

PHYSICS (PY)

The Physics program prepares the graduate for a career as a research laboratory physicist, for entry into a number of related fields including secondary teaching, engineering, medicine, medical research, geology/geophysics, instrumentation, and for graduate degree programs in physics and related disciplines. The five options in the Physics program (general, instrumentation, mathematics, chemistry, and computer science) allow students to customize their curriculum to specific career or graduate degree goals.

Bachelor of Science - Physics Major (All Options)

MAJOR CODE: 40.0801

Program components for a Bachelor of Science degree with a major in Physics include:

1. APPLICABLE GENERAL UNIVERSITY REQUIREMENTS:

To graduate, each student must:

- complete a minimum of 33 semester hours of the last 39 semester hours at ASU.
- complete 60 to 64 semester hours of upper level college/university credit (300-400 level courses).
- complete a minimum of 15 semester hours of upper (300/400) level coursework in his or her major at Athens State University, not including courses taken by consortium arrangement. School or departmental regulations may require more than 15 semester hours of coursework in the major at Athens State University.
- complete all course requirements for major(s).
- complete all course requirements for minor (if applicable).
- complete all of the gen. ed. requirements for the degree.
- attain an overall grade point average of 2.0, a 2.0 on all coursework attempted at Athens State University and at least a 2.0 in the major field. School or departmental regulations may require more than a 2.0 grade point average (see major requirements in each discipline).
- complete the total hour requirement as specified by the degree.
- complete the teacher certification requirements (if applicable).

EACH STUDENT MUST ASSUME RESPONSIBILITY FOR KNOWING THE ACADEMIC REQUIREMENTS FOR THE DEGREE THAT IS BEING PURSUED.

2. GENERAL EDUCATION REQUIREMENTS:

Area I.	Written Composition	6 semester hours ___ ___
Area II.	Humanities/Fine Arts (12 semester hours)	
	At least one fine arts course	3 semester hours ___
	At least one literature course	3 semester hours ___
	Other Humanities/Fine Arts courses	6 semester hours ___ ___
Area III.	Mathematics and Natural Sciences (11 semester hours)	
	Precalculus Algebra <u>or</u> Precalculus Algebra and Trigonometry	3-4 semester hours ___
	College Chemistry I and II	8 semester hours ___ ___
Area IV.	History/Behavioral and Social Sciences (12 semester hours)	
	At least one history course	3 semester hours ___
	Other History/Behavioral or Social Science courses	9 semester hours ___ ___ ___
<u>TOTAL GENERAL EDUCATION REQUIREMENTS</u>		<u>41 SEMESTER HOURS</u>

3. **MAJOR PREREQUISITE COURSES (PRE-PROFESSIONAL)**

**Precalculus Trigonometry	3 semester hours	___
General Physics I (Calculus based)	4 semester hours	___
General Physics II (Calculus based)	4 semester hours	___
Calculus I	4 semester hours	___
Calculus II	4 semester hours	___
Calculus III	4 semester hours	___
Electives	0-3 semester hours	___

**If Precalculus Algebra (3 semester hours) is completed to satisfy the Area III mathematics requirement, the student should complete Precalculus Trigonometry (3 semester hours) in addition to Precalculus Algebra. Completion of Precalculus Algebra and Trigonometry (4 semester hours) will satisfy both the Area III mathematics requirement and the Area V requirement for trigonometry.

TOTAL MAJOR PREREQUISITE HOURS: 23 SEMESTER HOURS

TOTAL GEN. ED. REQ. & MAJOR PREREQUISITE HOURS: 64 SEMESTER HOURS

4. **PROFESSIONAL COURSES:**

PHYSICS PROGRAM CORE:

MA 310 Matrices and Linear Algebra	3 semester hours	___
MA 421 Differential Equations	3 semester hours	___
PY 303 Calculus Physics III (Modern Physics)	4 semester hours	___
PY 306 Thermal Physics	3 semester hours	___
PY 309, 310 Mechanics I, II	6 semester hours	___ ___
PY 312, 412 Electricity and Magnetism I, II	6 semester hours	___ ___
PY 415 Intermediate Quantum Physics I	3 semester hours	___
CIS 301 Problem Solving with Computers	3 semester hours	___
Total Required Physics Core	31 semester hours	

General Physics Option:

Upper Level Math Elective (MA 316, MA 401, or MA 428)	3 semester hours	___
PY 344 Principles of Optics	4 semester hours	___
PY 435 Senior Laboratory	3 semester hours	___
Upper level 300/400 Physics electives	6 semester hours	___ ___

Instrumentation Option:

IT 306 Interfacing Techniques	4 semester hours	___
IT 316 Applied Digital Design	4 semester hours	___
IT 425 Introduction to Robotics	4 semester hours	___
IT 440 Process Control Instrumentation	4 semester hours	___
Upper level 300/400 Instrumentation or Physics elective	3-4 semester hours	___

Mathematics Option:

(Five mathematic electives from the following:)

MA 316 Vector Analysis	3 semester hours	___
MA 330 Advanced Mathematical Software	3 semester hours	___
MA 401 Complex Analysis	3 semester hours	___
MA 423 Numerical Analysis	3 semester hours	___
MA 428 Partial Differential Equations	3 semester hours	___
MA 445 Mathematical Modeling and Simulation	3 semester hours	___

Chemistry Option:

CH 311, 312 Organic Chemistry I, II	8 semester hours	___ ___
CH 324 Analytical Chemistry	4 semester hours	___
CH 410 Instrumental Analysis	4 semester hours	___
CH 410L Instrumental Analysis Lab		
CH 420 Intermediate Inorganic Chemistry	3 semester hours	___

Computer Science Option:

MA 308 Discrete Mathematics	3 semester hours	___
CS 317, 318 Computer Science I and II <u>or</u> two high level computer language courses	6 semester hours	___ ___
CS 372 Data Structures	3 semester hours	___

Two computer science electives from the following six courses: 6-7 semester hours ___ ___

- CS 309 Introduction to Digital Logic
- CS 409 Computer Architecture
- CS 414 Programming Languages
- CS 415 Operating Systems
- CS 417 Object Oriented Programming
- CS 472 Algorithm Analysis

TOTAL PHYSICS OPTION HOURS: 15-20 SEMESTER HOURS

TOTAL PROFESSIONAL HOURS: 46-51 SEMESTER HOURS

- 5. The Physics major must complete a minimum of 15 semester hours of upper division 300/400 level physics coursework at Athens State University.
- 6. A minor is **not** required. However, the General Physics major is encouraged to complete a minor in Mathematics (see Mathematics program requirements.)

7. **GENERAL ELECTIVES 13-18 SEMESTER HOURS**

TOTAL HOURS FOR GRADUATION: 128 SEMESTER HOURS

Physics Minor

A minor in Physics requires 24 semester hours of Physics coursework including 15 semester hours of upper division coursework, at least 9 semester hours of which must be taken at Athens State University. Strict adherence to course prerequisites must be observed.

The minor must include the following courses or their approved equivalents:

General Physics with Calculus I, II	8 semester hours
PY 303 Calculus Physics III (Modern Physics)	4 semester hours
Upper level Physics courses to be approved by Physics Faculty Advisor	12 semester hours
TOTAL HOURS FOR MINOR	24 semester hours

Bachelor of Science - Physics (All Options) Major
(Licensure and Certification Track for Teaching in Secondary Education) (Grades 6-12)
MAJOR CODE: 40.0801

(Due to the No Child Left Behind Federal Act of 2001, the program listed below may have changed. See your advisor.)

NOTE: To teach in secondary schools, the students MUST:

- 1) complete the below listed requirements to include the minor for certification and licensure;
- 2) contact the certification officer in the College of Education for approval of appropriate professional education courses and compliance with NCLB Federal Act of 2001 and State Department of Education licensure standards;
- 3) maintain a grade point average of at least a 2.75 on a 4.0 scale in each of the following: professional education, teaching field, and overall education. This is a requirement for student teaching and for graduation.
- 4) repeat courses in which D's and F's are made and realize that all attempts are calculated in the GPA. Education courses with the prefixes ED, EL, ER, SC, SE, CE, and HPE may be repeated one time only; and
- 5) understand that underlined courses in the minor require admission into the Teacher Education Program (TEP).

Program components for a Bachelor of Science degree with a major in Physics include:

1. APPLICABLE GENERAL UNIVERSITY REQUIREMENTS:

To graduate, each student must:

- complete a minimum of 33 semester hours of the last 39 semester hours at ASU.
- complete 60 to 64 semester hours of upper level college/university credit (300-400 level courses).
- complete a minimum of 15 semester hours of upper (300/400) level coursework in his or her major at Athens State University, not including courses taken by consortium arrangement. School or departmental regulations may require more than 15 semester hours of coursework in the major at Athens State University.
- complete all course requirements for a major(s).
- complete all course requirements for a minor (if applicable).
- complete all of the general education requirements for the degree.
- complete the total hour requirement as specified by the degree.
- complete the teacher certification requirements (if applicable).

EACH STUDENT MUST ASSUME RESPONSIBILITY FOR KNOWING THE ACADEMIC REQUIREMENTS FOR THE DEGREE THAT IS BEING PURSUED. PLEASE FOLLOW CAREFULLY.

2. GENERAL EDUCATION REQUIREMENTS:

Area I. Written Composition 6 semester hours ___ ___

Area II. Humanities and Fine Arts (12 semester hours)

The Arts 3 semester hours ___
 Speech (SPH 106 or SPH 107) 3 semester hours ___
 Humanities Elective 3 semester hours ___
 Literature* 3 semester hours ___ or 6 semester hours ___ ___

Area III. Natural Sciences and Mathematics (12 semester hours)

Calculus I** 4 semester hours ___
 College Chemistry I and II 8 semester hours ___

Area IV. History/Behavioral and Social Sciences (12 semester hours)

History* 3 semester hours ___ or 6 semester hours ___ ___
 General Psychology 3 semester hours ___
 Other History/Behavioral or Social Science Elective 3 semester hours ___

***Students must complete a 6 semester hour sequence in either Area II Literature or Area IV History.**

****Prerequisites: Precalculus Algebra and Precalculus Trigonometry**

TOTAL GENERAL EDUCATION REQUIREMENTS: 42 SEMESTER HOURS

3.	MAJOR PREREQUISITE COURSES (PRE-PROFESSIONAL)	
	Calculus II	4 semester hours ___
	Calculus III	4 semester hours ___
	General Physics I (Calculus based)	4 semester hours ___
	General Physics II (Calculus based)	4 semester hours ___
	Electives	6 semester hours ___ ___

TOTAL MAJOR PREREQUISITE HOURS: 22 SEMESTER HOURS

TOTAL GEN. ED. REQ. & MAJOR PREREQUISITE HOURS: 64 SEMESTER HOURS

4. **PROFESSIONAL COURSES:**

PHYSICS PROGRAM CORE:

MA 310	Matrices and Linear Algebra	3 semester hours ___
MA 421	Differential Equations	3 semester hours ___
PY 303	Calculus Physics III (Modern Physics)	4 semester hours ___
PY 306	Thermal Physics	3 semester hours ___
PY 309, 310	Mechanics I, II	6 semester hours ___ ___
PY 312, 412	Electricity and Magnetism I, II	6 semester hours ___ ___
PY 415	Intermediate Quantum Physics I	3 semester hours ___
	Total Required Physics Core	28 semester hours

General Physics Option:

	Upper Level Math Elective (MA 316, MA 401, or MA 428)	3 semester hours ___
PY 344	Principles of Optics	4 semester hours ___
PY 435	Senior Laboratory	3 semester hours ___
	Upper level 300/400 Physics electives	6 semester hours ___ ___

Instrumentation Option:

IT 306	Interfacing Techniques	4 semester hours ___
IT 316	Applied Digital Design	4 semester hours ___
IT 425	Introduction to Robotics	4 semester hours ___
IT 440	Process Control Instrumentation	4 semester hours ___
	Upper level 300/400 Instrumentation or Physics elective	3-4 semester hours ___

Mathematics Option:

(Five mathematic electives from the following:)

MA 316	Vector Analysis	3 semester hours ___
MA 330	Advanced Mathematical Software	3 semester hours ___
MA 401	Complex Analysis	3 semester hours ___
MA 423	Numerical Analysis	3 semester hours ___
MA 428	Partial Differential Equations	3 semester hours ___
MA 445	Mathematical Modeling and Simulation	3 semester hours ___

Chemistry Option:

CH 311, 312	Organic Chemistry I, II	8 semester hours ___ ___
CH 324	Analytical Chemistry	4 semester hours ___
CH 410	Instrumental Analysis	4 semester hours ___
CH 410L	Instrumental Analysis Lab	
CH 420	Intermediate Inorganic Chemistry	3 semester hours ___

Computer Science Option:

MA 308 Discrete Math	3 semester hours	___
CS 317, 318 Computer Science I and II or Two high level computer language courses	6 semester hours	___ ___
CS 372 Data Structures	3 semester hours	___
Two computer science electives from the following six courses:	6-7 semester hours	___ ___
CS 309 Introduction to Digital Logic		
CS 409 Computer Architecture		
CS 414 Programming Languages		
CS 415 Operating Systems		
CS 417 Object Oriented Programming		
CS 472 Algorithm Analysis		

TOTAL PHYSICS OPTION HOURS: 15-20 SEMESTER HOURS

TOTAL PROFESSIONAL HOURS: 43-48 SEMESTER HOURS

5. The Physics major must complete a minimum of 15 semester hours of upper division 300/400 level physics coursework at Athens State University.

6. **MINOR COURSES FOR CERTIFICATION:**

ED 301 Foundations of Education I	1 semester hour	___
ED 302 Foundations of Education II	2 semester hours	___
ED 305 Technology & Media in Education	3 semester hours	___
SC 331 Issues and Management in Secondary Education	3 semester hours	___
SC 333 <u>Teaching Reading/Writing in the Content Areas</u>	3 semester hours	___
SC 362 <u>Assessment and Evaluation in Secondary Education</u>	3 semester hours	___
PS 334 <u>Adolescent Psychology</u>	3 semester hours	___
SE 301 Introduction to Exceptional Learners	3 semester hours	___
PY 456 <u>Materials and Methods of Teaching Physics in Middle School/ High School</u>	3 semester hours	___
SC 486 <u>Internship in High School Education</u>	9 semester hours	___ ___ ___

TOTAL MINOR REQ. FOR CERTIFICATION/LICENSURE..... 33 semester hours

TOTAL HOURS FOR GRADUATION 140 -145 SEMESTER HOURS