

BS Phys

Bachelor of Science in Physics

Under Review | Fall 2024

Proposal Information

<div>Status</div> <div>Active</div>	<div>Workflow Status</div> <div>In Progress</div> <div>Faculty Senate Approval, Faculty Senate</div> <div>Waiting for Approval   Faculty Senate Approval</div> <div>Rick Holmes</div> <div>Nancy Middlebrook</div> <div>expand ▲</div>
	<div>Changes</div> <div><div>• Program Description</div><div>• Concentration Required</div><div>• Requirements</div><div>• participants</div><div>• Admissions Requirements</div></div> <div>Show All ▼</div>

Proposal Information

Proposed	Proposed
<b>Sponsoring faculty/staff member</b>	<b>Sponsoring faculty/staff email</b>
Ylva Pihlstrom	ylva@unm.edu
Existing	Existing
<b>Sponsoring faculty/staff member</b>	<b>Sponsoring faculty/staff email</b>
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<b>College</b>	<b>Department</b>
College of Arts & Sciences	Physics & Astronomy
	<b>Campus</b>
	Main Campus

Effective Term and Year

Proposed

**Proposed Effective Term and Year**

Fall 2024

Existing

**Proposed Effective Term and Year**

Fall 2023

## Justification

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Proposed

### **Program Justification**

We are replacing the three current concentrations (Biophysics, Optics, and Earth and Planetary) with an Applied Physics concentration and a General Physics concentration. Updates here reflect the necessary modifications to accomplish this new structure.

Additional motivation:

Our undergraduate major program has remained largely the same over the last 30+ years, including a B.S. in Physics, B.S. in Astrophysics, and a B.A. in Physics and Astrophysics. New topics have been introduced through electives, and through concentrations in Biophysics, Earth and Planetary Sciences, and Optics. Over the years, the student body entering the physics and astrophysics programs has changed and is much more diverse. In addition, society and technology has developed and now graduates entering the workforce need a different skill set than 10-30 years ago. This includes, for example, computer and programming literacy. It is time for our program to be updated to reflect the skills needed for our students to be prepared for what comes after their graduation, may it be graduate school, industry, or non-STEM careers.

With the above realizations in mind, the primary goals of the proposed program changes are:

To allow a more flexible education with a more varied set of exit paths into the workforce.

To make the program more attractive to students aiding with recruitment, and to grow the number of undergraduates in our program.

Summary of proposed changes:

Update the course requirements for the B.S. in Physics, B.S. in Astrophysics, and B.A. in Physics and Astrophysics degrees to better reflect the skillsets needed for the respective career goals.

Remove the B.S. in Physics concentrations in Biophysics, Optics, and Earth and Planetary sciences and replace those with a single concentration in Applied Physics which contains a large degree of flexibility to allow student-focused career preparation.

For all degree programs, replace some of the fixed course requirements with electives to allow more flexibility.

Existing

### **Program Justification**

Adding information about BSEE/BS in Physics dual degree

## **Program Category and Level**

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### **Program Category**

Program

### **Program Level**

Undergraduate

### **Degree, Minor, or Certificate Name**

Bachelor of Science in Physics

### **Degree Type**

Bachelor of Science

**Degree/Certificate Level**

Undergraduate

Proposed

**Is this program also offered online?**

No

Existing

**Is this program also offered online?**

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**Associated Forms**

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Select any associated course forms that exist

Select any associated program forms that exist

**Shared Credit and Dual Degree information**

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**Interdepartmental Program**

Yes

Program	Department	College
BS Elect Engr		
<b>Program</b>	<b>Department</b>	<b>College</b>
BS Elec Engr/BS Phys Dual Degree		
<b>Program</b>	<b>Department</b>	<b>College</b>
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<b>Program</b>	<b>Department</b>	<b>College</b>
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<b>Program</b>	<b>Department</b>	<b>College</b>
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**Catalog Information**

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Proposed

### **Program Description**

The B.S. in Physics is designed to prepare students for a career in physics-focused research and technology development. Our program will prepare students to attend graduate school in physics, astrophysics, or a related field. With a strong foundation in mathematics and physics along with experimental methods, students will develop skills for qualitative and quantitative analysis of physical problems in various regimes including, for example, optics, biophysics, particle physics, quantum information, and geophysics. To complement classwork, students have the opportunity to participate in research projects with our faculty.

The B. S. Physics with Applied Physics concentration is designed to be tailored to a student's interests, be they focused on entering the scientific/engineering workforce following their B.S. or going on to graduate study. This concentration is very flexible in the electives, allowing for student-focused career preparation.

The BSEE/BS in Physics dual degree is designed for students who wish to combine the skill set of the engineer's applications focus with the physicist's scientific understanding and research-oriented background. Such students are in high demand by industry and positively viewed by graduate school admission committees.

## **Dual Degrees**

Students in this program may earn a dual degree with a Bachelor of Science in Electrical Engineering. Consult the dual degree program listing for requirements.

Existing

### **Program Description**

The B.S. in Physics and the B.S. in Astrophysics are designed to prepare students to attend graduate school in those fields, and are also intended for students seeking careers which do not require graduate study.

The BSEE/BS in Physics dual degree is designed for students who wish to combine the skill set of the engineer's applications focus with the physicist's scientific understanding and research-oriented background. Such students are in high demand by industry and positively viewed by graduate school admission committees.

## **Dual Degrees**

Students in this program may earn a dual degree with a Bachelor of Science in Electrical Engineering. Consult the dual degree program listing for requirements.

Proposed

**Admissions Requirements**

For admission to any degree program in the department, within the College of Arts and Sciences, in any given semester, it is required that the student have passed PHYS 1310, or a more advanced physics course, with a grade of "C" or higher.

Existing

**Admissions Requirements**

First year students planning to major or minor in physics or astrophysics, if they have the necessary mathematics, usually take PHYS 1310, 1310L and MATH 1512 in their first semester, and PHYS 1320, 1320L and MATH 1522 in their second semester. There is some flexibility in these prerequisites.

For admission to any degree program in the department, within the College of Arts and Sciences, in any given semester, it is required that the student have passed PHYS 1310, or a more advanced physics course, with a grade of "C" (not "C-") or higher.

Proposed

### **Graduation Requirements**

There is a set of core courses all students take, which include basic math and physics courses plus a set of upper level physics laboratory and lecture courses. In addition to the core courses a student will take 18 credit hours following the specific requirements of either the General Physics or the Applied Physics concentration. A student must complete both the core as well as one of the concentrations in order to graduate.

Academic advisement is required **each semester** for students majoring in physics. Students in University College with an area of interest or a definite major in mind in this department should meet with a departmental advisor as soon as possible, to ensure that they obtain current curriculum and admissions policies as well as specific advice on how to meet the requirements for admission.

All coursework required for a Physics major completion (including core course work and pre-requisites) must be successfully completed within three attempts. An attempt includes receiving any letter grade (A through F), WP, WF, W, WNC, CR, NC, I or AUDIT. This includes courses offered by other departments at UNM or other institutions. Students will not be able to continue in a Physics/Astronomy major or pre-major status if they do not successfully complete a required course within the three attempts. After that, students will be required to change their declared major.

Students are not allowed to receive credit for both PHYS 1230 and 1310, nor for both PHYS 1240 and 1320.

Existing

### **Graduation Requirements**

The basic courses PHYS 1310, 1310L, 1320, 1320L, 2310, 2310L and MATH 1512, 1522 and 2531 are prerequisite to all 300-level and higher physics and astronomy courses, and are required for major and minor study in Physics and in Astrophysics for either the B.S. or the B.A. degree. For the B.S. in Astrophysics, ASTR 2110, 2110L, 2115 and 2115L are also required.

Academic advisement is required **each semester** for students majoring in physics or astrophysics. Students in University College with an area of interest or a definite major in mind in this department should meet with a departmental advisor as soon as possible, to ensure that they obtain current curriculum and admissions policies as well as specific advice on how to meet the requirements for admission.

All coursework required for a Physics/Astronomy major completion (including supportive course work and pre-requisites) must be successfully completed within three attempts. An attempt includes receiving any letter grade (A through F), WP, WF, W, WNC, CR, NC, I or AUDIT. This includes courses offered by other departments at UNM or other institutions. Students will not be able to continue in a Physics/Astronomy major or pre-major status if they do not successfully complete a required course within the three attempts. After that, students will be required to change their declared major.

Students are not allowed to receive credit for both PHYS 1230 and 1310, nor for both PHYS 1240 and 1320.

## **Professional Credential/Licensure Program Information**

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Proposed

**License/Certification associated with program**

No

Existing

**License/Certification associated with program**

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## Degree Information

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**Degree Hours**

120

Proposed

**Minimum Major Hours**

83

Existing

**Minimum Major Hours**

**Professional Accrediting Bodies**

## Degree Requirements

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## Requirements

- Complete all of the following
  - Complete the following:
    - **PHYS1310 - Calculus-Based Physics I (3)**
    - **PHYS1310L - Calculus-Based Physics I Laboratory (1)**
    - **PHYS1320 - Calculus-Based Physics II (3)**
    - **PHYS1320L - Calculus-Based Physics II Laboratory (1)**
    - **PHYS2310 - Calculus-Based Physics III (3)**
    - **PHYS2310L - Calculus-Based Physics III Laboratory (1)**
    - ~~PHYS2415 - Computational Physics (3)~~
    - ~~PHYS301 - Thermodynamics and Statistical Mechanics (3)~~
    - ~~PHYS307L - Junior Laboratory (3)~~
    - ~~PHYS304 - Analytical Mechanics II (3)~~
    - **PHYS303 - Analytical Mechanics I (3)**
    - ~~PHYS306L - Junior Laboratory (3)~~
    - ~~PHYS307L - Junior Laboratory (3)~~
    - ~~PHYS330 - Introduction to Modern Physics (3)~~
    - ~~PHYS366 - Mathematical Methods of Physics (4)~~
    - ~~PHYS405 - Electricity and Magnetism I (3)~~
    - ~~PHYS406 - Electricity and Magnetism II (3)~~
    - ~~PHYS491 - Intermediate Quantum Mechanics I (3)~~
    - ~~PHYS492 - Intermediate Quantum Mechanics II (3)~~
    - ~~PHYS493L - Contemporary Physics Laboratory (3)~~
  - **Complete the following:**
    - **CHEM1215 - General Chemistry I for STEM Majors (3)**
    - **CHEM1215L - General Chemistry I for STEM Majors Laboratory (1)**
    - **MATH1512 - Calculus I (4)**
    - **MATH1522 - Calculus II (4)**
    - **MATH2531 - Calculus III (4)**
    - **MATH314 - Linear Algebra with Applications (3)**
    - **MATH316 - Applied Ordinary Differential Equations (3)**
  - ~~Earned at least 3 credits from PHYS 300–499~~
  - **Earn at least 21 credits from the following types of courses:**  
**Complete the requirements for either the General Physics concentration or the Applied Physics concentration (see separately listed concentration requirements).**
  - Complete the following:
    - ~~CHEM1215 - General Chemistry I for STEM Majors (3)~~
    - ~~CHEM1215L - General Chemistry I for STEM Majors Laboratory (1)~~
    - ~~CHEM1225L - General Chemistry II for STEM Majors Laboratory (1)~~
    - ~~CHEM1225 - General Chemistry II for STEM Majors (3)~~
    - ~~MATH314 - Linear Algebra with Applications (3)~~
    - ~~MATH316 - Applied Ordinary Differential Equations (3)~~
  - ~~PHYS 451, \*452, and 456 cannot be substituted for the 3-credit hour elective course numbered above 300.~~
  - ~~No minor is required for the B.S. in Physics, although an optional minor or second major may be selected.~~
  - ~~Earn at least 63 37 credits from the following types of courses:~~  
~~Completed at least 63 credits from the following types of courses:~~ In addition to the program-specific requirements outlined here, all undergraduate students are required to fulfill **UNM's other General Education Program requirements**. In some instances, courses included in an undergraduate degree program's **requirements** requirement may also fulfill a General Education requirement. Please review the General Education Program in this Catalog for General **UNM Education** and information. Students within the College of

Arts and Sciences must to also earn complete 1) a major minimum and a minor; or 2) two majors; or 3) one of the 120 special credits, curricula including of UNM's the General College Education that Program requires no minor requirements.

Grand Total Credits: 120

Concentrations

Program Concentrations

Code	Title
CON Earth Plnt Sci	Earth and Planetary Sciences
CON Optics	Optics
CON BioPhys	Biophysics
Proposed Concentration Required	
Yes	
Existing Concentration Required	
No	

Emphases

Emphasis required	Emphasis Hours
N/A	
Emphasis Rules	
No Rules	

Sample Degree Plan

Proposed

**Sample Degree Plan Upload**

- Proposed BS Applied Physics Four Year RoadMap.10.22.23.pdf

Existing

**Sample Degree Plan Upload**

## Program Learning Outcomes

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Proposed

**Learning Outcomes**

1. Students will demonstrate an understanding of concepts of physics.
2. Students will demonstrate the ability to analyze problems.
3. Students will demonstrate the ability to apply computing tools to problems.
4. Students will demonstrate the ability to communicate, orally and in writing, in a scientific context.
5. Students will demonstrate the ability to carry out experiments to arrive at scientific results.

Existing

**Learning Outcomes**

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