

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 131. As part of the core curriculum requirements, complete MATH F200X.)
2. Complete the B.S. degree requirements. (See page 136. As part of the B.S. degree requirements, complete MATH F201X, PHYS F211X* and PHYS F212X*.)
3. Complete the following program (major) requirements:
 - a. Complete the following:
 - MATH F202X—Calculus III 4
 - PHYS F213X—Elementary Modern Physics* 4
 - PHYS F220—Introduction to Computational Physics* 4
 - PHYS F301—Introduction to Mathematical Physics* 4
 - PHYS F341—Classical Physics I: Particle Mechanics* 4
 - PHYS F342—Classical Physics II: Electricity and Magnetism* 4
 - b. Complete mathematics credits at the F200-level or above 9
 - c. Complete physics credits at the F300-level or above* 9
 - d. Complete credits in applied physics*** 17
4. Minimum credits required 120

Concentrations: Atmospheric Physics, Computational Physics, Technical Management

Atmospheric Physics

1. Complete the general university requirements. (See page 131. As part of the core curriculum requirements, complete: MATH F200X.)
2. Complete the B.S. degree requirements. (See page 136. As part of the B.S. degree requirements, complete: MATH F201X, PHYS F211X* and PHYS F212X*.)
3. Complete the following program (major) requirements:
 - a. Complete the following:
 - MATH F202X—Calculus III 4
 - PHYS F213X—Elementary Modern Physics* 4
 - PHYS F220—Introduction to Computational Physics* 4
 - PHYS F301—Introduction to Mathematical Physics* 4
 - PHYS F341—Classical Physics I: Particle Mechanics* 4
 - PHYS F342—Classical Physics II: Electricity and Magnetism* 4
 - b. Complete mathematics credits at the F200-level or above 9
 - c. Complete physics credits at the F300-level or above* ** 9
 - d. Complete the following: *
 - ATM F401—Introduction to Atmospheric Science 3
 - ATM F413—Atmospheric Radiation 3
 - ATM F445—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 131. As part of the core curriculum requirements, complete MATH F200X.)
2. Complete the B.S. degree requirements. (See page 136. As part of the B.S. degree requirements, complete MATH F201X, PHYS F211X* and PHYS F212X*.)
3. Complete the following program (major) requirements:
 - a. Complete the following:
 - MATH F202X—Calculus III 4
 - PHYS F213X—Elementary Modern Physics* 4
 - PHYS F220—Introduction to Computational Physics* 4
 - PHYS F301—Introduction to Mathematical Physics* 4
 - PHYS F341—Classical Physics I: Particle Mechanics* 4
 - PHYS F342—Classical Physics II: Electricity and Magnetism* 4
 - b. Complete mathematics credits at the F200-level or above 9
 - c. Complete credits in applied physics* ** 12
 - d. Complete the following in the concentration: *
 - MATH F310—Numerical Analysis 3
 - CS F201—Computer Science I 3
 - CS F202—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. (See page 131. As part of the core curriculum requirements, complete MATH F200X.)
2. Complete the B.S. degree requirements. (See page 136. As part of the B.S. degree requirements, complete MATH F201X, PHYS F211X* and PHYS F212X*.)
3. Complete the following program (major) requirements:
 - a. Complete the following:

MATH F202X—Calculus III	4
PHYS F213X—Elementary Modern Physics*	4
PHYS F220—Introduction to Computational Physics*	4
PHYS F301—Introduction to Mathematical Physics*	4
PHYS F341—Classical Physics I: Particle Mechanics*	4
PHYS F342—Classical Physics II: Electricity and Magnetism*	4
 - b. Complete mathematics credits at the F200-level or above, which can include courses needed for the M.B.A. program, including:

STAT F200X—Elementary Probability and Statistics or equivalent	9
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 - c. Complete physics credits at the F300-level or above*
 - 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 F261, F262—Accounting Concepts and Uses	6
BA F325—Financial Management***	3
BA F330—The Legal Environment of Business***	3
BA F343—Principles of Marketing***	3
BA F360—Operations Management***	3
BA F390—Organizational Theory and Behavior***	3

4. Minimum credits required 124

- * Students must earn a C grade (2.0) 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 F202X, STAT F200X, PHYS F220 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 F103X and F104X from core curriculum natural science requirement.

See General Science.

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

Baccalaureate Core Requirements

(Note: all courses for Core must be completed with C- or higher.)

COMMUNICATION (9)

Complete the following:

ENGL F111X(3) _____
ENGL F190H may be substituted.

Complete one of the following:

ENGL F211X OR ENGL F213X(3) _____

Complete one of the following:

COMM F131X OR COMM F141X(3) _____

PERSPECTIVES ON THE HUMAN CONDITION (18)

Complete all of the following four courses:

ANTH F100X/SOC F100X(3) _____
 ECON F100X OR PS F100X(3) _____
 HIST F100X(3) _____
 ENGL/FL F200X(3) _____

Complete one of the following three courses:

ART/MUS/THR F200X, HUM F201X OR ANS F202X (3) _____

Complete one of the following six courses:

BA F323X, COMM F300X, JUST F300X, NRM F303X,
 PS F300X OR PHIL F322X(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 F103X, MATH F107X, MATH F161X OR
 STAT F200X(3 – 4) _____
** No credit may be earned for more than one of MATH F107X or F161X.*

OR complete one of the following*:

MATH F200X, MATH F201X, MATH F202X,
 MATH F262X OR MATH F272X(4) _____
**Or any math course having one of these as a prerequisite.*

NATURAL SCIENCES (8)

Complete any two (4-credit) courses:

ATM F101X(4) _____
 BIOL F100X(4) _____
 BIOL F103X(4) _____
 BIOL F104X(4) _____
 BIOL F111X(4) _____
 BIOL F112X(4) _____
 BIOL F115X(4) _____
 BIOL F116X(4) _____
 CHEM F100X(4) _____
 CHEM F103X(4) _____
 CHEM F104X(4) _____
 CHEM F105X(4) _____
 CHEM F106X(4) _____
 GEOG F111X(4) _____
 GEOS F100X(4) _____
 GEOS F101X(4) _____
 GEOS F112X(4) _____
 GEOS F120X(4) _____
 GEOS F125X(4) _____
 MSL F111X(4) _____
 PHYS F102X(4) _____
 PHYS F103X(4) _____
 PHYS F104X(4) _____
 PHYS F115X(4) _____
 PHYS F116X(4) _____
 PHYS F175X(4) _____
 PHYS F211X(4) _____
 PHYS F212X(4) _____
 PHYS F213X(4) _____

LIBRARY AND INFORMATION RESEARCH (0 – 1)

Successful completion of library skills competency test OR
 LS F100X or F101X prior to junior standing.....(0 – 1) _____

UPPER-DIVISION WRITING AND ORAL COMMUNICATION (0)

Complete the following:

Two writing intensive courses designated (W)(0) _____
 and 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) _____

CORE CREDITS REQUIRED 38 – 39

Minimum credits required for degree 120