

# PHYSICS

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

## BS Degrees

Minimum Requirements for Degrees: 120 credits

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 in industry, government or the private sector that require refined abilities in problem-solving.

The **Physics** concentration represents the classical undergraduate physics curriculum while the **Applied Physics** concentration provides a solid foundation in general physics with the flexibility to include applied or interdisciplinary course work, aimed at e.g., engineering physics, biophysics, or oceanography.

The **Atmospheric Physics** concentration is a solid foundation at the interface of physics, climate sciences and meteorology. The **Computational Physics** concentration is relevant for students seeking careers in any areas that require expertise in computational modeling and simulation of physical systems.

The **Technical Management** concentration 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 MBA program in UAF's School of Management.

## Major — BS Degree

1. Complete the general university requirements. (See page 131. As part of the core curriculum requirements, complete MATH F200X)\*
2. Complete the BS degree requirements. (See page 136. As part of the BS degree requirement, complete MATH F201X, PHYS F211X, and PHYS F212X.)\*
3. Complete the following program (major) requirements:\*  
PHYS F211X—General Physics .....4  
PHYS F212X—General Physics .....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
4. Complete the following program (major) requirements:\*\*  
MATH F200X—Calculus I .....4  
MATH F201X—Calculus II .....4  
MATH F202X—Calculus III .....4
5. Complete one of the following concentrations:\*

### Physics

- a. Complete 6 credits of MATH electives at the F300-level or above. (MATH F314, MATH F421, or MATH F422 are recommended.)\* ...6
- b. Complete the following:\*  
PHYS F313—Thermodynamics and Statistical Physics .....4  
PHYS F343—Classical Physics III: Vibration and Waves .....4  
PHYS F381W,O—Physics Laboratory .....3  
PHYS F421—Quantum Mechanics .....4  
PHYS F462—Geometrical and Physical Optics .....4

- c. Complete 6 credits from the following:\*  
PHYS F471—Advanced Topics in Physics I  
PHYS F472—Advanced Topics in Physics II

### Applied Physics

- a. Complete 6 credits of MATH electives at the F300-level or above. (MATH F314, MATH F421, or MATH F422 are recommended.) .....6
- b. Complete 9 physics credits at the 300-level or above .....9
- c. Complete 17 credits from applied physics .....17  
*Note: The 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.*

### Atmospheric Physics

- a. Complete 9 physics credits at the 300-level or above.\* .....9
- b. Complete the following:\*  
ATM F401—Introduction to Atmospheric Science .....3  
ATM F413—Atmospheric Radiation .....3  
ATM F445—Atmospheric Dynamics .....3
- c. Complete 8 credits in other relevant upper-division courses.\* .....8  
*Note: The 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.*

### Computational Physics

- a. Complete 6 credits of MATH electives at the F300-level or above. (MATH F314, MATH F421, or MATH F422 are recommended.)\* ...6
- b. Complete credits in other relevant upper-division courses .....5  
*Note: The 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.*
- c. Complete the following:\*  
MATH F310—Numerical Analysis .....3  
CS F201—Computer Science I .....3  
CS F202—Computer Science II .....3
- d. Complete 12 credits in applied physics\* .....12  
*Note: The 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.*

### Technical Management

- a. Complete 6 credits of MATH electives at the F300-level or above. (MATH F314, MATH F421, or MATH F422 are recommended.)\* ...6
- b. Complete STAT F200X—Elementary Probability and Statistics .....3
- c. Complete 12 physics credits at the 300-level or above.\* .....12
- d. Complete the following:\*  
ACCT F261—Principles of Financial Accounting .....3  
ACCT F262—Principles of Managerial Accounting .....3
- e. Complete the following:  
(Students must take ACCT F26, MATH F202X, and PHYS F220 before taking these courses; or have permission of the MBA director. The School of Management agrees that such students will be allowed to register for these courses.)  
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
6. Minimum credits required .....120  
\* Students must earn a C- grade or better in each course.  
\*\* Satisfies core curriculum or BS degree requirements, but not both.  
\*\*\* Students can be required to earn a B grade or higher if applying for the MBA program.

*Note: Other courses suggested to fulfill minimum credit requirements: ES F201, F307 and F308.*

*Note: Must exclude PHYS F103X and PHYS F104X from core curriculum natural science requirement.*

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

1. Complete all the requirements of the BS degree.
2. All prospective physics teachers must complete the following:\*  
CHEM F105X and CHEM F106X—General Chemistry.....8  
PHYS F211X—General Physics .....4  
PHYS F212X—General Physics .....4  
PHYS F213X—Elementary Modern Physics.....4  
PHYS F220—Introduction to Computational Physics .....4  
PHYS F301—Introduction to Mathematical Physics.....  
MATH electives .....3
3. Complete 16 credits of physics-approved electives..... 16
4. All prospective science teachers must complete the following:\*  
PHIL F481—Philosophy of Science (3).....3

\* Students must earn a C- grade or better in each course.

*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. 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 F211X—General Physics .....4  
PHYS F212X—General Physics .....4  
PHYS F213X—Elementary Modern Physics.....4
2. Complete 8 credits of physics electives at the 300 – 400-level .....8
3. Minimum credits required .....20

\* Students must earn a C- grade or better in each course.

## Baccalaureate Core Requirements

### Communication . . . . . 9 Credits

- ENGL F111X—Introduction to Academic Writing.....(3)  
*ENGL F190H may be substituted.*

Complete one of the following:

- ENGL F211X—Academic Writing about Literature.....(3)
- ENGL F213X—Academic Writing about the Social and Natural Sciences.....(3)

Complete one of the following:

- COMM F131X—Fundamentals of Oral Communication: Group Context.....(3)
- COMM F141X—Fundamentals of Oral Communication: Public Context.....(3)

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### Perspectives on the Human Condition . . . . . 18 Credits

Complete all of the following four courses:

- ANTH F100X/SOC F100X—Individual, Society and Culture.....(3)
- ECON F100X or PS F100X—Political Economy.....(3)
- HIST F100X—Modern World History.....(3)
- ENGL/FL F200X—World Literature.....(3)

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Complete one of the following three courses:

- ART/MUS/THR F200X—Aesthetic Appreciation: Interrelationship of Art, Drama and Music.....(3)
- HUM F201X—Unity in the Arts.....(3)
- ANS F202X—Aesthetic Appreciation of Alaskan Native Performance.....(3)

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Complete one of the following six courses:

- BA F323X—Business Ethics.....(3)
- COMM F300X—Communicating Ethics.....(3)
- JUST F300X—Ethics and Justice.....(3)
- NRM F303X—Environmental Ethics and Actions.....(3)
- PS F300X—Ethics and Society.....(3)
- PHIL F322X—Ethics.....(3)

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Or complete 12 credits from the above courses plus one of the following:

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

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### Mathematics . . . . . 3 Credits

Complete one of the following:

- MATH F103X—Concepts and Contemporary Applications of Mathematics.....(3)
  - MATH F107X—Functions for Calculus\*.....(4)
  - MATH F161X—Algebra for Business and Economics\*\*.....(3)
  - STAT F200X—Elementary Probability and Statistics.....(3)
- \* No credit may be earned for more than one of MATH F107X or F161X.

Or complete one of the following:\*

- MATH F200X—Calculus I\*\*.....(4)
- MATH F201X—Calculus II.....(4)
- MATH F202X—Calculus III.....(4)
- MATH F262X—Calculus for Business and Economics.....(4)
- MATH F272X—Calculus for Life Sciences.....(4)

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

\*\* No credit may be earned for more than one of Math F200X, F262X or F272.

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### Natural Sciences . . . . . 8 Credits

Complete any two (4-credit) courses.

- ATM F101X—Weather and Climate of Alaska.....(4)
- BIOL F100X—Human Biology.....(4)
- BIOL F101X—Biology of Sex.....(4)
- BIOL F103X—Biology and Society.....(4)
- BIOL F104X—Natural History.....(4)
- BIOL F115X—Fundamentals of Biology I.....(4)
- BIOL F116X—Fundamentals of Biology II.....(4)
- BIOL F120X—Introduction to Human Nutrition.....(4)
- BIOL F213X—Human Anatomy and Physiology I.....(4)
- BIOL F214X—Human Anatomy and Physiology II.....(4)
- CHEM F100X—Chemistry in Complex Systems.....(4)
- CHEM F103X—Basic General Chemistry.....(4)
- CHEM F104X—Beginnings in Biochemistry.....(4)
- CHEM F105X—General Chemistry.....(4)
- CHEM F106X—General Chemistry.....(4)
- GEOG F111X—Earth and Environment: Elements of Physical Geography.....(4)
- GEOS F100X—Introduction to Earth Science.....(4)
- GEOS F101X—The Dynamic Earth.....(4)
- GEOS F106X—Life and the Age of Dinosaurs.....(4)
- GEOS F112X—History of Earth and Life.....(4)
- GEOS F120X—Glaciers, Earthquakes and Volcanoes.....(4)
- GEOS F125X—Humans, Earth and Environment.....(4)
- MSL F111X—The Oceans.....(4)
- PHYS F102X—Energy and Society.....(4)
- PHYS F103X—College Physics.....(4)
- PHYS F104X—College Physics.....(4)
- PHYS F115X—Physical Science I.....(4)
- PHYS F175X—Astronomy.....(4)
- PHYS F211X—General Physics.....(4)
- PHYS F212X—General Physics.....(4)
- PHYS F213X—Elementary Modern Physics.....(4)

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### Library and Information Research . . . . . 0 – 1 Credit

- Successful completion of library skills competency test or LS F100X or LS F101X prior to junior standing

0 – 1

### Upper-Division Writing and Oral Communication

Complete the following at the upper-division level:

- Two writing intensive courses designated (W) and one oral communication intensive course designated (O), or two oral communication intensive courses designated (O/2) (see degree and/or major requirements)

Total credits required 38 – 39

All degrees (e.g. B.A., B.S., etc.) require additional courses.

Refer to specific degree and program requirements.

Students must earn a C- grade or better in each course used toward the baccalaureate core.