Department of Physics & Engineering Physics

Bachelor of Science in Education (for High School Teachers)

PHYSICS EDUCATION MAJOR

The teaching of physics offers a unique career opportunity. Enthusiastic, innovative and well-prepared teachers are needed not only to prepare high school students for careers in science but also to provide all students with an appreciation of science and how it has benefited society. This is especially true in physics, the most fundamental of the physical sciences. Physics describes and explains not only what goes on in our immediate surroundings but also in the minute world of atoms and elementary particles and the vast world of stars and galaxies. Physics teachers can help provide the knowledge that students need to understand and appreciate the world in which they live, and to show the many scientific ideas upon which modern technology is built.

The Bachelor of Science in Education degree with a major in Physics Education is divided into two options:

The **B.S. in Physics Education – Physics option** is a 57-60 hour major focusing specifically on the area of physics and satisfying the Missouri certification for high school teaching of physics only. However, once the Missouri Physics teaching certification is obtained, endorsements in other areas (e.g. biology or chemistry) may be added by passing the appropriate subject area Praxis II exam.

The **B.S. in Physics Education - Unified Science option** is a 72 hour major certifying the student to teach any of the major science areas at the high school level in the state of Missouri. This degree is particularly attractive to rural high schools that need a single instructor to teach several different sciences, however, this course of study may take 5 years to complete.

**FACULTY ADVISOR:**
Dr. Margaret Hill

**CAREER OPPORTUNITIES:**

**EMPLOYMENT OUTLOOK:**
There is currently a shortage of qualified physics teachers at the secondary level for which there is no immediate solution. Thus, graduates will have no difficulty in obtaining teaching positions. A national awareness of this problem has led to the speculation that salaries will increase substantially in the future to attract needed qualified teachers.

**HIGH SCHOOL PREPARATION FOR MAJOR:**
Students should have completed four years of mathematics, which includes trigonometry and an introduction to calculus. Four years of science, including physics and chemistry, is highly recommended. A strong background in English and a speech course are desirable since a teaching position requires effective written and verbal communication.
**Major:** Physics Education  
**Option:** Physics  
**Degree:** Bachelor of Science in Education

**MINIMUM DEGREE REQUIREMENTS**

I. **University Studies** *(up to 24 hours can be met within sections II and III in the following curriculum)*  
   **51 hours (27 actual)**

   **NOTE:** The following University Studies courses are required for teacher certification:
   - EN140 Rhetoric & Critical Thinking #  
   - PS103 U.S. Political Systems  
   - EC101 Econ. Problems & Policies or EC215 Ppls. of Microecon.##
   - US105 American History I or US107 American History II
   - EC101 Econ. Problems & Policies or EC215 Ppls. of Microecon.##
   - SC105 Fundamentals of Oral Communication #

II. **Required Courses for the Major**  
   **57-60 hrs.**

   A. **History/Philosophy of Science and Technology**  
      UI422* Scientific Reasoning (3)*  
      **Total History/Philosophy:** 3 hours

   B. **Biology**  
      BS108* Biology for Living (3)*  
      or BS218* Biological Science: A Process Approach  
      or BO200 Plant Biology  
      or ZO200 Animal Biology  
      **Total Biology:** 3 hours

   C. **Chemistry**  
      CH181/001/081* Basic Principles of Chemistry or  
      CH185/005/085* General Chemistry I and  
      CH186 General Chemistry II (3)  
      **Total Chemistry:** 5 - 8 hours

   D. **Mathematics**  
      MA140 Analytic Geometry and Calculus I (5)*  
      MA145 Analytic Geometry and Calculus II (4)  
      MA240 Analytic Geometry and Calculus III (3)  
      MA245 Vector Calculus (2)  
      **Total Mathematics:** 14 hours

   E. **Physics**  
      PH230/030 General Physics I (5)  
      PH231/031 General Physics II (5)  
      EP100 Physics & Engineering Concepts (1)  
      PH341 Optics (3)  
      UI330 Experimental Methods I (PH345) (3)*  
      PH360 Modern Physics (3)  
      PH370 Mechanics (3)  
      PH371 Electromagnetics (3)  
      **Total Physics:** 26 hours

   F. **Geoscience**  
      UI318 Earth Science: A Process Approach* (3)*  
      or GO110 Physical Geology  
      or GO220 Meteorology  
      or GO320 Oceanography  
      **Total Geoscience:** 3 hours

   H. **Environmental Science**  
      BS105 Environmental Biology (3)*  
      or BI332 General Ecology  
      or GO305 Environmental Geoscience  
      or UI372* Earthquakes & Society  
      or UI360* Recycling & Waste Management  
      **Total Environmental Science:** 3 hours

III. **Professional Education** *(includes 6 credits university studies – PY222 and SE275)*  
   **44 hours**

**Minimum Degree Requirements**  
**128-131 hours**

#course must be passed with grade of C or higher; ## prerequisite of AD101; *denotes University Studies courses
**Major:** Physics Education  
**Option:** Physics  
**Degree:** Bachelor of Science in Education

### SUGGESTED PLAN

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hrs</th>
<th>Second Semester</th>
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<tbody>
<tr>
<td>EP100 Physics &amp; Eng. Concepts (fall only)</td>
<td>1</td>
<td>MA145 Analytic Geometry &amp; Calculus II</td>
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<tr>
<td>MA140 Analytic Geometry &amp; Calculus I</td>
<td>5</td>
<td>PH230 General Physics I Lecture</td>
<td>5</td>
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<tr>
<td>CH181/001/081 Basic Principles of Chemistry (lecture, recitation, laboratory) OR CH185/005/085 General Chemistry I</td>
<td>5</td>
<td>PH030 General Physics I Laboratory</td>
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<tr>
<td>UI100 First Year Seminar</td>
<td>3</td>
<td>CH186 General Chemistry II</td>
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<tr>
<td>EN100 English Composition</td>
<td>3</td>
<td>ED251 Intro to MSE Technology</td>
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<td>ED250 Intro to MSE Teaching</td>
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<tr>
<th>Third Semester</th>
<th>Hrs</th>
<th>Fourth Semester</th>
<th>Hrs</th>
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<tbody>
<tr>
<td>MA240 Analytic Geometry &amp; Calculus III</td>
<td>3</td>
<td>MA245 Vector Calculus (spring only)</td>
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<tr>
<td>PH231 General Physics II Lecture</td>
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<td>PH341 Optics** (even spring)</td>
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<td>PH031 General Physics II Laboratory</td>
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<td>EF304 School and Society</td>
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<td>BS108 Biology for Living</td>
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<td>SE305 Secondary Block II Field Exp.</td>
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<td>PY222 Development of the Adolescent</td>
<td>3</td>
<td>SE306 Theories of Learning &amp; Mgmt</td>
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<td>SC105 Fund. of Oral Communication</td>
<td>3</td>
<td>SE307 Teaching Reading in Sec. School</td>
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<td>SE308 Fund. of High School Education</td>
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<tr>
<th>Fifth Semester</th>
<th>Hrs</th>
<th>Sixth Semester</th>
<th>Hrs</th>
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<tr>
<td>PH360 Modern Physics (fall only)</td>
<td>3</td>
<td>PS103 U.S. Political Systems</td>
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<tr>
<td>PH371 Electromagnetics (odd fall)</td>
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<td>Environmental Science elective</td>
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<td>UI330 Experimental Methods I (PH345)</td>
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<td>UI422 Scientific Reasoning (spring only, evenings)</td>
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<td>US105 American History I</td>
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<td>SE300 Technology to Enhance Learning§</td>
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<td>EN140 Rhetoric &amp; Critical Thinking</td>
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<td>SE320 Techniques of Teaching Science***</td>
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<td>SE275 Diversity in America’s Schools§</td>
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<td>SE370 Secondary Block III Field Exp.***</td>
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<th>Hrs</th>
<th>Eighth Semester</th>
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<td>PH370 Mechanics (even fall)</td>
<td>3</td>
<td>EX390 Psych. &amp; Educ. Of Except. Child§</td>
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<td>UI318 Earth Sci.: A Process Approach</td>
<td>3</td>
<td>EF400 Seminar for Student Teachers</td>
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<td>Literary Expression</td>
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<td>SE463 Student Teaching Experience I</td>
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<tr>
<td>Artistic Expression</td>
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<td>SE464 Student Teaching Experience II</td>
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<td>EC101 Econ. Problems &amp; Policies</td>
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**TOTAL HOURS**  
131

CH186 is required in a subsequent semester if the CH185/005/085 option is chosen.

**This course is offered once every two years in the spring semester and may have to be taken in the Sixth or Eighth Semester.**

***offered spring only—meets M-F, 8-11 am

§ These courses can be taken out of sequence

Admission to Teacher Education Program:  
students must complete 57 hours of coursework, PY222, and Block I (with a written recommendation); pass the CBASE exam; and fill out an application for admission to the teacher ed. program.  
No Block II or higher education course (including SE275) may be registered for without admission to the teacher education program.