

# Physics

College of Natural Science and Mathematics  
Department of Physics  
(907) 474-7339  
www.uaf.edu/physics/

## B.A., B.S. Degrees

Minimum Requirements for Degrees: 120 credits

The science of physics is concerned with the nature of matter and energy in all physical systems, from elementary particles to the structure and origin of the universe. Physics, together with mathematics and chemistry, provides the foundation for work in all fields of the physical sciences and engineering, and contributes greatly to other disciplines such as the biosciences and medicine.

The undergraduate curriculum provides a solid foundation in classical and modern physics, with emphasis on both its experimental and theoretical aspects. A student completing this curriculum can be well prepared for advanced study in physics and related sciences, and for other careers that also require refined abilities in problem solving.

The physics department is also responsible for the bachelor's degree programs in general science and applied physics. These programs are also described in this catalog.

### Major—B.A. Degree

1. Complete the general university requirements (page 116).
2. Complete the B.A. degree requirements (page 120).
3. Complete the following program (major) requirements:
  - a. Complete the following:
    - PHYS 113—Concepts of Physics..... 1
    - PHYS 211X—General Physics..... 4
    - PHYS 212X—General Physics..... 4
    - PHYS 213X—Elementary Modern Physics ..... 4
    - PHYS 301—Introduction to Mathematical Physics..... 4
    - PHYS approved electives ..... 20
  - b. Complete the following:
    - MATH 200X—Calculus\*\* ..... 4
    - MATH 201X—Calculus\*\* ..... 4
    - MATH 202X—Calculus..... 4
    - MATH electives at the 300-level or above..... 3
4. Minimum credits required ..... 120
  - \* Student must earn a C grade or better in each course.
  - \*\* Satisfies core curriculum or B.A. degree requirements, but not both.

### Major—B.S. Degree

1. Complete the general university requirements. (See page 116. As part of the core curriculum requirements, these courses are suggested: CHEM 105X and CHEM 106X; GEOS 101X; BIOL 105X.)
2. Complete the B.S. degree requirements (page 121).
3. Complete the following program (major) requirements:
  - PHYS 113—Concepts of Physics..... 1
  - PHYS 211X—General Physics..... 4
  - PHYS 212X—General Physics..... 4
  - PHYS 213X—Elementary Modern Physics ..... 4
  - PHYS 220—Introduction to Computational Physics ..... 4
  - PHYS 301—Introduction to Mathematical Physics..... 4
  - PHYS 313—Thermodynamics and Statistical Physics..... 4
  - PHYS 341—Classical Physics I: Particle Mechanics..... 4
  - PHYS 342—Classical Physics II: Electricity and Magnetism ..... 4
  - PHYS 343—Classical Physics III: Vibration and Waves..... 4
  - PHYS 381W,O—Physics Laboratory ..... 3
  - PHYS 382W—Physics Laboratory..... 3

- PHYS 421—Quantum Mechanics ..... 4
  - PHYS 462—Geometrical and Physical Optics..... 4
  - PHYS 471—Advanced Topics in Physics I\*\* ..... 3
  - PHYS 472—Advanced Topics in Physics II\*\* ..... 3
4. Complete the following program (major) requirements:
    - MATH 200X—Calculus\*\*\* ..... 4
    - MATH 201X—Calculus\*\*\* ..... 4
    - MATH 202X—Calculus..... 4
    - MATH electives at the 300-level or above\*\*\*\* ..... 6

5. Minimum credits required ..... 120

\* Student must earn a C grade or better in each course.  
\*\* Student must take at least three emphasis topics from 471 and at least three application topics from 472  
\*\*\* Satisfies core curriculum or B.S. degree requirements, but not both.  
\*\*\*\* Suggested electives: MATH 314, 421 and 422.  
Note: Other courses suggested to fulfill minimum credit requirements: ES 201, 307 and 308.

### Requirements for physics teachers (grades 7–12)

1. Complete all the requirements of the B.A. or B.S. degree.
2. All prospective physics teachers must complete the following:
  - CHEM 105X and CHEM 106X—General Chemistry..... 8
  - PHYS 113—Concepts of Physics..... 1
  - PHYS 211X—General Physics..... 4
  - PHYS 212X—General Physics..... 4
  - PHYS 213X—Elementary Modern Physics ..... 4
  - PHYS 220—Introduction to Computational Physics ..... 4
  - PHYS 301—Introduction to Mathematical Physics..... 4
  - PHYS approved electives ..... 16
  - MATH electives..... 3
3. All prospective science teachers must complete one of the following:
  - PHIL 380—Conceptual Foundations of Science (3)  
or PHIL 382—Science & Technological Limits (3)  
or PHIL 481—Philosophy of Science (3)..... 3

Note: We strongly recommend that prospective secondary science teachers seek advising from the UAF School of Education early in your undergraduate degree program, so that you can be appropriately advised of the state of Alaska requirements for teacher licensure. You will apply for admission to the UAF School of Education's post-baccalaureate teacher preparation program, a one-year intensive program, during your senior year.

### Minor

1. Complete the following:
  - PHYS 103X–104X—College Physics (8)  
or PHYS 211X–212X—General Physics (8)..... 8
2. Complete the following:
  - PHYS 213X—Elementary Modern Physics ..... 4
  - Electives at the 300–400-level..... 8
3. Minimum credits required ..... 20



## Baccalaureate Core Requirements

All degrees (e.g. B.A., B.S., etc.) require additional courses.  
Refer to specific degree and program requirements.

### COMMUNICATION (9)

**Complete the following:**

ENGL 111X .....(3) \_\_\_\_\_  
*ENGL 190H may be substituted.*

**Complete one of the following:**

ENGL 211X OR ENGL 213X .....(3) \_\_\_\_\_

**Complete one of the following:**

COMM 131X OR COMM 141X .....(3) \_\_\_\_\_

### PERSPECTIVES ON THE HUMAN CONDITION (18)

**Complete all of the following four courses:**

ANTH 100X/SOC 100X .....(3) \_\_\_\_\_  
ECON 100X OR PS 100X .....(3) \_\_\_\_\_  
HIST 100X .....(3) \_\_\_\_\_  
ENGL/FL 200X .....(3) \_\_\_\_\_

**Complete one of the following three courses:**

ART/MUS/THR 200X, HUM 201X OR ANS 202X .....(3) \_\_\_\_\_

**Complete one of the following six courses:**

BA 323X, COMM 300X, JUST 300X, NRM 303X,  
PS 300X OR PHIL 322X .....(3) \_\_\_\_\_

**OR complete 12 credits from the above courses PLUS**

- two semester-length courses in a single Alaska Native language or other non-English language OR
- three semester-length courses (9 credits) in American Sign Language taken at the university level.

### MATHEMATICS (3)

**Complete one of the following:**

MATH 103X, MATH 107X, MATH 161X OR STAT 200X .....(3-4) \_\_\_\_\_  
*\* No credit may be earned for more than one of MATH 107X or 161X.*

**OR complete one of the following:\***

MATH 200X, MATH 201X, MATH 202X,  
MATH 262X OR MATH 272X .....(4) \_\_\_\_\_

*\*Or any math course having one of these as a prerequisite*

### NATURAL SCIENCES (8)

**Complete any two (4-credit) courses:**

ATM 101X .....(4) \_\_\_\_\_  
BIOL 100X .....(4) \_\_\_\_\_  
BIOL 103X .....(4) \_\_\_\_\_  
BIOL 104X .....(4) \_\_\_\_\_  
BIOL 105X .....(4) \_\_\_\_\_  
BIOL 106X .....(4) \_\_\_\_\_  
BIOL 111X .....(4) \_\_\_\_\_  
BIOL 112X .....(4) \_\_\_\_\_  
CHEM 100X .....(4) \_\_\_\_\_  
CHEM 103X .....(4) \_\_\_\_\_  
CHEM 104X .....(4) \_\_\_\_\_  
CHEM 105X .....(4) \_\_\_\_\_  
CHEM 106X .....(4) \_\_\_\_\_  
GEOG 205X .....(4) \_\_\_\_\_  
GEOS 100X .....(4) \_\_\_\_\_  
GEOS 101X .....(4) \_\_\_\_\_  
GEOS 112X .....(4) \_\_\_\_\_  
GEOS 120X .....(4) \_\_\_\_\_  
GEOS 125X .....(4) \_\_\_\_\_  
MSL 111X .....(4) \_\_\_\_\_  
PHYS 102X .....(4) \_\_\_\_\_  
PHYS 103X .....(4) \_\_\_\_\_  
PHYS 104X .....(4) \_\_\_\_\_  
PHYS 115X .....(4) \_\_\_\_\_  
PHYS 116X .....(4) \_\_\_\_\_  
PHYS 175X .....(4) \_\_\_\_\_  
PHYS 211X .....(4) \_\_\_\_\_  
PHYS 212X .....(4) \_\_\_\_\_  
PHYS 213X .....(4) \_\_\_\_\_

### LIBRARY AND INFORMATION RESEARCH (0-1)

Successful completion of library skills competency test OR  
LS 100X or 101X prior to junior standing .....(0-1) \_\_\_\_\_

### UPPER-DIVISION WRITING AND ORAL COMMUNICATION (0)

**Complete the following:**

Two writing intensive courses designated (W) .....(0) \_\_\_\_\_  
One oral communication intensive course designated (O) .....(0) \_\_\_\_\_  
**OR** two oral communication intensive courses designated (O/2), at the upper-division level (see degree and/or major requirements).....(0) \_\_\_\_\_

**TOTAL CREDITS REQUIRED.....38-39**