Space Physics and Astronomy

The Wiess School of Natural Sciences

Chair
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Professors
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Wendell Horton, Jr.
Carolyn Sumners
Jon C. Weisheit
J. David Winningham
David T. Young

Adjunct Associate Professors
James H. Newman
Tomasz F. Stepinski

Degrees Offered:
B.A. (in physics with space physics and astronomy option), M.S., Ph.D.

Although the department does not offer an undergraduate degree, students interested in studies of cosmic phenomena may complete the B.A. in physics with the space physics and astronomy option (see major in physics). The Department of Space Physics and Astronomy offers graduate study in research areas that include ground- and space-based observational astronomy, theoretical astrophysics and space plasma physics, earth systems science, and solar system physics. To earn an advanced degree, students must be knowledgeable in several of these areas and expert in at least one. Details on research programs and degree requirements are available from the department.

Degree Requirements for B.A. in Physics with Space Physics and Astronomy Option

For general university requirements, see Graduation Requirements (pages 17–19). Students majoring in physics who have elected the space physics and astronomy option must satisfy the following course requirements:

First year
MATH 101 Single Variable Calculus I
MATH 102 Single Variable Calculus II
PHYS 101/111 Mechanics
PHYS 102/112 Electricity and Magnetism
CHEM 121 General Chemistry
SPAC 100 Exploring the Cosmos
Second year
MATH 211 *Ordinary Differential Equations and Linear Algebra*
MATH 212 *Multivariable Calculus*
PHYS 201 *Waves and Optics*
PHYS 202 *Modern Physics*

PHYS 231 *Elementary Physics Lab II*
SPAC 230 *Astronomy Laboratory*
NSCI 230 *Computation in Natural Science*
(or CAAM 211 *Introduction to Engineering Computation*)

Third year
SPAC 350 *Introduction to Astrophysics—Stars*
SPAC 360 *Introduction to Astrophysics—Galaxies and Cosmology*

PHYS 301 *Intermediate Mechanics*
PHYS 302 *Intermediate Electrodynamics*
PHYS 425 *Statistical and Thermal Physics*
CAAM 336 *Differential Equations in Science and Engineering*

Fourth year
SPAC 400 *Research Seminar*

PHYS 311 *Introduction to Quantum Physics I*

Undergraduates also are urged to develop some proficiency in computer programming before their junior year.

**Degree Requirements for M.S. and Ph.D. in Space Physics and Astronomy**

For general university requirements, see Graduate Degrees (pages 72–73). A bachelor’s degree in physics or a closely related discipline is necessary for admission to the department. Program requirements are detailed in a booklet available from the department or from the World Wide Web at <http://spacsun.rice.edu>.

**M.S. Program.** Candidates for the M.S. degree must successfully:
- Demonstrate an understanding of physics and astronomy in an oral examination
- Complete at least 30 semester hours of approved advanced course work/research, and
- Prepare a written thesis on an original research topic and defend the thesis orally; or
- Prepare and submit a research paper as first author to a refereed journal, and defend the report orally.

**Ph.D. Program.** Doctoral candidates must show the capacity for independent, original research, and the doctoral thesis must be of a quality acceptable for publication in a reputable scientific journal.

Students normally are admitted to candidacy for the Ph.D. degree by satisfying the requirements for the M.S. degree in space physics and astronomy (see above). Students who already hold a recognized M.S. degree or who do not want to pursue a master’s degree should follow the procedures described in the department booklet. Candidates who hold a M.S. degree could complete requirements for the Ph.D. in two years; otherwise it takes at least four years of graduate study (the average completion time has been 5.1 years). Candidates for the Ph.D. degree must successfully:
- Complete at least 60 semester hours of approved advanced course work/research
- Prepare a thesis on an original research topic
- Defend the thesis orally

See SPAC (pages 497–501) in the Courses of Instruction section.