Year 2 Physics Department Assessment
Non-Accredited Program

Student Learning Outcomes

1. Demonstrate the ability to apply fundamental, overarching themes in physics, including conservation laws, symmetry, the particulate nature of matter, waves, interactions, and fields, and systems, models and their limitations.
2. Demonstrate competency in applying basic laws of physics in classical and quantum mechanics, electricity and magnetism, thermodynamics and statistical mechanics and special relativity, and the applications of these laws in areas such as optics, computational physics, and astronomy.
3. Represent basic physics concepts in multiple ways, including mathematically (including through estimations), conceptually, verbally, pictorially, computationally, by simulation, and experimentally.
4. Demonstrate knowledge of how basic physics concepts are applied in modern technology and apply this knowledge to the solution of applied problems.
5. Solve complex, ambiguous problems in real-world contexts.
6. Show how results obtained relate to the original problem, determine follow-up investigations, and place the results in a larger perspective.
7. Demonstrate instrumentation competency: competency in basic experimental technologies, including vacuum, electronics, optics, sensors, and data acquisition equipment. This includes basic experimental instrumentation abilities, such as knowing equipment limitations; understanding and using manuals and specifications; building, assembling, integrating, operating, troubleshooting, and repairing equipment; establishing interfaces between apparatus and computers; and calibrating laboratory instrumentation and equipment.
8. Demonstrate software competency: competency in learning and using industry-standard computational, design, analysis, and simulation software, and documenting the results obtained from a computation or design.
9. Demonstrate data analytics competency: competency in analyzing data, including with statistical and uncertainty analysis; distinguishing between models; and presenting those results with appropriate tables and charts.
10. Communicate with many different audiences from many different cultures and scientific backgrounds, understand each audience and its needs, and make the communication relevant and maximally impactful for that audience.
11. Obtain information and evaluate its accuracy and relevance through reading (print and online), listening, and discussing.
12. Articulate one's own state of understanding and be persuasive in communicating the worth of one's own ideas and those of others.
13. Communicate in writing about scientific and technical concepts concisely and completely, and revise writing to achieve grammatically-correct and logically-constructed arguments.
14. Organize and communicate ideas using words, mathematical equations, tables, graphs, pictures, animations, diagrams, and other visualization tools.
15. Work collegially and collaboratively in diverse, interdisciplinary teams both as a leader and as a member in pursuing a common goal.

16. Obtain knowledge about existing technology resources relevant for the task at hand. For example: How is the technology made? How does it work? What does it cost? Who tests it? What industries are affected by it? Where are the centers of these industries located? Where can the computational resources needed for the task be found?
17. Demonstrate familiarity with basic workplace concepts. Concepts such as program and project management, including planning, scheduling, tracking progress, adapting, and working within constraints, quality assessment and assurance, and working with and enhancing the safety culture in the workplace.
18. Display awareness of regional and national career opportunities and pathways for physics graduates.
19. Demonstrate critical professional and life skills, including completing work on time, optimism, realism, time management, responsibility, respect, commitment, perseverance, independence, resourcefulness, integrity, ethical behavior, and cultural and social competence

Area	SLO*	ULG**	Measures/Instruments	How the Info is Used
Physics Specific Skills	1. Demonstrate the ability to apply fundamental, overarching themes in physics, including conservation laws, symmetry, the particulate nature of matter, waves, interactions, and fields, and systems, models and their limitations.	C, Q, W	Major Field Test (given prior to leaving EIU) or possibly some other exam of general physics knowledge	Departmental review of data and updating the material taught in each course
	2. Demonstrate competency in applying basic laws of physics in classical and quantum mechanics, electricity and magnetism, thermodynamics	C, Q, W	Grades in PHY 4470, PHY 4750, PHY 4855, PHY 4865, PHY 4320, and PHY 4100	Departmental review of data and updating the material taught in each course

	and statistical mechanics and special relativity, and the applications of these laws in areas such as optics, computational physics, and astronomy.			
	3. Represent basic physics concepts in multiple ways, including mathematically (including through estimations), conceptually, verbally, pictorially, computationally, by simulation, and experimentally.	C, Q, W	Grades in PHY 1371, PHY 1372, PHY 3150, PHY 4711, PHY 4712	Departmental review of data and updating the material taught in each course
	4. Demonstrate knowledge of how basic physics concepts are applied in modern technology and apply this knowledge to the solution of applied problems.	C, Q, W	Grades in PHY 3150, PHY 4713	Departmental review of data and updating the material taught in each course
Scientific Technical Skills	5. Solve complex, ambiguous problems in real-world contexts.	C, S, R	Grades in PHY 4713, PHY 2601, PHY 4601	Departmental review of data to inform directions of future lab experiences and research projects

	6. Show how results obtained relate to the original problem, determine follow-up investigations, and place the results in a larger perspective.	C, Q	Grades in PHY 4713, PHY 2601, PHY 4601	Departmental review of data to inform directions of future lab experiences and research projects
	7. Demonstrate instrumentation competency: competency in basic experimental technologies, including vacuum, electronics, optics, sensors, and data acquisition equipment. This includes basic experimental instrumentation abilities, such as knowing equipment limitations; understanding and using manuals and specifications; building, assembling, integrating, operating, troubleshooting, and repairing equipment; establishing interfaces between apparatus and	NA	Grades in PHY 3150, PHY 4470, PHY 4711, PHY 4712, PHY 4713	Departmental review of data and updating the material taught in each course

	computers; and calibrating laboratory instrumentation and equipment.			
	8. Demonstrate software competency: competency in learning and using industry-standard computational, design, analysis, and simulation software, and documenting the results obtained from a computation or design.	C, Q, W	Grades in PHY 3270, PHY 4320	Departmental review of data to inform directions of software updates and purchases
	9. Demonstrate data analytics competency: competency in analyzing data, including with statistical and uncertainty analysis; distinguishing between models; and presenting those results with appropriate tables and charts.	C, Q, W	Grades in PHY 1372, PHY 3150, PHY 4711, PHY 4712	Departmental review of data and updating the material taught in each course

Communications Skills	10. Communicate with many different audiences from many different cultures and scientific backgrounds, understand each audience and its needs, and make the communication relevant and maximally impactful for that audience.	W, S, R	EWP Report	Departmental review of data and updating the material taught
	11. Obtain information and evaluate its accuracy and relevance through reading (print and online), listening, and discussing.	W, S	Professor's Evaluation of PHY 1001	Professor and Departmental review of evaluation and improving the course
	12. Articulate one's own state of understanding and be persuasive in communicating the worth of one's own ideas and those of others.	S	Speaking Report	Departmental review of data and weighing the balance of speaking, discussion, and research
	13. Communicate in writing about scientific and technical concepts concisely and completely, and revise writing to achieve grammatically-	C, W	Grades in PHY 3410, PHY 3420, PHY 4855, PHY 4865	Departmental review of data and determination of appropriate direction for further learning

	correct and logically-constructed arguments.			
	14. Organize and communicate ideas using words, mathematical equations, tables, graphs, pictures, animations, diagrams, and other visualization tools.	W, Q	Grades in PHY 4000	Departmental review of data and updating the material taught
Professional/Workplace Skills	15. Work collegially and collaboratively in diverse, interdisciplinary teams both as a leader and as a member in pursuing a common goal.	R	Exit Interview	Departmental discussions of lab partner work and practices
	16. Obtain knowledge about existing technology resources relevant for the task at hand. For example: How is the technology made? How does it work? What does it cost? Who tests it? What industries are affected by it? Where are the centers of these industries located? Where can the	S, W	Grades in PHY 3150, PHY 4713	Departmental review of data and updating the processes for each course

	computational resources needed for the task be found?			
	17. Demonstrate familiarity with basic workplace concepts. Concepts such as program and project management, including planning, scheduling, tracking progress, adapting, and working within constraints, quality assessment and assurance, and working with and enhancing the safety culture in the workplace.	R	Alumni Survey	Departmental discussion of overall approach to student's global integration and how the Department can relate
	18. Display awareness of regional and national career opportunities and pathways for physics graduates.	NA	Exit Interview, Alumni Survey	Departmental review of data and updating the material taught
	19. Demonstrate critical professional and life skills, including completing work on time, optimism,	R	Exit Interview, Alumni Survey	Departmental discussions of expectations and standards

	realism, time management, responsibility, respect, commitment, perseverance, independence, resourcefulness, integrity, ethical behavior, and cultural and social competence			
* Student Learning Objectives				
** University Learning Goals -	C = Critical Thinking			
	W = Writing and Critical Reading			
	S = Speaking and Listening			
	Q = Quantitative Reasoning			
	R = Responsible Citizenship			
	NA = Not Applicable			

Assessment Vehicles

The following are two assessment surveys. The first is an exit survey that will be used to poll students in their senior year to learn their impressions. The second is an Alumni survey to see how the EIU education has helped them in their career.

EIU Physics-Engineering Exit Interview

Year entered program_____ Year graduating/transferring _____

Program Option_____ Name(*Optional*)_____

(Physics, Astronomy, Computational Physics, Teacher Licensure in Physics, Electrical Engineering, B.S. in Engineering (3-2), Engineering Physics (3-2), Pre-Engineering (2-2))

Upon graduation/transfer I am:
___Taking a job related to my major (specify)
_____

___Taking a job unrelated to my major (specify)
_____

___Continuing my studies at: _____(area of study)_____

___Other: _____

Please provide answers using the following numerical scheme:

1=strongly disagree 2=disagree 3=neutral 4=agree 5=strongly agree NA=not applicable

1. I can recommend EIU to another student.	1.	___
2. In general, the quality of instruction at EIU is high.	2.	___
3. In concept, the EIU general education curriculum is a good idea.	3.	___
4. EIU as a whole provides a stimulating atmosphere for undergraduate study.	4.	___
5. I can recommend my physics degree program to another student.	5.	___
6. In general, I am pleased with the curriculum in my physics degree program.	6.	___
7. The quality of instruction in the physics department is high.	7.	___
8. Class sizes in the physics classes are appropriate.	8.	___
9. Undergraduate research opportunities were available to me.	9.	___
10. I had a rewarding undergraduate research experience.	10.	___
11. Faculty members in the physics department provide a stimulating atmosphere.	11.	___

12. Faculty members in the physics department are constructively involved in education. 12. ___

13. Faculty members in the physics department are accessible and helpful. 13. ___

14. My academic advisor in the physics department was accessible and helpful. 14. ___

15. Fellow students were intellectually stimulating. 15. ___

16. The physics department staff was accessible and helpful. 16. ___

17. The physics lab facilities and equipment were appropriate for undergraduate instruction. 17. ___

18. The program should require coursework in advanced computer skills. 18. ___

19. Research should be required of all students in my major. 19. ___

The physics program at EIU has:

20. prepared me for the next step in my professional career. 20. ___

21. given me an appropriate background in mechanics. 21. ___

22. given me an appropriate background in electricity and magnetism. 22. ___

23. given me an appropriate background in thermodynamics. 23. ___

24. given me an appropriate background in quantum mechanics. 24. ___

25. developed in me the ability to use mathematics in the solution of real physics problems. 25. ___

26. given me the ability to calculate the experimental error in real physical situations. 26. ___

27. given me the ability to communicate effectively, both verbally and in writing. 27. ___

28. given me the ability to use basic experimental apparatus for studying physical phenomena. 28. ___

Should PHY 1351, 1361, 1371 have a 1-hour of discussion section each week (to discuss homework, etc.) to go along with the 3 hours of lecture and 3 hours of lab? Yes No

Did you work in an REU, an internship, or a Physics or Engineering activity? If so, please specify.

Were there any specific strengths or weaknesses in textbooks, equipment, etc in the:

(a) introductory physics sequence

Were there any specific strengths or weaknesses in textbooks, equipment, etc in the:

(b) math sequence of courses

(c) chemistry classes

(d) advanced physics labs

(e) physics electives or other physics classes or research

If you wish, describe an area or areas in which the instructional program was good.

If you wish, describe an area or areas in which the instructional program was lacking. How can it be improved?

Are there any general thoughts on the department that you would like to share?

Please return this form to the Physics Department's office (or your instructor):

Dr. Steven Daniels / 2133 Physical Science / Eastern Illinois University / Charleston, IL 61920

The assessment program may include a final interview five years after graduation/transfer. Please separately email your name, address, and preferred email address to djcombs@eiu.edu.

EIU Physics and Engineering Graduate Survey

Please return this survey by May 15th, 2021.

Please take some time to complete this survey as part of our continuing efforts to assess the quality of the Physics Department's instructional programs. This survey will help the department to prepare for it's upcoming IBHE review.

Your Name: _____

Your Address: _____

_____

Your Email: _____

Year graduated from EIU: _____

Program completed: _____

(Physics, Astronomy, Computational Physics, Teacher Licensure, Electrical Engineering, Engineering Physics, BS in Engineering, Pre-Engineering)

Highest degree obtained:_____

Location of degree: _____

Description of your current position:

_____

_____

_____

Current position title: for example Graduate Student in Physics or Quality Control Engineer

_____

Name and address of company / school at which you currently work:

_____

_____

_____

_____

Please provide responses to the statements listed below using the following numerical scheme: 1=strongly disagree, 2=disagree, 3=neutral., 4=agree, 5=strongly agree

If you would like, please feel free to insert comments in the space between statements.← Disagree Agree →

1. I have a positive attitude toward my major. **1 2 3 4 5**

2. I would recommend the EIU Physics degree program to other students. **1 2 3 4 5**

3. I was pleased with the curriculum in the EIU Physics degree program. **1 2 3 4 5**

4. The physics program prepared me very well for my current job or position. **1 2 3 4 5**

5. The quality of instruction in the physics department was high. **1 2 3 4 5**

6. Class sizes in the Physics courses were appropriate. **1 2 3 4 5**

Please indicate what you would consider to be the ideal number of students in an introductory physics class. _____

7. Faculty members in the physics department provided a stimulating atmosphere. **1 2 3 4 5**

8. Faculty members in the physics department were constructively involved in education. **1 2 3 4 5**

9. Faculty members in the physics department were accessible and helpful. **1 2 3 4 5**

10. My academic advisor in the physics department was accessible and helpful. **1 2 3 4 5**

11. Problem solving skills learned at EIU have helped me in my current position. **1 2 3 4 5**

12. The physics lab facilities & equipment were appropriate for undergraduate instruction. **1 2 3 4 5**

If you wish, describe what you liked about the program.

If you wish, describe ways in which the program could be improved.

Are there any general thoughts on the department that you would like to share?

Thank you for your time in filling out this survey. We appreciate your willingness to help us in assessing the quality of the Physics Department's programs at Eastern Illinois University.

Sincerely,

Steve Daniels, Physics Department Chair

Improvements and Changes Based on Assessment

1. Provide a short summary (1-2 paragraphs or bullets) of any curricular actions (revisions, additions, and so on) that were approved over the past two years as a result of reflecting on the student learning outcomes data. Are there any additional future changes, revisions, or interventions proposed or still pending?

The Physics Department went through a complete overhaul of the curriculum that was completed in 2018 and the first classes of the new program were in FA2019. The first class of graduates under this program will graduate in SA2021 so we do not have any assessment data on those students.

2. Please provide a brief description or bulleted list of any improvements (or declines) observed/measured in student learning. Be sure to mention any intervention made that has not yet resulted in student improvement (if applicable).

Due to the short implementation time for the program there are no improvements or declines.

History of Annual Review		
Date of Annual Review	Individuals/Groups who reviewed the Plan	Results of the Review
2017 and prior		
Links to all MAPs are broken from the VPAA MAP website	Karla Sanders	Varied from Fully Mature to Satisfactory
https://www.eiu.edu/acaffair/MAP/		

CLAS Deans' comments on PHY B.S. report

Reviewer: Michael Cornebise

Please note: **This is a STARTING POINT for conversation, with no rubric per se. We will be developing a rubric collaboratively (amongst chairs, Associate Deans, and our new EIU Assessment Coordinator, Yvette Smith) in the spring of 2021 based on peer/aspirant institution models, then we'll evaluate it by that. Meanwhile, if you'd like to modify your document based on these comments, feel free. We appreciate your patience with this process as it evolves!**

1. SLOs are extensive and are generally clear and measurable. They use a good mix of high-level, mid-level, and low-level Bloom's Taxonomy verbs.
2. The assessment plan includes a nice mix of measurements to gather data at different levels. These include a major field test, an exit interview, an alumni survey, EWP data and a speaking report along with grades obtained in major classes. The attached Exit Interview sheet Graduate Survey instruments are extensive and should yield interesting and useful quantitative and qualitative data.
3. My only criticism is that the plan seems to rely heavily on grades obtained in specified courses to assess many of the SLOs. How will the department determine the extent to which learning outcomes are met (or not, as the case may be)? To drill down a bit deeper, the department might consider the use of targeted exam questions that every student will answer or pre- and post-tests to evaluate
4. While the last column addresses how the info will be used, can you include more information as to how the data will be evaluated and shared with the department in order to improve learning outcomes?

Overall, though, the plan seems comprehensive and ready for data collection.