

# PHYSICS

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

## MS, PhD Degrees

Minimum Requirements for Degrees: MS: 30 – 33 credits;  
PhD: 18 thesis credits

Advanced study at the graduate level is offered in various areas of physics and applied physics, including many of the research specialties found at the UAF's Geophysical Institute. Faculty and student research programs currently emphasize space physics, infrasonics, complex dynamics of nonlinear systems, ice physics and condensed matter physics.

The MS degree with computational physics concentration provides expertise in advanced computing environments, in the relevant mathematical foundations and in the specific physics discipline. It is directed toward students with undergraduate academic backgrounds in physics or other closely associated fields, such as engineering, that have the appropriate physics course work. This degree is relevant for students seeking careers in any areas that require expertise in computational modeling and simulation of physical systems.

The MS degree with space physics concentration focuses on the physics of upper atmospheres, ionospheres, magnetospheres and the interplanetary medium. It includes core physics courses and specialty courses in space physics, aeronomy, magnetospheric and auroral physics, and advanced plasma physics. The specialty courses support graduate research with faculty members at UAF's Geophysical Institute, and include areas such as numerical simulations and time-series analysis. Additional courses such as radiative transfer and physics of fluids provide added breadth.

### MS Degree

1. Complete the general university requirements (page 202).
2. Complete the master's degree requirements (page 206).
3. Complete four of the following:
  - PHYS F611—Mathematical Physics I ..... 3
  - PHYS F612—Mathematical Physics II ..... 3
  - PHYS F621—Classical Mechanics ..... 3
  - PHYS F622—Statistical Mechanics ..... 3
  - PHYS F631—Electromagnetic Theory..... 3
  - PHYS F632—Electromagnetic Theory ..... 3
  - PHYS F651—Quantum Mechanics..... 3
  - PHYS F652—Quantum Mechanics ..... 3
4. Complete the thesis or non-thesis requirements:
  - Thesis**
    - a. Complete the following:
      - PHYS F699—Thesis ..... 6 – 12
    - b. Complete 12 credits from the following:
      - Approved PHYS F600-level courses
      - Approved ATM F600-level courses
    - c. Minimum credits required ..... 30
  - Non-Thesis**
    - a. Complete the following:
      - PHYS F698—Non-thesis Research/Project ..... 3 – 6
      - Approved courses ..... 18
    - b. Minimum credits required\* ..... 33
- \* *At least 30 credits must be regular course work.*

### Computational Physics Concentration

1. Complete the general university requirements (page 202).
2. Complete the master's degree requirements (page 206).
3. Complete the following:
  - PHYS F611—Mathematical Physics I ..... 3
  - PHYS F612—Mathematical Physics II ..... 3
  - PHYS F629—Methods of Numerical Simulation in Fluids and Plasma..... 3
4. Complete at least 3 credits from the following:
  - Approved MATH F600-level courses (excluding MATH/PHYS F611 and F612) ..... 3
  - Approved CS F600-level courses..... 3
5. Complete the thesis or non-thesis requirements:
  - Thesis**
    - a. Complete the following:
      - PHYS F699—Thesis ..... 6 – 12
    - b. Complete approved PHYS F600-level courses ..... 6
    - c. Minimum credits required ..... 30
  - Non-Thesis**
    - a. Complete the following:
      - PHYS F698—Non-thesis Research/Project ..... 3 – 6
      - Approved PHYS F600-level courses ..... 9
    - b. Minimum credits required\* ..... 33
- \* *At least 30 credits must be regular course work.*

### Space Physics Concentration

1. Complete the general university requirements (page 202).
2. Complete the master's degree requirements (page 206).
3. Complete four of the following:
  - PHYS F626—Fundamentals of Plasma Physics ..... 3
  - PHYS F627—Advanced Plasma Physics..... 3
  - PHYS F629—Methods of Numerical Simulation in Fluids and Plasma..... 3
  - PHYS F672—Magnetospheric Physics ..... 3
  - PHYS F673—Space Physics..... 3
4. Complete the thesis or non-thesis requirements:
  - Thesis**
    - a. Complete the following:
      - PHYS F699—Thesis ..... 6 – 12
    - b. Complete approved PHYS F600-level courses ..... 12
    - c. Minimum credits required ..... 30
  - Non-Thesis**
    - a. Complete the following:
      - PHYS F698—Non-thesis Research/Project ..... 3 – 6
      - Approved PHYS F600-level courses ..... 18
    - b. Minimum credits required\* ..... 33
- \* *At least 30 credits must be regular course work.*

### PhD Degree

1. Complete the general university requirements (page 202).
2. Complete the PhD degree requirements\* (page 207).\*
3. Complete and pass a written and oral comprehensive examination.
4. Minimum credits required ..... 18
- \* *Complete in accordance with physics department's policies and procedures manual for graduate students.*