Physics, Applied

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

B.S. Degree

Minimum Requirements for Degree: 120 credits; 124 credits for concentration in Technical Management

The science of physics is concerned with the nature of matter and energy for 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 fields such as the biosciences and medicine.

The field of applied physics encompasses those areas that have developed practical applications from fundamental research in physics in the last century, including space physics, plasma physics, condensed matter physics, device physics, surface physics, biophysics, laser physics and reactor physics.

The undergraduate curriculum provides a solid foundation in general physics. Students may study applied physics in one of three concentrations or may design a course of study appropriate for individual goals. Examples outside the approved concentrations could include engineering physics and biophysics. In all cases, the credits in applied physics (items "d" and "e" in each course outline) must be appropriate for the chosen subject area.

The concentration in Technical Management provides an opportunity to combine basic knowledge of physics with an aptitude for leadership in business. Declared physics majors in good standing with appropriate grades, department mentoring, and with approval for some courses are upon graduation welcome to apply to the M.B.A. program in UAF's School of Management. GMAT exam required.

Major—B.S. Degree with no concentration

1. Complete the general university requirements. (See page 116. As part of the core curriculum requirements, complete MATH 200X.)

2. Complete the B.S. degree requirements. (See page 121. As part of the B.S. degree requirements, complete MATH 201X, PHYS 211X* and PHYS 212X*.)

3. Complete the following program (major) requirements:
   a. Complete the following:
   MATH 202X—Calculus...4
   PHYS 213X—Elementary Modern Physics*....................................4
   PHYS 220—Introduction to Computational Physics* 4
   PHYS 301—Introduction to Mathematical Physics*.......................4
   PHYS 341—Classical Physics I: Particle Mechanics*......................4
   PHYS 342—Classical Physics II: Electricity and Magnetism* 4
   b. Complete mathematics credits at the 200-level or above 9
   c. Complete physics credits at the 300-level or above*.................9
   d. Complete credits in applied physics* ** 17

4. Minimum credits required...120

Concentrations: Atmospheric Physics, Computational Physics,

Atmospheric Physics

1. Complete the general university requirements. (See page 116. As part of the core curriculum requirements, complete: MATH 200X.)

2. Complete the B.S. degree requirements. (See page 121. As part of the B.S. degree requirements, complete: MATH 201X, PHYS 211X* and PHYS 212X*.)

3. Complete the following program (major) requirements:
   a. Complete the following:
   MATH 202X—Calculus...4
   PHYS 213X—Elementary Modern Physics*....................................4
   PHYS 220—Introduction to Computational Physics* 4
   PHYS 301—Introduction to Mathematical Physics*.......................4
   PHYS 341—Classical Physics I: Particle Mechanics*......................4
   PHYS 342—Classical Physics II: Electricity and Magnetism* 4
   b. Complete mathematics credits at the 200-level or above 9
   c. Complete physics credits at the 300-level or above* **............9
   d. Complete the following:*
   ATM 401—Introduction to Atmospheric Science 3
   ATM 413—Atmospheric Radiation 3
   ATM 445—Atmospheric Dynamics...3
   e. Complete credits in other relevant upper-division courses* ** 8

4. Minimum credits required...120

Computational Physics

1. Complete the general university requirements. (See page 116. As part of the core curriculum requirements, complete MATH 200X.)

2. Complete the B.S. degree requirements. (See page 121. As part of the B.S. degree requirements, complete MATH 201X, PHYS 211X* and PHYS 212X*.)

3. Complete the following program (major) requirements:
   a. Complete the following:
   MATH 202X—Calculus...4
   PHYS 213X—Elementary Modern Physics*....................................4
   PHYS 220—Introduction to Computational Physics* 4
   PHYS 301—Introduction to Mathematical Physics*.......................4
   PHYS 341—Classical Physics I: Particle Mechanics*......................4
   PHYS 342—Classical Physics II: Electricity and Magnetism* 4
   b. Complete mathematics credits at the 200-level or above 9
   c. Complete credits in applied physics* ** 12
   d. Complete the following in the concentration:*
   MATH 310—Numerical Analysis 3
   CS 201—Computer Science I..3
   CS 202—Computer Science II 3
   e. Complete credits in other relevant upper-division courses* ** 5

4. Minimum credits required...120

Technical Management

1. Complete the general university requirements. (As part of the core curriculum requirements, complete MATH 200X.)

2. Complete the B.S. degree requirements. (As part of the B.S. degree requirements, complete MATH 201X, PHYS 211X* and PHYS 212X*.)

3. Complete the following program (major) requirements:
   a. Complete the following:
   MATH 202X—Calculus...4
   PHYS 213X—Elementary Modern Physics*....................................4
   PHYS 220—Introduction to Computational Physics* 4
   PHYS 301—Introduction to Mathematical Physics*.......................4
   PHYS 341—Classical Physics I: Particle Mechanics*......................4
   PHYS 342—Classical Physics II: Electricity and Magnetism* 4

UNIVERSITY OF ALASKA FAIRBANKS
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b. Complete mathematics credits at the 200-level or above, which can include courses needed for the M.B.A. program, including: STAT 200X—Elementary Probability and Statistics or equivalent ..9
c. Complete physics credits at the 300-level or above* 12
d. Complete the following in the concentration, which can be prerequisites for entrance into the UAF School of Management's M.B.A. program****.

ACCT 261, 262—Accounting Concepts and Uses 6
BA 325—Financial Management*** 3
BA 330—The Legal Environment of Business*** 3
BA 343—Principles of Marketing*** 3
BA 360—Operations Management*** 3
BA 390—Organizational Theory and Behavior*** 3

4. Minimum credits required 120

Student must earn a C grade or better in each course.

***Note: These credits must be in a chosen subject area and approved before the beginning of the student's final semester by the head of the physics department.*

*** *Prerequisites are MATH 202X, STAT 200X, PHYS 220 or permission of the M.B.A. director.*

**** *Students can be required to earn a B grade or better if applying for the M.B.A. program.*

Note: Must exclude PHYS 103X and 104X from core curriculum natural science requirement.

See General Science.

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