industrial and Operatings Engineering BSE from University of Michigan	May 2, 2011 12:09 PM
36	Masters of Public Health with a concentration in health management. They did an administrative fellowship with the university of pittsburgh medical center. worked as a manager and am now coaching/training in healthcare quality improvement	May 2, 2011 11:37 AM
37	Ph.D. in Mathematics. I'm now an assistant professor of mathematics.	May 2, 2011 11:24 AM
38	MS and PhD in Optics from Univeristy of Rochester, founded Photon Gear, Inc. in 2000.	May 2, 2011 11:06 AM
39	MS Physics, career in System Engineering	May 2, 2011 10:52 AM
40	I received a Master's degree in Engineering Physics from The University of Virginia, and have spent 26 years in the Semiconductor industry.	May 2, 2011 10:51 AM
41	Ph.D. program at U. of Mich. for one year (M.S. only received) and then the U. of Mich. Law School and career as a lawyer. Now general counsel.	May 2, 2011 10:43 AM
42	After Albion I attended the University of Michigan and graduated with a BSME in Mechanical Engineering in 2008, an MSE in Mechanical Engineering in 2010, and am currently in the PhD program for Materials Science and Engineering. I co-founded a clean tech startup, CSquared Innovations LLC, that is developing a high power, high energy density lithium ion battery.	May 2, 2011 10:39 AM
43	chemist	May 2, 2011 10:21 AM

Page 2, Q6. Please enter here any comments that you may have with regard to the previous question.		
1	Hard to remember what I took after 35 yrs. All were pretty good. I don't use a lot of what I learned but it comes back quick when I need it, and I do need it occasionally.	May 15, 2011 3:07 PM
2	I have a hard time claiming that any particular course in my physics degree was of great value in my career path. I can say that the analytical methods I learned in physics labs have been of the greatest value to me throughout my life, but the information from the coursework, has not been a boon to me in my chosen career.	May 14, 2011 5:49 PM
3	When I went to U of M, I was given credit for courses such as Electricity and Magnetism but still had to take the prerequisite Mathematics courses.	May 5, 2011 10:50 PM
4	None of these course titles are familiar to me. However: Freshman (Basic) Physics: -- adequate, good on getting an understanding of physical principles E&M -- not nearly rigorous enough, ok on basic E&M concepts Thermodynamics -- very good and comprehensive Mechanics -- not adequate Other courses -- of little impact	May 5, 2011 12:29 PM
5	Don't remember many of the courses.	May 4, 2011 9:52 PM
6	i don't use any content form those classes in my day-to-day; what I learned was that process is vital. that understanding those processes was more important than getting the correct answer. that recognizing the relationships and systems was more important than data.	May 4, 2011 4:21 PM
7	Math methods is key!	May 4, 2011 1:23 PM
8	students who will be moving on to engineering (either as grad students, or as part of the pre-engineering program) could benefit greatly from coursework which focuses more on linear systems and from a more rigorous treatment of probability	May 4, 2011 1:00 PM
9	Of these, by far the most valuable was Mathematical Physics (380) --- this was a fantastic preparation for my graduate school program! 242 was also very helpful in building up mathematical tools I would later use a lot.	May 3, 2011 8:42 PM
10	Not sure if I am remembering all of the courses correctly	May 3, 2011 8:34 PM
11	I don't remember my specific courses, but I do recall enjoying the ones I took. I was at Albion from Fall 86 to Spring 88.	May 3, 2011 6:54 PM
12	Most, if not all, of these classes were not offered in 1958-1962	May 3, 2011 5:02 PM
13	Hey,I'm a Physics Major....how could any Physics course not be valuable? I took QM at Oak Ridge...not the direction I went, of little value.	May 3, 2011 4:00 PM
14	As I have not entered a field where I'm using my physics education, when answering this question on purely a career benefit basis it may not appear that my physics classes were of particular use. That said, I pursued a degree in physics primarily because I found the concepts interesting and (frustratingly) challenging.	May 3, 2011 3:23 PM
15	There was a deficiency in the math offered at the time I attended Albion. At the time there needed to be some Math for physics offered. I think it was only offered as independent study at the time.	May 3, 2011 3:04 PM

Page 2, Q6. Please enter here any comments that you may have with regard to the previous question.		
16	Its been too long to remember the course numbers! Above is a best guess....some of the names I remember do not appear.	May 3, 2011 1:50 PM
17	Mathematical physics courses in the 1960s would have been helpful. Eventually I did not use my modern physics background.	May 3, 2011 1:13 PM
18	Could really have used a structured Quantum Mech course. Also, advanced E&M, & practical electronics instruction.	May 2, 2011 4:10 PM
19	I think the analytical physics were really great at establishing a baseline for the proper mindset and approach to solving problems. Even though not all of the material is relevant to what I went on to study it was still seems to come up in conversation and analogous I find myself using similar processes to solve different problems. The Electronics course has played an extremely large role in my success so far as so many different systems in biology can be modeled using an electronic model. The Theoretical Mechanics course also have served me well despite the now apparent emphasis on astronomy (It's ok, I enjoyed it). The Advanced physics lab (I didn't see it listed above) was also very neat although I finding less relevant than other coursework.	May 2, 2011 2:32 PM
20	I wish I could have taken more lab courses and a practical statistics course. Those would have been very valuable for future research.	May 2, 2011 2:24 PM
21	Physics (and mathematics) developed a methodology to think through problems which applied to numerous endeavors.	May 2, 2011 2:09 PM
22	This is a difficult question to answer. The courses were all helpful in finishing my undergraduate education but I am not working in a physics related field in my professional career so they are of little help to me now.	May 2, 2011 12:09 PM
23	Interestingly, since i have verged from the path of straight physics, most of the value i found from the classes is related to problem solving and how the class encouraged that process or the process of learning. Granted, some of that may be due to the teacher, but some of it was the material as well.	May 2, 2011 11:37 AM
24	My most valuable classes were the independent studies I was able to take. Having Drs. Seely and Moreau set me loose with a book and push me to try to understand the material was terribly valuable. It was a great skill to have when dealing with courses in graduate school with less than stellar teachers. I also thought 242 was terribly useful. There were a lot of mathematical tidbits that I hadn't seen, or didn't remember seeing previously that were very useful in later courses. I really enjoyed the quantum mechanics course as well, I would suggest having students take it in tandem with Physical Chemistry -- this provides two different views that reinforce each other very nicely. The mathematical physics course was not terribly useful for me, I found we relied too much on MathCad and not enough on learning the mathematics.	May 2, 2011 11:24 AM
25	I believe 137 was the intro class for physics that required a term paper, which is what led to pursuing an engineering degree in Optics.	May 2, 2011 11:06 AM
26	Not applicable to me and my subsequent career to answer course by course. However, collectively the college math/physics courses were key to creative problem solving skills.	May 2, 2011 10:43 AM

Page 2, Q7. If you found any other course(s) at Albion, in any discipline, to be of particular value to you and to your career, please list these course(s), or a synopsis of these courses, here.		
1	I strongly believe in the liberal arts education that combines science with other curriculum areas. As an engineer, project manager, and management leader, I use many other skills and knowledge every day, not just my science/engineering background.	May 15, 2011 6:35 PM
2	Math Calculus courses Computer classes (but remember this was back in 68-72, it was quite a bit different back then)	May 15, 2011 3:07 PM
3	Pretty much all of the courses in my Computational Math major have been vital to me in my chosen career as a computer programmer.	May 14, 2011 5:49 PM
4	MATH 236-Linear Algebra, CS 256-Practicum in C, CS-352 Data Structures & Algorithms	May 12, 2011 12:14 PM
5	Albion prepared me with an great foundation in the theories of physics and math that were very easy to apply in graduate engineering curriculum.	May 8, 2011 11:00 AM
6	All of the courses required through the pre-engineering program were valuable including computer science and math. Economics courses were also valuable. All of these helped me in my mechanical engineering concrete.	May 7, 2011 3:44 PM
7	Generally, the liberal arts curriculum has helped provide a wider perspective.	May 5, 2011 10:50 PM
8	All of the math courses were extremely valuable to me. In addition, Freshman Chemistry, one semester of organic chemistry, and P. Chem were valuable.	May 5, 2011 12:29 PM
9	English courses. Being able to communicate effectively is of the utmost importance. Many of the engineers I work with can barely write a sentence.	May 4, 2011 9:52 PM
10	Statics as well as Thermodynamics. Dr. Mason taught these as a directed study. These greatly helped when transferring to U of M for the pre-Engineering Dual Degree Program.	May 4, 2011 9:06 PM
11	Philosophy of Art. Art and science need to be taught together more often; they're both about observations of the world -- the interpretation of the observation changes, of course.	May 4, 2011 4:21 PM
12	programming courses have been absolutely invaluable to me as both a private sector researcher and as a PhD student.	May 4, 2011 1:00 PM
13	Electronics, Mathematical Physics (380), Mathematical Modeling (survey course in math department)	May 4, 2011 8:48 AM
14	Differential Equations, Calculus III, Linear Algebra	May 3, 2011 8:42 PM
15	Econ Accounting	May 3, 2011 8:05 PM
16	Chem 340, Darren Mason's math classes	May 3, 2011 5:09 PM
17	I consider all the classes I took of value (except gym -- hated it!) -- english, philosophy, religion, soch, art, -- even chapel twice a week was of value.	May 3, 2011 5:02 PM
18	Getting a liberal arts education, rather than focusing solely on science, proved very valuable for me, both professionally as well as personally.	May 3, 2011 4:35 PM

Page 2, Q7. If you found any other course(s) at Albion, in any discipline, to be of particular value to you and to your career, please list these course(s), or a synopsis of these courses, here.		
19	I found that the upper level physical chemistry courses were very beneficial as well as differential equations in mathematics.	May 3, 2011 4:01 PM
20	Intro to Art (lab) - made me think a little bit outside the box Intro to Psychology - How we motivate ourselves and others Writing - always did poorly, but so important.	May 3, 2011 4:00 PM
21	I believe everyone should be required to take at least introducotry accounting. In todays world no matter what you end up doing having a basic understanding of accounting is a fundamental skill, whether that is wrtting grant proposals, running you own business or wroking for a corporation.	May 3, 2011 3:17 PM
22	All of the Math courses taken (second major); Library Science (Until the electronics age!); European History (Dr. Walsh); WSI (taught swimming and became an assistant coach at WOHS - 3 state championships!)	May 3, 2011 1:50 PM
23	Freshman chemistry	May 3, 2011 1:13 PM
24	Multivariable calculus, Linear Algebra and Differential Equations, and Math Modeling were very helpful and all of the Biology courses I took were extremely helpful. I enjoyed my Honors courses as well.	May 2, 2011 2:32 PM
25	Having taken the Complex Analysis course (Math Dept) turned out to be really helpful for me when I took a graduate level Mathematical Methods for Physicists course.	May 2, 2011 2:24 PM
26	I'm old school because I found the Liberal Arts education at Albion to be of particular value in my life overall.	May 2, 2011 2:09 PM
27	Nothing is particularly striking. my extracurriculars did prepare me for some of the work. I'd say TAing the physics labs also helped me learn how to teach others.	May 2, 2011 11:37 AM
28	All the math classes I took with Drs. Bollman and Mason.	May 2, 2011 11:24 AM
29	Chemistry and Business Intro	May 2, 2011 11:06 AM
30	I found all of the calculus and differential equations classes in the mathematics departments very valuable to graduate school and my subsequent engineering career.	May 2, 2011 10:51 AM
31	Programming Courses Calculus III	May 2, 2011 10:28 AM

Page 2, Q9. Please feel free to enter comments that are relevant to the previous question here.		
1	Got a good background for engineering degree, but not a lot of engineering application stuff.	May 15, 2011 3:07 PM
2	Although course work did not end up applying directly to my grad work or career, it did teach me to think critically, problem solve, and built a strong foundation of math and science.	May 15, 2011 1:52 PM
3	My biggest lack of preparation for grad school was math for quantum physics, especially tensor math and relativistic physics. I believe that I was well prepared for graduate level mechanics, E&M and stat mech.	May 14, 2011 8:38 AM
4	The physics curriculum has provided a stronger base of knowledge than people who had gone directly into engineering school.	May 5, 2011 10:50 PM
5	Answer is given with reference to: (a) 94% of class was from major schools with major programs, (Cal Tech, MIT, U of Chicago, U of Illinois, Brooklyn Polytech, etc). (6) 6% of class (3 of us) was from liberal arts colleges: one from Queens College had a very large number of high level physics courses; the other from Reed College (the Swarthmore of the West at the time) did not do as well as I, even though he had to have had better preparation.	May 5, 2011 12:29 PM
6	i understood the value of the process. it's not about the grades.	May 4, 2011 4:21 PM
7	I came to grad school with a class made up of students who had taken nothing by math and physics in undergrad. I was able to hold my own and proud of Albion for that fact.	May 4, 2011 1:23 PM
8	The small class size and relatively slow pace of physics courses did not at all prepare me for graduate school at a technical university (Georgia Tech). I ended up taking lots of "remedial" courses my first two years of grad school to catch up on areas like quantum mechanics.	May 3, 2011 9:50 PM
9	While I did not have all of the background I needed (e.g. in complex variables, differential equations) I, found that I had a strong enough foundation to be able to fill in the gaps.	May 3, 2011 8:42 PM
10	I noted Well Prepared, but my graduation was from a different school.	May 3, 2011 6:54 PM
11	I lacked computer programming experience. I also had little knowledge of physical chemistry, QM, and atomic physics in general.	May 3, 2011 5:09 PM
12	The lack of any quantum mechanics at Albion, at least at that time (1963 - 1967), proved challenging.	May 3, 2011 4:35 PM
13	Compared to my fellow classmates I feel that I was better prepared for graduate class work than the average student at my current institution	May 3, 2011 4:01 PM
14	I had to take many Junior/Senior-level Prerequisites at Illinois because I changed fields (Physics to EE). The other students didn't have a chance because of my preparation at Albion.	May 3, 2011 4:00 PM
15	The "Albion Experience" provided not only the classroom book learning but also other campus experiences that prepared me to deal with many issues through my personal and professional life.	May 3, 2011 3:17 PM

Page 2, Q9. Please feel free to enter comments that are relevant to the previous question here.		
16	There was a deficiency in the math offered at the time I attended Albion. At the time there needed to be some Math for physics offered. I think it was only offered as independent study at the time.	May 3, 2011 3:04 PM
17	The courses prepared me exceedingly well for a High School teaching career, and for several "second/part time" careers (aviation; accident investigation; high vac & optical coating research (Donnelly Mirrors, Holland);	May 3, 2011 1:50 PM
18	My math background was weak for high energy particle physics. That was convenient since I then entered oceanography where I have had a successful career.	May 3, 2011 1:13 PM
19	My first year of grad school I felt very behind, especially in QM. Of course, the competition mostly came from larger schools with a wider course selection. However, my understanding of the basics was solid, and the fancy stuff followed with work. This probably wasn't an unusual experience for the first year of grad school.	May 2, 2011 4:10 PM
20	Engineering classes were a breeze. I was prepared with a good foundation of physics to apply to engineering concepts.	May 2, 2011 3:40 PM
21	I wish I had the opportunity to have more exposure to MATLAB although I appreciate the minor exposure to it in Electronics and skills I gained through learning JAVA and Mathematica.	May 2, 2011 2:32 PM
22	In entering grad school, I felt other students had more experience with lab equipment or programming, however, my mathematical knowledge and general physics was at the same level as others.	May 2, 2011 2:24 PM
23	At my graduation I had no computer experience (since that was fairly new) and no business courses, but the skills of learning were in fact my strength.	May 2, 2011 2:09 PM
24	I thought my education basis was satisfactory but there were transitional issues that were a great challenge (see #11).	May 2, 2011 12:09 PM
25	small class size and intense teaching really helped prepare me for graduate school and beyond	May 2, 2011 11:06 AM
26	Albion College gave me a great foundation of mathematics and physics for graduate school. Additional semiconductor physics would have been helpful to me personally for graduate school and my career. I most enjoyed the atomic and nuclear physics classes. They were my favorites.	May 2, 2011 10:51 AM
27	I found myself very well prepared for graduate school in physics -- just not prepared for the lack of opportunities at the time for employment thereafter.	May 2, 2011 10:43 AM

Page 2, Q10. What do (or did) you perceive to be strengths of Albion's Physics program?		
1	Adequate, Gene really thought he received a good education at Albion College.	May 24, 2011 8:17 AM
2	For me, good preparation in basics that you can always go back to when you need.	May 15, 2011 3:07 PM
3	Staff.	May 15, 2011 1:52 PM
4	The dedication of the faculty to the students, and maintaining a high degree of modern information in the physics courses.	May 14, 2011 5:49 PM
5	Personal interactions with Professors. Small classes.	May 14, 2011 8:38 AM
6	The Faculty: their experience, passion, and commitment; The student to faculty ratio.	May 12, 2011 12:14 PM
7	Great instructors, small class sizes and en environment that encouraged learning.	May 8, 2011 11:00 AM
8	It gives students a strong physics background and the labs were hands on.	May 7, 2011 3:44 PM
9	The small focused classes.	May 5, 2011 10:50 PM
10	Certainly the Albion physics curriculum is far better than 50 years ago. I would continue to urge that upper level course be sufficiently rigorous for entering grad school (Jackson for E&M (both statics and dynamics), Synge & Griffith (Jacobians and Hamiltonians, for example) -- these are dated texts no doubt, but that is the idea). Also, I would think that the mathematical physics tha I had in grad school is now in the undergrad curriculum, and I would urge all students to be very proficient in that course.	May 5, 2011 12:29 PM
11	Being a part of a liberal arts education.	May 4, 2011 9:52 PM
12	Professors took time to explain things to students. Had much patience. Also challenged us.	May 4, 2011 9:06 PM
13	attentive, devoted faculty.	May 4, 2011 4:21 PM
14	The relationships between majors and faculty.	May 4, 2011 1:23 PM
15	The instruction is truly wonderful, and the involvement of the professors in students lives is highly motivating. Students gain a strong theoretical understanding of physics.	May 4, 2011 1:00 PM
16	The professors are excellent teachers and do a great job engaging their students. There are varied research opportunities for students as well.	May 4, 2011 8:48 AM
17	Ironically (based on my answer to the last question), the small class sizes.	May 3, 2011 9:50 PM
18	The dedication of the faculty to the students! All four faculty that were there when I was, Drs. Ludington, Moreau, Seely, and Williams, invested a lot of time in my education, and that was a huge motivation to me to try to understand the course material. I also appreciated the integration of Mathcad into several of the classes---while I've used different software packages more since then (MATLAB and Mathematica), becoming familiar with a similar package was very helpful.	May 3, 2011 8:42 PM

Page 2, Q10. What do (or did) you perceive to be strengths of Albion's Physics program?		
19	Course size. In general, attending courses at Albion allowed more of an opportunity to interact with all those in the class and with the professor.	May 3, 2011 6:54 PM
20	Exceptional faculty, both in math and physics.	May 3, 2011 5:09 PM
21	Have no idea. What helped me was that I learned to think and reason, but which classs did I learn that in, if not all of them. (Perhaps I came knowing how.)	May 3, 2011 5:02 PM
22	Being able to associate with a variety of excellent students from varied disciplines.	May 3, 2011 4:35 PM
23	I feel that I received a good understanding of the fundamental concepts in physics more so than other graduate students I have encountered, though they typically had learned about a broader range of topics than I had. I also believe it was beneficial having a lot of access to the professors and the smaller class sizes for the upper level classes.	May 3, 2011 4:01 PM
24	Breadth, Rigor, small classes, personal attention,	May 3, 2011 4:00 PM
25	It was a challenging course materials and great one on one interaction with the professors.	May 3, 2011 3:17 PM
26	Small classes; caring instructors; excellent equipment (although much "dated" by today's standards); commaraderie amoung students	May 3, 2011 1:50 PM
27	Individual attention.	May 3, 2011 1:13 PM
28	rigorous problem solving	May 3, 2011 10:02 AM
29	Low student-teach ratio allowed for plenty of individual interaction.	May 2, 2011 4:10 PM
30	Small size. Ability to have strong personal relationships with professors.	May 2, 2011 3:40 PM
31	The constant encouragement throughout the constant challenges. Topics were approached despite any level of difficulty and assessment was adjusted accordingly. I extremely appreciate the relationships that students have with faculty members.	May 2, 2011 2:32 PM
32	The professors are very involved with students and are always available for questions. I felt like I was already used to the graduate student style of learning (small classrooms, discussion, focus on understanding problems rather than only worrying about grades) when I entered my program.	May 2, 2011 2:24 PM
33	I am a student of Dr. Robert Luttermoser and therefore I learned that physics and "real" science is in fact a way to deal with life.	May 2, 2011 2:09 PM
34	Great academics, amazing professors who continued to be resources after graduation.	May 2, 2011 12:09 PM
35	size - i thought the small program had many advantages, 1-1 contact with professors, closeness among students for problem solving and discussion. the professors were great - were sensitive to students and their needs. responsive.	May 2, 2011 11:37 AM
36	The faculty. Their interest and willingness to ensure that I was able to get a high-quality education was, and still is, invaluable to me.	May 2, 2011 11:24 AM

Page 2, Q10. What do (or did) you perceive to be strengths of Albion's Physics program?		
37	small class size and dedicated faculty, drs. kramer and Petersen were awesome professors	May 2, 2011 11:06 AM
38	Interaction with Faculty	May 2, 2011 10:52 AM
39	Low student to teacher ratio. Also ability to do research with the professors at undergraduate level. I remember on working on a vacuum system with one other student.	May 2, 2011 10:51 AM
40	We had very small classes and rigorous expectations for understanding the content.	May 2, 2011 10:43 AM
41	The student to professor ratio is outstanding. The attention students receive is very unique. The available research opportunities for students is also a strong feature.	May 2, 2011 10:39 AM
42	Small class size and good professors Interesting labs	May 2, 2011 10:28 AM
43	intimacy and focus on learning rather than competition	May 2, 2011 10:21 AM

Page 2, Q11. What do (or did) you perceive to be weaknesses of Albion's Physics program?		
1	Don't recall any.	May 15, 2011 1:52 PM
2	Resources to learn better study habits. My challenge was never in understanding the material, but in figuring out how to balance doing homework with other stuff...	May 14, 2011 5:49 PM
3	Math required for graduate level quantum courses.	May 14, 2011 8:38 AM
4	Including some practical engineering type courses would provide future engineering students a better bridge to that transition.	May 8, 2011 11:00 AM
5	When I was there the physics track coursework did not begin until the spring semester.	May 7, 2011 3:44 PM
6	The small department did not offer a lot of variety. The five of us pretty much had to take the same classes.	May 5, 2011 10:50 PM
7	I can't think of anything.	May 4, 2011 9:52 PM
8	Newer teachers. But I believe those teachers will continue to improve and do great things.	May 4, 2011 9:06 PM
9	the physical facility.	May 4, 2011 4:21 PM
10	That it can be perceived as a "service" department, with low-level courses for non-majors.	May 4, 2011 1:23 PM
11	I think that research work should be encouraged much more vigorously, both summer experiences and during the school year. As a student I would have benefited from more instruction on how to pursue outside research opportunities, and more encouragement to pursue research at Albion	May 4, 2011 1:00 PM
12	The small size of the department can be detrimental- with only a few physics majors the upper-level classes often must be taught as tutorials, which is not ideal.	May 4, 2011 8:48 AM
13	Relevant course offerings were limited. Depending on the faculty member, I sometimes wished that standards could have been a little higher on tests. At times I didn't feel that I was pushed as mush as i wanted to be.	May 3, 2011 5:09 PM
14	At that time, at least, no quantum mechanics.	May 3, 2011 4:35 PM
15	The curriculum seemed to me to be lacking an advanced laboratory course, which I feel would be a beneficial addition. It was also difficult to get enough students together and find a professor for the advanced courses. I also think that the other graduate students had a better knowledge of what research is currently being conducted than I did when I started.	May 3, 2011 4:01 PM
16	I spent a semester at Oak Ridge, so I only took 7 or 8 Physics classes at Albion...not enough. Also, lab experiments seemed too directed, little probem solving experience. That was a problem in grad school. For me, not a good background in Electrical Engineering concepts, so I had to take a lot of EE Prerequisites in grad school. Perhaps you should have a program or a couple of courses that give your students an introduction to what they will need in an engineering program.	May 3, 2011 4:00 PM

Page 2, Q11. What do (or did) you perceive to be weaknesses of Albion's Physics program?		
17	Lack of awareness of potential impact of grading scale compared to other departments at the school.	May 3, 2011 3:17 PM
18	During my Senior year, a new professor was added to the Physics staff who was more interested in impressing us with his knowledg that teaching us what we needed. This was an aberration when judged by the entire Physics staff.	May 3, 2011 1:50 PM
19	Lack of integration with the math program.	May 3, 2011 1:13 PM
20	Lack of breadth of available courses to choose from.	May 2, 2011 4:10 PM
21	More examples of applied uses for physics	May 2, 2011 3:40 PM
22	Size. It would be nice to have course offerings but the limited students in the program the current offerings are fantastic.	May 2, 2011 2:32 PM
23	Student's access to upper level lab experiments and equipment was very limited when I went there. I don't think I did any lab work my junior or senior year.	May 2, 2011 2:24 PM
24	It was not well explained to me how intense the classes would be at U of M or the heavy credit load that would be required to finish the degree in 4 semesters. I had to basically take 4 engineering classes for 4 semesters in a row and was competing with other students in the classes who were talking a more balanced load of classes (maybe 1-2 engineering classes with 1-2 lighter/ less technical classes). It was a very difficult transition.	May 2, 2011 12:09 PM
25	diversity of classes and availably. since the department is small, a physics major had to follow a pretty prescribed curriculum to get in all the requirements. this also restricted the ability to get other elective courses in or the liberal arts requirements.	May 2, 2011 11:37 AM
26	It's small, we don't have access to cutting edge equipment and laboratories.	May 2, 2011 11:24 AM
27	none as long as program is run similar	May 2, 2011 11:06 AM
28	I did not remember many semiconductor physics courses / sections that would have been valuable for my furure career. I had to make it up in graduate school.	May 2, 2011 10:51 AM
29	My intent was to go to graduate school and do theoretical physics. It probably would have been great to have had more Albion physics majors with similar interests.	May 2, 2011 10:43 AM
30	There could be more emphasis on applied physics, connecting the in class topics to current global issues such as energy generation and storage.	May 2, 2011 10:39 AM

Page 2, Q12. What changes would you suggest that we consider for improving Albion's Physics program?		
1	It's been a couple of minutes since I graduated, and I haven't kept up on the curriculum all that well... but that said, there isn't a lot of applied physics on the curriculum, and it occurs to me that that might help out the engineering students.	May 14, 2011 5:49 PM
2	More course options that focus on application in an engineering sense (see answer to question 11).	May 8, 2011 11:00 AM
3	There were opportunities for research programs but their was not as strong of a connection with industry for internship positions. Increasing these ties would be beneficial.	May 7, 2011 3:44 PM
4	I don't have any at this time.	May 5, 2011 10:50 PM
5	None	May 4, 2011 9:52 PM
6	Have a professor that can teach engineering accredited classes to help students interested in the pre-Engineering Dual Degree Program get a head start.	May 4, 2011 9:06 PM
7	more opportunity to take physics out of the science complex and to engage the rest of the campus population in interdisciplinary studies.	May 4, 2011 4:21 PM
8	I have always felt that some funding should be found to pay students for research work, even if it isnt much. Maybe just small amounts for older students would be good to start. If the younger students see the opportunities maybe the will be more willing to put in the work voluntarily at first.	May 4, 2011 1:00 PM
9	I'm not sure any improvements I would suggest would still be relevant given the enormous changes in the program since my graduation.	May 3, 2011 9:50 PM
10	The physics program's weaknesses primarily stemmed from a lack of students overall in my analysis. Perhaps the some of the premeds could be converted.	May 3, 2011 5:09 PM
11	An advanced lab course would be beneficial. Though I did not have to take the seminar course, I think that was probably a good addition to the course material.	May 3, 2011 4:01 PM
12	Hard to say, I've been away for 38 years. Tailor offerings to prepare students for graduate program. My foundation in EE concepts was weak which left holes in my EE training.	May 3, 2011 4:00 PM
13	I am too long away from Albion to provide any meaningful input on this topic.	May 3, 2011 3:17 PM
14	Including some options for environmental work (this goes somewhat counter to my comments on math rigor.	May 3, 2011 1:13 PM
15	I like what I've seen in terms of research opportunities for students. I don't know what coursework is like now, so don't feel qualified to make suggestions.	May 2, 2011 4:10 PM

Page 2, Q12. What changes would you suggest that we consider for improving Albion's Physics program?		
16	You might want to consider dropping the seminar requirement. I went to almost as many lectures when I was in the course as when I had completed the requirement. Not all of the speakers were relevant/interesting. Also, encourage research! One of the greatest assets Columbia has is research. I know time is limited but getting students in the lab doing actual research would be much better than the three labs in analytical physics. While I enjoyed the labs they really didn't contribute much to my educational goals and were mostly a time sink. I might also suggest working in more demos in class. Albion has a ton of little trinkets hidden away that could provide very good examples of the theory the students are learning in lecture.	May 2, 2011 2:32 PM
17	Again, an upper level lab class would be nice. Also, physics majors should be either required (or highly encouraged) to take as much computer programming and statistics classes as they can. Having an advanced lab that includes programming projects and practical statistical methods applied to research would be beneficial to future students.	May 2, 2011 2:24 PM
18	Students need to be given a sample schedule of what the final 2 years look like in the 3-2 program. Having a side by side comparison to what other students will be taking those final 2 years in the secondary school will highlight the differences/ challenges.	May 2, 2011 12:09 PM
19	some of the advanced courses it would be helpful if they were offered twice a year - or if more of the physics major classes could fulfill requirements for the liberal arts component.	May 2, 2011 11:37 AM
20	Get the college to increase your funding for laboratories and research.	May 2, 2011 11:24 AM
21	don't go away from teaching the fundamentals	May 2, 2011 11:06 AM
22	Encouraging student's to make presentations in seminars or conferences (writing papers also). You may already be doing that, but that is something that I would have benefited from. Communication of technical information is so very important in industry.	May 2, 2011 10:51 AM
23	None. It obviously needs to work for an array of students who are not going to be physics majors. My biggest concern is that we do not train enough non-scientists with the analytical skills that scientists typically have and do not produce enough mathematical literacy more generally.	May 2, 2011 10:43 AM
24	More research.	May 2, 2011 10:39 AM

Page 2, Q13. Please provide any additional comments you may have on Albion's Physics program. If you have news to send for the department newsletter, please send it to Jackie Masternak, department secretary, at jmasternak@albion.edu .

1	Although my career after graduate school took me toward more business types of roles, Albion prepared me very well for graduate school. I felt more prepared than my classmates that went to Michigan as an undergrad in many ways.	May 8, 2011 11:00 AM
2	I'm proud to say I studies physics at Albion, I'm glad the department got its 4th tenure track position back, and I look forward to seeing what you can do in the future! You can count on my donations, small as they are.	May 4, 2011 1:23 PM
3	Unfortunately, I'm probably not much help for this Physics survey, but thought I would attempt.	May 3, 2011 6:54 PM
4	Typing into this survey form is cumbersome. Often key strokes are missed so I have to type very deliberately. Please don't use this one again.	May 3, 2011 4:00 PM
5	Great job! In hindsight I wouldn't have done anything any differently (except perhaps study a little more).	May 2, 2011 2:32 PM
6	The Physics Department does a great job overall! Having professors that care goes a long way to helping students be interested in physics and stick with the subject.	May 2, 2011 2:24 PM
7	not that i can think of! I liked the physics program very much!!	May 2, 2011 11:37 AM
8	Thanks for a great education!	May 2, 2011 11:24 AM

Page 2, Q14. Name (optional)		
1	Eugene L. Perrien 10 Independence Square Bloomington, IL	May 24, 2011 8:17 AM
2	Jim Allen (1972)	May 15, 2011 3:07 PM
3	Tony Bertoia, 1987	May 15, 2011 1:52 PM
4	Steighton Haley	May 14, 2011 5:49 PM
5	Jim Haywood, 1980	May 14, 2011 8:38 AM
6	Mark Jeromin	May 12, 2011 12:14 PM
7	Ken Kish, Class of 1987	May 8, 2011 11:00 AM
8	Andy Ruddick	May 7, 2011 3:44 PM
9	Fred Porter	May 5, 2011 10:50 PM
10	Wilbur Hurst, '61	May 5, 2011 12:29 PM
11	David Childs	May 4, 2011 9:52 PM
12	roberto ventura, '95	May 4, 2011 4:21 PM
13	Tim Rambo	May 4, 2011 1:00 PM
14	Sarah Paukstis, Albion class of '92	May 3, 2011 9:50 PM
15	David Hansen	May 3, 2011 8:42 PM
16	Brenda Schmitz (formerly Brenda Tomlinson)	May 3, 2011 6:54 PM
17	Margaret (Sjoholm) Hayes	May 3, 2011 5:02 PM
18	Lynn E. Rehn, '67	May 3, 2011 4:35 PM
19	Andrew Fidler	May 3, 2011 4:01 PM
20	Tim Huemiller '73	May 3, 2011 4:00 PM
21	Carlton E. Langer Class of 1976 Cell Phone: 216-469-7791	May 3, 2011 3:17 PM
22	Tom Frohman	May 3, 2011 3:04 PM
23	Robert Washburn Lakewood Ranch, FL (Bradenton/Sarasota area)	May 3, 2011 1:50 PM
24	Thomas C. Royer, '63 Professor Emeritus @ University of Alaska and Old Dominion University	May 3, 2011 1:13 PM
25	Rob Rutherford	May 3, 2011 10:02 AM
26	Bartev Vartanian	May 2, 2011 4:10 PM
27	Kyle Kidder	May 2, 2011 3:40 PM
28	Brandan Walters	May 2, 2011 2:32 PM

Page 2, Q14. Name (optional)		
29	Woody King (1965)	May 2, 2011 2:09 PM
30	katie brewer	May 2, 2011 11:37 AM
31	William Green '05	May 2, 2011 11:24 AM
32	gary blough	May 2, 2011 11:06 AM
33	Bob Armitage - 1970	May 2, 2011 10:43 AM

Recent responses to Selected Questions
on the 2011 Physics Alumni Survey

5. From the long list below, please mark the Physics courses that you perceive to be of particularly little value or of particularly great value to you and your career path since your graduation from Albion (some upper-level courses may have been offered as tutorials). Skipped answers will be interpreted to be courses that were of "typical" value, not applicable, or courses that were not memorable. Comments may be entered in the question box that follows.

	1998-2007 (N=12)		Tot		2008-present (N=8)		Tot
	little	great			little	great	
102		1	1			1	1
105			0				0
167		7	7			6	6
168		7	7			6	6
169		7	7			4	4
191		1	1		1	2	3
206			0			1	1
242	1	4	5			3	3
243			0		1		1
244			0		1		1
245	1	2	3			6	6
260			0				0
291			0			1	1
321	1	4	5				0
325		4	4		1	2	3
336		5	5			1	1
345		2	2				0
380	1	4	5			3	3
384			0			1	1
387	2	2	4			3	3

6. Please enter here any comments that you may have with regard to the previous question. [Question 5]

1998-2007	2008-present
Of these, by far the most valuable was Mathematical Physics (380) --- this was a fantastic preparation for my graduate school program! 242 was also very helpful in building up mathematical tools I would later use a lot.	students who will be moving on to engineering (either as grad students, or as part of the pre-engineering program) could benefit greatly from coursework which focuses more on linear systems and from a more rigorous treatment of probability
This is a difficult question to answer. The courses were all helpful in finishing my undergraduate education but I am not working in a physics related field in my professional career so they are of little help to me now.	I think the analytical physics were really great at establishing a baseline for the proper mindset and approach to solving problems. Even though not all of the material is relevant to what I went on to study it was still seems to come up in conversation and analogous I find myself using similar processes to solve different problems. The Electronics course has played an extremely large role in my success so far as so many different systems in biology can be modeled using an electronic model. The Theoretical Mechanics course also have served me well despite the now apparent emphasis on astronomy (It's ok, I enjoyed it). The Advanced physics lab (I didn't see it listed above) was also very neat although I finding less relevant than other coursework.
Interestingly, since i have verged from the path of straight physics, most of the value i found from the classes is related to problem solving and how the class encouraged that process or the process of learning. Granted, some of that may be due to the teacher, but some of it was the material as well.	
My most valuable classes were the independent studies I was able to take. Having Drs. Seely and Moreau set me loose with a book and push me to try to understand the material was terribly valuable. It was a great skill to have when dealing with courses in graduate school with less than stellar teachers. I also thought 242 was terribly useful. There were a lot of mathematical tidbits that I hadn't seen, or didn't remember seeing previously that were very useful in later courses. I really enjoyed the quantum mechanics course as well, I would suggest having students take it in tandem with Physical Chemistry -- this provides two different views that reinforce each other very nicely. The mathematical physics course was not terribly useful for me, I found we relied too much on MathCad and not enough on learning the mathematics.	I wish I could have taken more lab courses and a practical statistics course. Those would have been very valuable for future research.

7. If you found any other course(s) at Albion, in any discipline, to be of particular value to you and to your career, please list these course(s), or a synopsis of these courses here.	
1998-2007	2008-present
MATH 236-Linear Algebra, CS 256-Practicum in C, CS-352 Data Structures & Algorithms	All of the courses required through the pre-engineering program were valuable including computer science and math. Economics courses were also valuable. All of these helped me in my mechanical engineering concrete.
Electronics, Mathematical Physics (380), Mathematical Modeling (survey course in math department)	Statics as well as Thermodynamics. Dr. Mason taught these as a directed study. These greatly helped when transferring to U of M for the pre-Engineering Dual Degree Program.
Differential Equations, Calculus III, Linear Algebra	programming courses have been absolutely invaluable to me as both a private sector researcher and as a PhD student.
Nothing is particularly striking. my extracurriculars did prepare me for some of the work. I'd say TAing the physics labs also helped me learn how to teach others.	Chem 340, Darren Mason's math classes
All the math classes I took with Drs. Bollman and Mason.	I found that the upper level physical chemistry courses were very beneficial as well as differential equations in mathematics.
	Multivariable calculus, Linear Algebra and Differential Equations, and Math Modeling were very helpful and all of the Biology courses I took were extremely helpful. I enjoyed my Honors courses as well.
	Having taken the Complex Analysis course (Math Dept) turned out to be really helpful for me when I took a graduate level Mathematical Methods for Physicists course.

8. How prepared do you perceive you were for your first career (including graduate school or engineering school) after your graduation from Albion?

	1998-2007 (N=12)				2008-present (N=8)			
not well	satisfactory	well	tot		not well	satisfactory	well	tot
0	3	6	9		0	2	4	6

9. Please feel free to enter comments that are relevant to the previous question here. [Question 8]

1998-2007	2008-present
While I did not have all of the background I needed (e.g. in complex variables, differential equations) I, found that I had a strong enough foundation to be able to fill in the gaps.	I lacked computer programming experience. I also had little knowledge of physical chemistry, QM, and atomic physics in general.
Engineering classes were a breeze. I was prepared with a good foundation of physics to apply to engineering concepts.	Compared to my fellow classmates I feel that I was better prepared for graduate class work than the average student at my current institution
I thought my education basis was satisfactory but there were transitional issues that were a great challenge (see #11).	I wish I had the opportunity to have more exposure to MATLAB although I appreciate the minor exposure to it in Electronics and skills I gained through learning JAVA and Mathematica.
	In entering grad school, I felt other students had more experience with lab equipment or programming, however, my mathematical knowledge and general physics was at the same level as others.
	Having taken the Complex Analysis course (Math Dept) turned out to be really helpful for me when I took a graduate level Mathematical Methods for Physicists course.

10. What do (or did) you perceive to be strengths of Albion's Physics program?

1998-2007	2008-present
The Faculty: their experience, passion, and commitment; The student to faculty ratio.	It gives students a strong physics background and the labs were hands on.
The professors are excellent teachers and do a great job engaging their students. There are varied research opportunities for students as well.	Professors took time to explain things to students. Had much patience. Also challenged us.
The dedication of the faculty to the students! All four faculty that were there when I was, Drs. Ludington, Moreau, Seely, and Williams, invested a lot of time in my education, and that was a huge motivation to me to try to understand the course material. I also appreciated the integration of Mathcad into several of the classes---while I've used different software packages more since then (MATLAB and Mathematica), becoming familiar with a similar package was very helpful.	The instruction is truly wonderful, and the involvement of the professors in students lives is highly motivating. Students gain a strong theoretical understanding of physics.
Small size. Ability to have strong personal relationships with professors.	Exceptional faculty, both in math and physics.
Great academics, amazing professors who continued to be resources after graduation.	I feel that I received a good understanding of the fundamental concepts in physics more so than other graduate students I have encountered, though they typically had learned about a broader range of topics than I had. I also believe it was beneficial having a lot of access to the professors and the smaller class sizes for the upper level classes.
size - i thought the small program had many advantages, 1-1 contact with professors, closeness among students for problem solving and discussion. the professors were great - were sensitive to students and their needs. responsive.	The constant encouragement throughout the constant challenges. Topics were approached despite any level of difficulty and assessment was adjusted accordingly. I extremely appreciate the relationships that students have with faculty members.
The faculty. Their interest and willingness to ensure that I was able to get a high-quality education was, and still is, invaluable to me.	The professors are very involved with students and are always available for questions. I felt like I was already used to the graduate student style of learning (small classrooms, discussion, focus on understanding problems rather than only worrying about grades) when I entered my program.
The student to professor ratio is outstanding. The attention students receive is very unique. The available research opportunities for students is also a strong feature.	I wish I could have taken more lab courses and a practical statistics course. Those would have been very valuable for future research.
intimacy and focus on learning rather than competition	

11. What do (or did) you perceive to be weaknesses of Albion's Physics program?	
1998-2007	2008-present
The small size of the department can be detrimental- with only a few physics majors the upper-level classes often must be taught as tutorials, which is not ideal.	When I was there the physics track coursework did not begin until the spring semester.
More examples of applied uses for physics	Newer teachers. But I believe those teachers will continue to improve and do great things.
diversity of classes and availably. since the department is small, a physics major had to follow a pretty prescribed curriculum to get in all the requirements. this also restricted the ability to get other elective courses in or the liberal arts requirements.	I think that research work should be encouraged much more vigorously, both summer experiences and during the school year. As a student I would have benefited from more instruction on how to pursue outside research opportunities, and more encouragement to pursue
It's small, we don't have access to cutting edge equipment and laboratories.	Relevant course offerings were limited. Depending on the faculty member, I sometimes wished that standards could have been a little higher on tests. At times I didn't feel that I was pushed as mush as i wanted to be.
There could be more emphasis on applied physics, connecting the in class topics to current global issues such as energy generation and storage.	The curriculum seemed to me to be lacking an advanced laboratory course, which I feel would be a beneficial addition. It was also difficult to get enough students together and find a professor for the advanced courses. I also think that the other graduate students had a better knowledge of what research is currently being conducted than I did when I started.
	Size. It would be nice to have course offerings but the limited students in the program the current offerings are fantastic.
	Student's access to upper level lab experiments and equipment was very limited when I went there. I don't think I did any lab work my junior or senior year.

12. What changes would you suggest that we consider for improving Albion's Physics program?

1998-2007	2008-present
Students need to be given a sample schedule of what the final 2 years look like in the 3-2 program. Having a side by side comparison to what other students will be taking those final 2 years in the secondary school will highlight the differences/ challenges.	There were opportunities for research programs but their was not as strong of a connection with industry for internship positions. Increasing these ties would be beneficial.
some of the advanced courses it would be helpful if they were offered twice a year - or if more of the physics major classes could fulfill requirements for the liberal arts component.	Have a professor that can teach engineering accredited classes to help students interested in the pre-Engineering Dual Degree Program get a head start.
Get the college to increase your funding for laboratories and research.	I have always felt that some funding should be found to pay students for research work, even if it isnt much. Maybe just small amounts for older students would be good to start. If the younger students see the opportunities maybe the will be more willing to put in the work voluntarily at first.
More research.	The physics program's weaknesses primarily stemmed from a lack of students overall in my analysis. Perhaps the some of the premeds could be converted.
	I feel that I received a good understanding of the fundamental concepts in physics more so than other graduate students I have encountered, though they typically had learned about a broader range of topics than I had. I also believe it was beneficial having a lot of access to the professors and the smaller class sizes for the upper level classes.
	An advanced lab course would be beneficial. Though I did not have to take the seminar course, I think that was probably a good addition to the course material.
	You might want to consider dropping the seminar requirement. I went to almost as many lectures when I was in the course as when I had completed the requirement. Not all of the speakers were relevant/interesting. Also, encourage research! One of the greatest assets Columbia has is research. I know time is limited but getting students in the lab doing actual research would be much better than the three labs in analytical physics. While I enjoyed the labs they really didn't contribute much to my educational goals and were mostly a time sink. I might also suggest working in more demos in class. Albion has a ton of little trinkets hidden away that could provide very good examples of the theory the students are learning in lecture.
	Again, an upper level lab class would be nice. Also, physics majors should be either required (or highly encouraged) to take as much computer programming and statistics classes as they can. Having an advanced lab that includes programming projects and practical statistical methods applied to research would be beneficial to future students.

GraduatesPhysics2011

1.

The Physics Department at Albion College now surveys its graduates and minors on the perceived value of the courses yo took and the level of preparation in order to gain insight on how to improve our curriculum and program. Your answers to the following questions will be valuable to us in our attempts to improve our curriculum and to identify characteristics of our “typical” graduate. This information will be included statistically in our department assessment report which is due May 16. Because that due date is close, please complete this survey as soon as possible.

Thanks. Dave

1. What is your Physics-related major or minor?

- ◯ Physics major
- ◯ Physics major with Secondary Education Certification
- ◯ Combined Course major - Physics ("Pre-engineering")
- ◯ Combined Course major - Math ("Pre-engineering")
- ◯ Combined Course major - Other ("Pre-engineering") - Please check this option if unsure
- ◯ Mathematics/Physics Interdepartmental Major
- ◯ Self-designed major
- ◯ Physics minor
- ◯ Physics minor with secondary education certification

2. Please list any additional majors here.

2.

3. What do you expect to be the next step, including travel, in your career path?

4. From the list below, please rate only the Physics courses that you took in terms of whether you perceive them to be of little value, typical value, or great value to you at this moment (some upper-level courses may have been offered as tutorials). Do not rank courses that you didn't take. Comments may be entered in the question box that follows.

	Of little value	Of typical value	Of great value	Did not take
102 Physics of Urban and Environmental Problems	◯	◯	◯	◯
105 Introductory Astronomy	◯	◯	◯	◯
167 Analytical Physics I	◯	◯	◯	◯
168 Analytical Physics II	◯	◯	◯	◯
191 Physics and Astronomy Seminar I	◯	◯	◯	◯
205 Planetary Astronomy	◯	◯	◯	◯
206 Astronomy and Astrophysics	◯	◯	◯	◯
242 Theoretical Methods in Physics	◯	◯	◯	◯
243 Mathematical Methods I (1/2	◯	◯	◯	◯
244 Mathematical Methods II (1/2)	◯	◯	◯	◯
245 Electronics	◯	◯	◯	◯
250 Modern Physics (2010-present)	◯	◯	◯	◯
291 Physics and Astronomy Seminar II	◯	◯	◯	◯
325 Theoretical Mechanics	◯	◯	◯	◯
336 Electricity and Magnetism	◯	◯	◯	◯
350 Advanced Laboratory	◯	◯	◯	◯
380 Mathematical Physics (1971-present)	◯	◯	◯	◯
387 Quantum Mechanics (1984-present)	◯	◯	◯	◯

5. Please enter here any comments you may have which are related to your response to the previous question.

6. If you found any other course(s) at Albion, in any discipline (e.g. Honors), to be of particular value to you and to your career, please list these course(s), or a synopsis of these courses, here.

7. How prepared do you perceive yourself to be for your first career, including graduate school? A text box for optional comments on your entry follows this question.

- ◯ Not well prepared
- ◯ Satisfactorally prepared
- ◯ Well prepared

8. Please feel free to enter comments that you may have which are related to your response to the previous question.

9. What do you perceive to be the strengths of Albion's Physics program?

10. What do you perceive to be the weaknesses of Albion's Physics program?

11. What changes would you suggest that we consider for improving Albion's Physics program?

12. Please provide any additional comments you may have on Albion's Physics program. If you have news to send for the department newsletter, please send it to Jackie Masternak, department secretary, at jmasternak@albion.edu, and remember that Dr. Moreau will be setting up a Facebook page.

13. Name (optional)

Thank you for your time in completing this survey. We wish you every success in the future. Dave Seely, Chair

GraduatesPhysics2011

SurveyMonkey

1. What is your Physics-related major or minor?

	Response Percent	Response Count
Physics major	**100.0%**	**3**
Physics major with Secondary Education Certification	0.0%	0
Combined Course major - Physics ("Pre-engineering")	0.0%	0
Combined Course major - Math ("Pre-engineering")	0.0%	0
Combined Course major - Other ("Pre-engineering") - Please check this option if unsure	0.0%	0
Mathematics/Physics Interdepartmental Major	0.0%	0
Self-designed major	0.0%	0
Physics minor	0.0%	0
Physics minor with secondary education certification	0.0%	0
	answered question	**3**
	skipped question	**1**

2. Please list any additional majors here.

	Response Count
	2
answered question	**2**
skipped question	**2**

3. What do you expect to be the next step, including travel, in your career path?

	Response Count
	1
answered question	1
skipped question	3

4. From the list below, please rate only the Physics courses that you took in terms of whether you perceive them to be of little value, typical value, or great value to you at this moment (some upper-level courses may have been offered as tutorials). Do not rank courses that you didn't take. Comments may be entered in the question box that follows.

	Of little value	Of typical value	Of great value	Did not take	Response Count
102 Physics of Urban and Environmental Problems	0.0% (0)	0.0% (0)	0.0% (0)	**100.0% (3)**	3
105 Introductory Astronomy	0.0% (0)	0.0% (0)	0.0% (0)	**100.0% (3)**	3
167 Analytical Physics I	0.0% (0)	**33.3% (1)**	**33.3% (1)**	**33.3% (1)**	3
168 Analytical Physics II	0.0% (0)	**66.7% (2)**	33.3% (1)	0.0% (0)	3
191 Physics and Astronomy Seminar I	33.3% (1)	**66.7% (2)**	0.0% (0)	0.0% (0)	3
205 Planetary Astronomy	0.0% (0)	0.0% (0)	0.0% (0)	**100.0% (3)**	3
206 Astronomy and Astrophysics	0.0% (0)	0.0% (0)	33.3% (1)	**66.7% (2)**	3
242 Theoretical Methods in Physics	0.0% (0)	33.3% (1)	**66.7% (2)**	0.0% (0)	3
243 Mathematical Methods I (1/2	0.0% (0)	0.0% (0)	0.0% (0)	**100.0% (3)**	3
244 Mathematical Methods II (1/2)	0.0% (0)	0.0% (0)	0.0% (0)	**100.0% (3)**	3
245 Electronics	**33.3% (1)**	**33.3% (1)**	0.0% (0)	**33.3% (1)**	3
250 Modern Physics (2010-present)	0.0% (0)	0.0% (0)	0.0% (0)	**100.0% (2)**	2
291 Physics and Astronomy Seminar II	0.0% (0)	**66.7% (2)**	0.0% (0)	33.3% (1)	3
325 Theoretical Mechanics	0.0% (0)	**66.7% (2)**	33.3% (1)	0.0% (0)	3
336 Electricity and Magnetism	0.0% (0)	**66.7% (2)**	33.3% (1)	0.0% (0)	3
350 Advanced Laboratory	0.0% (0)	0.0% (0)	33.3% (1)	**66.7% (2)**	3
380 Mathematical Physics (1971-present)	0.0% (0)	0.0% (0)	**66.7% (2)**	33.3% (1)	3
387 Quantum Mechanics (1984-present)	**33.3% (1)**	**33.3% (1)**	**33.3% (1)**	0.0% (0)	3

answered question	3
skipped question	1

5. Please enter here any comments you may have which are related to your response to the previous question.

	Response Count
	1
answered question	1
skipped question	3

6. If you found any other course(s) at Albion, in any discipline (e.g. Honors), to be of particular value to you and to your career, please list these course(s), or a synopsis of these courses, here.

	Response Count
	3
answered question	3
skipped question	1

7. How prepared do you perceive yourself to be for your first career, including graduate school? A text box for optional comments on your entry follows this question.

		Response Percent	Response Count
Not well prepared		33.3%	1
Satisfactorally prepared		33.3%	1
Well prepared		33.3%	1
answered question			3
skipped question			1

8. Please feel free to enter comments that you may have which are related to your response to the previous question.

	Response Count
	2
answered question	2
skipped question	2

9. What do you perceive to be the strengths of Albion's Physics program?

	Response Count
	3
answered question	3
skipped question	1

10. What do you perceive to be the weaknesses of Albion's Physics program?

	Response Count
	3
answered question	3
skipped question	1

11. What changes would you suggest that we consider for improving Albion's Physics program?

	Response Count
	1
answered question	**1**
skipped question	**3**

12. Please provide any additional comments you may have on Albion's Physics program. If you have news to send for the department newsletter, please send it to Jackie Masternak, department secretary, at jmasternak@albion.edu, and remember that Dr. Moreau will be setting up a Facebook page.

	Response Count
	0
answered question	**0**
skipped question	**4**

13. Name (optional)

	Response Count
	1
answered question	**1**
skipped question	**3**

Page 1, Q2. Please list any additional majors here.

1	Computer Science, Honors	May 3, 2011 4:10 PM
2	Mathematics	May 3, 2011 2:32 PM

Page 2, Q3. What do you expect to be the next step, including travel, in your career path?		
1	I plan to firstly work at Optec, Inc. in Lowell, MI over the summer, and thereafter I plan to earn an M.A. in the Serious Games Design program at Michigan State University.	May 3, 2011 4:21 PM

Page 2, Q5. Please enter here any comments you may have which are related to your response to the previous question.		
1	Did not include Phys 169, but I would put of Typical Value.	May 3, 2011 2:39 PM

Page 2, Q6. If you found any other course(s) at Albion, in any discipline (e.g. Honors), to be of particular value to you and to your career, please list these course(s), or a synopsis of these courses, here.		
1	Most of my computer science major courses will be of equal value to my physics courses, particularly Algorithms, Programming Languages, and Software Development	May 3, 2011 4:21 PM
2	Quantum Enigma, Photography, Japanese	May 3, 2011 3:37 PM
3	I have found that a course in analysis and algebra to be a great use in the advanced physics courses as it allows for a deeper understanding of how the math behind the physics works and deeper insight into quantum mechanics.	May 3, 2011 2:39 PM

Page 2, Q8. Please feel free to enter comments that you may have which are related to your response to the previous question.		
1	I really don't know what to expect for my career at this point, so I just put something there to have an answer. I may end up being superbly prepared.	May 3, 2011 3:37 PM
2	I felt that I needed another advanced course or two, like Mechanics 2 or E&M 2.	May 3, 2011 2:39 PM

Page 2, Q9. What do you perceive to be the strengths of Albion's Physics program?		
1	The large degree of flexibility displayed by professors for accomodating upper-level students' schedules was incredibly helpful.	May 3, 2011 4:21 PM
2	Personal interactions between faculty and students.	May 3, 2011 3:37 PM
3	The ability to meet with professors at odd times of the day.	May 3, 2011 2:39 PM

Page 2, Q10. What do you perceive to be the weaknesses of Albion's Physics program?		
1	Currently, I suspect that the curriculum/textbooks for 167/168 students are overwhelming to them and a major turn-off for incoming students. Time will tell whether this method of introduction prepares students better for upper-level courses.	May 3, 2011 4:21 PM
2	Personal interactions between faculty and students (it goes both ways) Many of the professors try to do too much during the semester, and then get bogged down and fall behind in class. Or something happens during class (error in notes, questions from students, etc.) to cause the class to get behind. Then we either have to play catch-up or skip material altogether. The students then suffer because the quality of the material covered goes downhill. Professors should also look at or work through homework problems before assigning them. Inevitably, in every class I've taken, students would come to the professor about a specific problem, and then it would turn out that the professor couldn't even solve it. This is not only frustrating, but doesn't really happen in other departments.	May 3, 2011 3:37 PM
3	Lack of more advanced coursework options. The option to take a E&M 2 or General Relativity course would be of benefit.	May 3, 2011 2:39 PM

Page 2, Q11. What changes would you suggest that we consider for improving Albion's Physics program?		
1	Allowing for more directed studies in other courses. Pushing more research options with students would be hugely beneficial, either internal or making external contacts.	May 3, 2011 2:39 PM

Page 2, Q13. Name (optional)		
1	Chris	May 3, 2011 2:39 PM

Physics Retreat
Thursday, May 19, 2011
Bellemont, Albion College

Summary of Meeting

Members of the Physics Department (Aaron Miller, Charles Moreau, Nicolle Zellner, and Dave Seely – Chair), were each provided with a folder that contained the following items:

Agenda
"Guidelines for Self-Study and External Evaluation of Undergraduate Physics Programs", AAPT, 2005
Academic Catalog pages for Physics
Physics Mission Statement
Physics Admission paragraph
List of Declared Majors
Enrollment and Retention analysis, 2005-2011
Physics Assessment Plan
August, 2009, Assessment Committee Feedback
MFT results 2005-201, by score
MFT results 2005-201, by year
2011 Physics Graduates Survey synopsis
2011 Alumni Survey synopsis
Recent Alumni Survey responses to Question 5 (course value) and Question 8 (perceived preparedness)

Session I (10:00 – 12:00)

We addressed much of the first two primary questions posed in the "Guidelines for Self Study" document, and each of the secondary questions posed in each section. Our responses were listed on a large "Post-It" tablet, and are summarized below for those questions specifically addressed.

1. *What Are the Characteristics and Goals of Students in Our Undergraduate Program?*

   A. *What is the level of preparation and the capabilities of students entering our physics program?*

      We characterized our incoming student population as having a wide skill distribution (particularly a wide distribution in math skills), having high-interest, but often low confidence. We also believe that they are reasonably well able to think critically (i.e. they are intelligent), but they tend to think superficially (low depth of thought), and many have poor writing skills. They are tech-savvy, and often prefer online hypertext to text in a book. Many seem to think "non-linearly" (non-sequentially), and seem to be easily distracted, or at least unable/unwilling to focus on details.

   B. *What goals do our students seek by completing their work in physics?*

      We think our students enjoy science, and like Physics because it gets at "big questions" and is hard. Some like to be part of the "geek" culture. Some want to be engineers, often following career paths of siblings or parents. Most do not seem to be focused on life after Albion (e.g. careers).

C. *Are our department goals for student achievement consistent with the students' goals and expectations?*

The department tends to think of itself as a good preparer of future graduate students and engineers. It also recognizes its role in providing courses for the "pre-med" curriculum and courses for the technical education for non-majors. The department goals are to give students in the introductory major's courses a solid foundation of classical physics with an appropriate mathematical background for further study, and we believe that there has been some decrease in math standards during the previous decade or two. We believe that our mathematics (Calculus) expectations are weak, but consistent with the abilities of many of the students we get. We also fear that our math expectations in the introductory courses may be sufficiently low as to "turn off" highly talented students.

D. *Are we serving every student who may benefit from a physics degree?*

We do not serve a large proportion of multi-racial students, but we do have a reasonably good gender balance (my national standards), in our introductory courses. We question whether or not we are serving all of the needs of the small percentage of students who will seek employment following college. It was suggested that we work more on resume building, and improving software skills of graduates.

We also recognize that our program does is not optimal for students who enter Physics during their second year, because upper level courses are offered on a less frequent basis due to staff constraints.

2. *Does Our Physics Curriculum Help Students to fulfill their goals?*

A. *What are the requirements for a physics major and minor in our department?*

Requirements for the major, minor, and astronomy minor were reviewed.

B. *Consider the physics major and minor programs in our department.*

We mostly focused the second-year experience, as we have done in the past. We need to determine if the second-year experience (consisting of Phys 243/244 *Math Methods*, Phys 245, *Electronics*, and Phys 250, *Modern Physics*, coupled with Math 245, Multivariate Calculus and Math 247, Differential Equations, are the best way to spend the course resources. Phys 245 covers material excluded from Phys 167 and 168 when it was "downsized"; Phys 243/244 help to address mathematical "deficiencies" and Math 250 is a standard second-year course. The results of the MFT and the results of the Alumni Survey indicate that we are weak in Optics, which isn't surprising because the topic is not well covered in the Phys 168 course. A comparative study of a few other B.A. programs shows that some include a second-year optics course (as opposed to a 3rd year course). The programs that offer optics tend not to have a second-year math-methods course. We will consider ways to improve lack of performance in optics in the future.

As mentioned earlier, we also discussed the difficulty in addressing the needs of students who enter Physics during their second year, but thus wish to earn a major in three years. This is somewhat problematic because required courses are not offered every year. We decided to look in more detail at the possibility that a student entering Physics during their second year

with two semesters of Calculus could take Phys 167 and Phys 245 simultaneously in the fall and Phys 168 and Phys 250 simultaneously in the spring. Potential problems with this idea were identified, but we will focus this coming year in determining if changes in course content could make such a schedule possible. Resume writing and the AlbionAdvantage were discussed.

C. *Are the teaching methods we use successful in accomplishing the goals of the course?*

Our discussion on this question was limited. We believe that the TabletPC change has increased student participation, and enrollment in second year physics courses is up. It is possible that the TabletPC-based pedagogy is responsible for the increase. We continue to struggle, however, with the level of mathematical preparedness for current and subsequent work in Physics and are reluctant to "dumb down" the level of expectation which we think we already have done to some extent.

Session II (2:10 – 2:30)

This session followed the All Staff/Faculty meeting that was held during the prior hour. We briefly discussed how the department relates to the institution. It was noted that Physics meets the needs of "pre-med" students, majors, secondary education majors, pre-engineering students, and general education, and thus has some comparatively large and small enrollment courses in the curriculum.

Session III (2:30 – 4:00)

Physics faculty met with Provost Susan Conner to discussion institutional challenges, the "role" the department plays in a larger institutional context, and resource constraints.

Session IV (4:00 – 5:00)

The following action steps were identified:

After BritonNetwork training, put skills and portfolio fodder on future syllabi.
Upgrade web page (meet with Dave Lawrence)
Assess Phys 243/244 this year for impact on future coursework
Assess Phys 250 this year for impact on future coursework (Quantum)\
Work harder to implement assessment measures in introductory labs (these were only partly implemented this year).