



WILLIAM WOODS
UNIVERSITY

Physics Annual Assessment 2023-2024

PHYSICS ANNUAL ASSESSMENT 2023-2024 **1**

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Annual Assessment 2023-2024

Physics

Program Profile

Program Mission Statement

Please insert your program mission statement here

The primary objective of the physics program is to help students learn to develop and accurately apply mathematical and analytical processes to descriptions and models of systems in the natural world. This is done through hands-on lab work, original research, and traditional coursework. The skills acquired in this program will prepare students to pursue a wide range of technical careers as well as further education.

Program Data

Delivery Method

Traditional On Campus (selected)
Online
Hybrid

Students Majors 2023-2024

Student Majors 2022-2023

1

Student Minors 2023-2024

Student Minors 2022-2023

3

3

Concentrations 2023-2024

If your program contains concentrations, please list the concentrations and the number of students identified within each concentration.

N/A

Concentrations 2022-2023

If your program contains concentrations, please list the concentrations and the number of students identified with each concentration.

N/A

Student Demographics

What are the program goals for student retention, persistence, and degree completion? What do the persistence numbers mean to the faculty in the program? Are the persistence numbers what the program expected? If not, how could the numbers improve?

The program has the following goals for retention and growth during the 2024-2025 school year:

- Recruit at least 5 minors from the students taking Physics 2 in the Spring

Optimal Enrollment

Considering current human and physical resources, what is the optimal enrollment for the program?

15

Is the Program Externally Accredited

Yes

No (selected)

External Accreditation

Name the Accrediting Agency or entity including the last review/approval. Is there an accrediting body for the field of study? If yes, what is the name of the group. Is the program seeking accreditation? If no, why?

There are currently no accrediting agencies for a program of this type.

Admissions and Marketing Materials

Reflect on the current marketing materials used for the program. Please attach screen shots of the website or any material you are referencing in this section. What changes, if any, should be made to the material? Are there recommendations on how to modify the current material?

There is no marketing material used for the physics minor.

Marketing Material

Program Assessment

Standard/Outcome

Identifier	Description
WWU2021.1	Knowledge and Scholarship: Demonstrate current knowledge and educational expertise in an academic or professional discipline engaging students in the process of academic discovery.

Additional Standards/Outcomes

Identifier	Description
PHY.1	Students will achieve an advanced understanding and appreciation for the physical laws governing the universe, through conceptual problem solving and laboratory experience.
PHY.2	Students will learn to model and simulate complex physical interactions computationally, they will design, construct, and program experimental apparatuses to test theories.
PHY.3	Students will develop sophisticated mathematical and numerical skills, allowing them to quantitatively understand and predict the behavior of physical systems.
PHY.4	Students will practice the scientific method and the processes involved in conducting original scientific research, along with the communication and presentation of their findings.

Alignment to the Institutional Objectives

Please discuss the Program alignment to the Institutional Objectives. Specific evidence is not to be uploaded, but discussion is expected of the assignment, and intentionality of how the objective is met with program curriculum.

Physics teaches more than just how the universe operates at a basic level. It teaches problem solving. It teaches students how to think for themselves and arrive at evidence based conclusions. Physics students are taught that no problem is too complicated. Provided with a problem, they are trained to take it apart, determine the important parameters, explore possible outcomes and discover new, elegant ways to reach a solution. In doing so, their confidence and ability improve so that they can enter the world equipped with the tools they need to help tackle the problems of our society through logical, quantitative analysis.

Institutional_objectives_2.docx

General Education Alignment to Program

How do the General Education criteria align with Program Objectives? What courses within the program build upon skills learned from general education courses (please list the program course and the general education criteria)?

Critical Analysis:

Students are expected to apply logical and analytical reasoning skills to diverse source material when they conduct literature reviews in PHY 490 - Senior Research. This course often involves case studies and independent investigation in which students must use recent literature to guide their research direction. Students are often expected to read original articles and determine objectives for future research. These skills build upon and are consistent with the description given for critical thinking.

Creative Expression:

Throughout the physics program, students are required to express physics concepts both visually through detailed graphs and figures in lab reports (PHY 202 – Physics Lab 1, PHY 212 – Physics Lab 2) and orally through presentations:

- PHY 201 (Physics 1): Students are required to give a presentation where they explain and solve a physics problem in front of the class. Presentations are 5 minutes.

- PHY 315 (Modern Physics): Students are required to give a presentation on a technological application made possible by a discovery made in modern physics. Presentations are 10 minutes and requires the student to perform independent research.

Quantitative Inquiry:

Quantifying the laws that govern our universe is the bedrock of physics. As such, every course in physics helps students develop and practice quantitative problem-solving skills.

Society and the Individual:

PHY 315 (Modern Physics) covers the last century of physics which saw a significant physics revolution in the early 20th century. Emphasis is placed on the historical aspect of physics and the implications it had on shaping the world throughout the 20th century through the development of nuclear, atomic, and quantum physics. Students are asked to contemplate the future of physics and any impacts it will have on our society as we become a technological civilization.

NSSE Objectives Discussed Spring 2022

Program Alignment to NSSE Objectives

Faculty discussed the most recent NSSE results in spring of 2022 and identified universal objectives for all academic content. Please articulate what the program is doing to further students' knowledge and skills in the following areas: 1C- Explained course material to one or more students; 2E - Tried to better understand someone else's view by imagining how an issues looks from his/her perspective; 4C-Analyzing an idea, experience, or line of reasoning in depth by examining its parts; 4D- Evaluating a point of view, decision, or information source. Please describe the activities used and the impact on student learning.

1C - Explained course material to one or more students:

In both Physics 1 and Physics 2, students were assigned a physics word problem to be presented to the class and solved step-by-step.

2E - Tried to better understand someone else's point of view by imagining how an issue looks from his/her perspective:
N/A. There are not different viewpoints at the level of physics being taught currently at WWU.

4C & 4D - Analyzing an idea, experience, or line of reasoning in depth by examining its parts; Evaluating a point of view, decision, or information source.

One of the primary goals for a physics course is to teach students how to solve problems by determining the pertinent variables and apply logic and mathematics to solve the problem using the laws of physics. Students are taught the rules by which the entire universe operates at the fundamental level. Observations in "higher order" sciences such as chemistry and biology are explained at the foundational level (fundamental parts) using physical laws.

Curriculum Map

A - Assessed
 R - Reinforced
 I - Introduced
 M - Master

Physics

	PHY 201	PHY 202	PHY 212	PHY 213	PHY 315	MAT 124
PHY.1 Students will achieve an advanced understanding and appreciation for the physical laws governing the universe, through conceptual problem solving and laboratory experience.	I, A		R, A		M, A	
PHY.2 Students will learn to model and simulate complex physical interactions computationally, they will design, construct, and program experimental apparatuses to test theories.		I, A		A, R		
PHY.3 Students will develop sophisticated mathematical and numerical skills, allowing them to quantitatively understand and predict the behavior of physical systems.	I		R		M, A	
PHY.4 Students will practice the scientific method, and the processes involved in conducting original scientific research, along with the communication and presentation of their findings.		I		R	M	

Changes to Curriculum

Are there any changes made to the curriculum map for this academic year? If so, please describe the program changes made along with the rationale for why and the impact the change should have on student learning?

No changes to the curriculum were made in the 23/24 school year.

Assessment Findings

Assessment Findings for the Assessment Measure level for Physics

Standard/Outcome				
PHY.1 Students will achieve an advanced understanding and appreciation for the physical laws governing the universe, through conceptual problem solving and laboratory experience.				
Assessment Measures				
PHY 201				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Class Assignment	Has the criterion A minimum of 85% of students will achieve an overall homework score of >85% been met yet? Met	10/11 (91%) students achieved >85% on their overall homework score.		
PHY 212				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Class Assignment	Has the criterion A minimum of 85% of students will achieve an overall homework score of >85% been met yet? Met	10/11 (91%) students achieved an overall homework score >85%.		
PHY 315				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Quiz/Exam	Has the criterion An average score of 80% or greater on in-class exams been met yet? Met	The overall average exam score was 86.75%.		

Standard/Outcome				
PHY.2 Students will learn to model and simulate complex physical interactions computationally, they will design, construct, and program experimental apparatuses to test theories.				
Assessment Measures				
PHY 202				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Class Assignment	Has the criterion At least 90% of students will	9/11 students (82%) students		- Refine Assessment Tool: A complete revision of the

	achieve >90% on "Lab 9 - Gravity" where students are asked to come up with their own experiment to measure the acceleration of gravity to high precision. been met yet? Not met	achieved >90% on Lab 9 - Gravity. 1 student did not turn in the lab assignment.		assessment map will be completed following the 5-year program review next year. Assessments will be made on work turned in and not subject to students who do not complete the assignment.
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PHY 213				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Class Assignment	Has the criterion At least 90% of students will achieve >90% on "Lab 4 - Mirrors" where students are asked to come up with their own experiment to measure the focal length of a large mirror. been met yet? Not met	Due to unforeseen circumstances, this particular lab assignment was unable to be completed this semester.		- Refine Assessment Tool: All assessments will be revised following the 5-year program review.

Standard/Outcome PHY.3 Students will develop sophisticated mathematical and numerical skills, allowing them to quantitatively understand and predict the behavior of physical systems.				
Assessment Measures				
PHY 315				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Class Assignment	Has the criterion All students will achieve a homework score >85% on all homework assignments. been met yet? Met	All students who completed the course achieved a homework score >85%.		

Analysis of the Assessment Process

Describe your assessment process; clearly articulate how the program uses coursework and or Student Performance Review for program wide assessment. Note any changes that occurred to the process since the previous year. Discuss what activities were successful and which ones were not as helpful and why. Please include who met to discuss the changes (unless you are a program of one person) and when you met. – Include a discussion on the process for collection and analysis of program data.

There were no changes made to the assessment process this year, however a revision of some of the benchmarks is in order. Since the physics program is up for review this coming year, all revisions to the assessment map will be made following the program review and migration to the new system. Emphasis on the new assessment map will be placed on material that is not subject to students choosing to not turn in work or work that could be copied from another student (homework, labs). Instead, focus will be placed in graded examinations and individual work in controlled circumstances.

Improvement Narrative List

Assessment Findings for the Assessment Measure level

Standard/Outcome	PHY.2 Students will learn to model and simulate complex physical interactions computationally, they will design, construct, and program experimental apparatuses to test theories.	
Legend	A	
Course/Event	PHY 202	
Assessment Measure	Direct - Class Assignment	
Assessment Findings	Not met	
Improvement Narrative		
	Improvement Type	Summary
	Refine Assessment Tool	A complete revision of the assessment map will be completed following the 5-year program review next year. Assessments will be made on work turned in and not subject to students who do not complete the assignment.

Standard/Outcome	PHY.2 Students will learn to model and simulate complex physical interactions computationally, they will design, construct, and program experimental apparatuses to test theories.	
Legend	A	
Course/Event	PHY 213	
Assessment Measure	Direct - Class Assignment	
Assessment Findings	Not met	
Improvement Narrative		
	Improvement Type	Summary
	Refine Assessment Tool	All assessments will be revised following the 5-year program review.

Program Activities

Student Performance Review

Describe the department Student Performance Review activities if not already articulated. Please describe the nature of the assessments conducted as well as the process of assessment happening on these two days. Include the schedule of assessment day for your program. What does the data and outcomes tell you? What changes will you make as a result of the data? What areas are successful for the program?

No activities were planned for Student Performance Review this cycle. There are no remaining physics majors.

Student Performance Review Schedule

Upload the program schedule for students during Performance Reviews.

Senior Showcase/Symposium

Describe program activities used to highlight Senior achievement. What benefit does the program gain from the activities? What if any assessment of students happens during this event?

There are no remaining physics majors.

Tools used for Assessment

Upload rubrics or other Assessment based tools used by the program that are important to the assessment process.

Service Learning

Does the Program include projects/ course content that uses the philosophy of service learning?

Yes

No (selected)

Service Learning Component

If so, how is service learning infused in the coursework within your department? Is service or community engagement in the program mission? Describe the Service Learning Activities that your students and department engaged in this past year. How did the activities improve student learning? How did the activities benefit the community?

N/A

Co-Curricular and LEAD Events

Describe Co-Curricular and LEAD events sponsored by program faculty. This includes LEAD and other events meant to engage students and foster learning outside of the classroom.

The physics and photography department paired up for a school-funded field trip to view the 2024 total solar eclipse. Dr. Sean Baldrige accompanied 12 students on an all-day excursion into southern Missouri to view and photograph the eclipse.

Dr. Sean Baldrige (Cox Distinguished Professorship in Science) hosted a LEAD event and presentation during the campus research symposium entitled "Astronomy Laboratory Exercises in the Classroom". The talk was held on April 11, 2024.

Student Accomplishments

Highlight special examples of student successes in the field (academic: mentor-mentee, conference presentations, competitive internship, journal acceptance; extra-curricular: horse show championship, art exhibit). This is for any

accomplishment a student achieved outside of course work or the normal expectation of student success.

N/A

Alumni Accomplishments

Please highlight special examples of any successes of recently graduated alumni (acceptance or graduation graduate school, employment or professional milestones).

N/A

Faculty Accomplishments

Highlight special examples of faculty success in the profession/field/content area. This is for any accomplishment of a faculty member that is research or professional in nature.

The sole faculty in the program (Dr. Sean Baldrige) was this year's Cox Distinguished Professor in Science and pursued a project to design, gather data, develop, and evaluate a series of educational experiment modules for use as astronomical laboratory exercises at the college level to determine if it is better to simulate data and/or environments or use real data in the experiment module. The project is currently ongoing and on-pace to be completed this summer with testing and evaluation to occur in the fall.

Assessment Rubric:

Clear	3.00 Exceeds	2.00 Meets	1.00 Falls Below Expectations	N/A
Mission Statement Clearly Articulated weight: 1.000	✓ The mission statement for the program is insightful and forward thinking. It aligns with the University Mission and learning objectives showing a clear alignment between the University and the program.	✓ The mission statement for the program clearly articulated and aligned with the University mission.	✓ The mission statement is minimal at best.	✓ N/A
Comment:				
Reflection on Student Demographics, Retention, and Degree Completion Data weight: 1.000	✓ The program provides a detailed description on the enrollment, retention, persistence and degree completion numbers. The program provides new ideas on how to improve retention of their program students or articulates what they are currently doing to keep students in their program.	✓ The program provides a basic reflection on enrollment, retention, persistence, and degree completion data provided.	✓ The program does not reflect on enrollment, retention, persistence, and degree completion data in a detailed way.	✓ N/A
Comment:				
Marketing Materials weight: 1.000	✓ The program outlines the successes and needs in regards to marketing. Detailed suggestions on how to market the program and what niche areas that are program specific would benefit the marketing strategy.	✓ The program discussed the general marketing strategy for the program.	✓ The program provided little to no discussion on the marketing materials or approach to how to market the program.	✓ N/A
Comment:				
Alignment to University Objectives weight: 1.000	✓ The program provides a detailed explanation of how program courses align to the Institutional Objectives. This explanation details specific courses, or activities that coordinate with the intent of the Institutional Objectives.	✓ The program provides a basic explanation of how program courses align to the Institutional Objectives. This explanation provides a minimal understanding of how the program is aligned to the Institutional Objectives.	✓ The program provides little to no explanation of how program courses align to the Institutional Objectives.	✓ N/A
Comment:				
General Education alignment clearly explained weight: 1.000	✓ The program provides a detailed explanation of the General Education criteria and how the basic skills learned are expanded upon in the program. Details include but are not limited to: specific courses, or activities that stretch the knowledge of the specific areas.	✓ The program provides a basic explanation of the General Education curriculum and how the skills learned are expanded in program courses.	✓ The program provides a minimal explanation of the General Education curriculum and how the skills learned are expanded in program courses.	✓ N/A
Comment:	the program is aligned to the old general education program			
NSSE Objectives weight: 1.000	✓ The program provided a detailed listing of activities and assessments used within the program that focused on the identified NSSE objectives. The activities and assessments were divided out within the curriculum and impacted different cohort groups.	✓ The program provided a basic explanation of the activities and assessments used within the program that focused on the identified NSSE objectives.	✓ The program provided minimal explanation of the activities and assessments used within the program that focused on the identified NSSE objectives.	✓ N/A
Comment:				
Curriculum Map alignment and changes weight: 1.000	✓ The curriculum map is detailed and complete. All Changes made to the curriculum map are detailed with supporting rationale for the decision..	✓ The curriculum map is complete. Changes made to the curriculum map are explained with some explanation as to why the changes were implemented.	✓ The curriculum map is not complete and little to no explanation on curricular changes was provided.	✓ N/A
Comment:				
Assessment Map weight: 1.000	✓ Assessment of objectives are spread out across the curriculum with a variety of assessment measures and each program objective is assessed a minimum of twice a year.	✓ Each objective is assessed a minimum of 2 times a year or an assessment rotation is explained so that all objectives are assessed. The assessments are not concentrated in one class.	✓ The assessment map is not complete or much of the assessment happens in only one course. Not all objectives are assessed annually, nor is a plan provided on assessment.	✓ N/A
Comment:				

Data Driven Decision-making is explained weight: 1.000	✓ An overview of program assessment is provided with details on the specific successes and challenges from the year. A detailed review of how assessment was administered over the academic year is clearly outlined.	✓ A basic overview of program assessment is provided with some details on the successes and challenges from the year. A basic review of how assessment was administered over the academic year is outlined.	✓ A basic overview of program assessment is not provided with little to no discussion on the administration of assessment over the academic year.	✓ N/A
Rich Text Editor, richtext-7640-29638				
Documentation provided on assessment findings weight: 1.000	✓ The program uploads all rubric and support information to support the claims in the assessment findings along with detailed instructions on the assessment process and data analysis.	✓ The program uploads all rubric and support information to support the claims in assessment findings.	✓ The program did not upload the data to support assessment claims in the assessment findings.	✓ N/A
Comment:				
Analysis of Assessment weight: 1.000	✓ The program completed assessment findings for each component identified, and provided a comprehensive summary of each assessment measure identified in the report.	✓ The program completed the assessment findings for each component and provided a summary for each assessment measure.	✓ The program did not provide a completed assessment findings for each component, nor did they complete the summary for each measure.	✓ N/A
Comment:				
Improvement narratives are selected with intentionality weight: 1.000	✓ The program identified Improvement Narratives that appear to move the program forward and see the bigger picture than only the specific program curriculum options	✓ The program used the provided Improvement Narratives and selected options that made sense to the objectives and issues within the assessment.	✓ The program did not use any improvement narratives, or the ones chosen are not aligned with assessment results.	✓ N/A
Comment:				
Student Performance Review weight: 1.000	✓ The program described and provided a detailed account of Student performance Review activities. Data evidence provided and detailed.	✓ The program provided the schedule and a brief description of Student Performance Review with data of the results.	✓ The program did not provide complete explanation on Student Performance Review nor did they provide data results.	✓ N/A
Comment:	the program is a stand alone minor and is not expected to participate			
Senior Showcase weight: 1.000	✓ The program had all senior students participate in Senior Showcase and provided a detailed explanation of their expectation and the presentations presented.	✓ The program described the Senior showcase activities and provided some evidence of what was presented.	✓ Little to no content of Senior showcase was provided.	✓ N/A
Comment:	the program is a stand alone minor and is not expected to participate			
Co Curricular and LEAD activities weight: 1.000	✓ The program detailed the activities of LEAD and other co-curricular programming that was provided throughout the year. They provided numerous events for students.	✓ The program provided a listing of LEAD events and activities provided.	✓ The program provided little to no description of the Co-curricular activities provided throughout the year.	✓ N/A
Comment:				
Faculty, alumni, and Student accomplishments weight: 1.000	✓ The program provided detail updates on successes on Students, Alumni and Faculty with added information explaining the kinds of success that were experienced.	✓ The program provided a listing of information on Students, Alumni, and faculty accomplishments.	✓ The program provided little to no data on students, alumni, faculty accomplishments.	✓ N/A
Comment:				

Appendix: Supplemental Data