Astronomy/Planetary Sciences (AST)

Major and Minor in Astronomy/Planetary Sciences

Department of Physics and Astronomy, College of Arts and Sciences

CHAIRPERSON: Peter Koch  DIRECTOR OF UNDERGRADUATE STUDIES: Phil Allen  ASSISTANT TO THE CHAIR: Pam Burris

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Majors of particular interest to students majoring in Astronomy: Electrical Engineering (ESE), Electronic, Optical, and Magnetic Materials (EOM), Mathematics (MAT), Optics (OPT), Science and Engineering (LSE)

Faculty

Alan Calder, Assistant Professor, Ph.D., Vanderbilt University: Nuclear Astrophysics. Member, New York Center for Computational Physics.

Jin Koda, Assistant Professor, Ph.D., University of Tokyo: Extragalactic astronomy and atmospheric studies.

Kenneth M. Lanzetta, Professor, Ph.D., University of Pittsburgh: Observational cosmology.

James M. Lattimer, Professor, Ph.D., University of Texas at Austin: Nuclear and neutrino astrophysics.

Stanimir Metchev, Assistant Professor, Ph.D., California Institute of Technology: Astronomy of brown dwarfs and exosolar planets.

Deane M. Peterson, Associate Professor, Ph.D., Harvard University: Observational stellar astronomy.

Michal Simon, Professor Emeritus, Ph.D., Cornell University: Observational astronomy.

Anand Sivaramakrishnan, Adjunct Professor, Ph.D., University of Texas at Austin: Nuclear and neutrino astrophysics.

F. Douglas Swesty, Research Associate Professor, Ph.D., Stony Brook University: Computational nuclear astrophysics.

Frederick M. Walter, Professor, Ph.D., University of California, Berkeley: Observational stellar astronomy.

Michael Zingale, Assistant Professor, Ph.D., University of Chicago: Computational and nuclear astrophysics.

Teaching Assistants

Estimated number: 4

Astronomy is the scientific discipline dedicated to the study of everything in the universe outside the Earth's atmosphere. The undergraduate major leading to the Bachelor of Science degree in astronomy/planetary sciences prepare a student for graduate and professional work. Graduates with a degree in astronomy teach in secondary schools, work in academic, government, and industrial laboratories, and teach and conduct research at colleges and universities.

Course requirements for the B.S. program are listed below and are summarized in the accompanying chart. When the student declares the Astronomy major, the director of undergraduate studies assigns a faculty advisor to the student. This advisor assists the student in the selection of courses. Students should consult frequently with their faculty advisors regarding their progress and regarding appropriate science courses. Because the position of the scientist in society is responsible and complex, the student is cautioned to pay careful attention to general education in the arts, humanities, and social sciences.

Courses in Astronomy

See the Course Descriptions listing in this Bulletin for complete information.

AST 100 Astronomy Today
AST 101-E Introduction to Astronomy
AST 105-E Introduction to the Solar System
AST 112 Astronomy Laboratory
AST 200 Current Astronomical Research at Stony Brook
AST 203-E Astronomy
AST 205 Introduction to Planetary Sciences
AST 248-H The Search for Life in the Universe
AST 277 Computation for Physics and Astronomy Majors
AST 287 Introductory Research in Astronomy
AST 301-H Collisions in the Solar System
AST 304 The Universe
AST 341 Stars and Radiation
AST 345 Undergraduate Research in Astronomy
AST 346 Galaxies
AST 347 Cosmology
AST 389-H Science Fiction

AST 443 Observational Techniques in Optical Astronomy
AST 447 Senior Tutorial in Astronomy
AST 475 Teaching Practicum in Astronomy
AST 487 Senior Research in Astronomy

Requirements for the Major in Astronomy/Planetary Sciences (AST)

The major in Astronomy leads to the Bachelor of Science degree. Up to three astronomy or physics courses passed with a C- may be applied to the major; all other courses offered for the major must be passed with a letter grade of C or higher.

Completion of the major requires 63 to 66 credits.

A. Required Departmental Courses:

1. AST 203 Astronomy
2. At least six credits from additional AST courses numbered 203 or higher (except AST 248, 277, 301, 394, 389, and 475). Up to three credits of AST 287, 447, and 487 may be used toward this requirement.

B. Required Physics Courses:

1. PHY 131/133, 132/134 Classical Physics I, II and labs (See Note 1)
2. PHY 251/252 Modern Physics with Laboratory
3. PHY 300 Waves and Optics
4. PHY 306 Thermodynamics, Kinetic Theory, and Statistical Mechanics
5. At least 8 credits from a list of advanced physics-related courses (the current list can be found in the Physics and Astronomy Office).

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C. Mathematics Requirements:
1. MAT 131, 132 Calculus I, II  
   (See Note 2 below)
2. One of the following:  
   MAT 203 Calculus III with Applications  
   MAT 205 Calculus III  
   AMS 261 Applied Calculus III
3. One of the following:  
   MAT 303 Calculus IV with Applications  
   MAT 305 Calculus IV  
   AMS 361 Applied Calculus IV: Differential Equations

D. Upper-Division Writing Requirement:  
All students majoring in Astronomy/Planetary Sciences must submit two papers (term papers or independent research papers) to the Astronomy coordinator for Department evaluation by the end of the junior year. If this evaluation is satisfactory, the student will have fulfilled the upper-division writing requirement.

Notes:
1. The following physics courses are alternatives to PHY 131/133, 132/134: PHY 125, 126, 127 or 141, 142.
2. The following alternate beginning calculus sequences may be substituted for MAT 131, 132 in major requirements or prerequisites: 125, 126, 127 or 141, 142 or 171. Equivalency for MAT courses achieved by earning the appropriate score on the Mathematics Placement Examination will be accepted as fulfillment of the requirement without the necessity of substituting other credits. For detailed information about the various calculus sequences, see the alphabetical listing for Mathematics, especially “Beginning Mathematics Courses,” and the course descriptions.

Honors Program in Astronomy/Planetary Sciences  
Students in the Astronomy/Planetary Sciences major who have maintained a cumulative grade point average of 3.30 through the junior year in courses required for the major may apply to the Department to become candidates for Departmental honors in astronomy/planetary sciences. Candidates for honors in astronomy/planetary sciences must include a sequence of mathematics, physics, or engineering courses approved by the student’s advisor following petition by the student.

2. AST 205 Introduction to Planetary Sciences
3. Three additional AST courses at the 300 level or higher. No more than one of these may come from AST 301, 304, or 389.
4. PHY 125 Classical Physics A  
or PHY 131/133 Classical Physics I  
or PHY 141 Classical Physics I: Honors
5. MAT 125 Calculus A  
or MAT 131 Calculus I  
or MAT 141 Honors Calculus I  
or MAT 171 Accelerated Single Variable Calculus  
or AMS 151 Applied Calculus I

In addition to the academic program, the student must complete an honors thesis while enrolled in AST 447 or 487. The thesis is evaluated by a committee composed of the student’s advisor and two other science faculty members including one from outside of the Department. If the honors program is completed with distinction and the student has maintained a minimum 3.30 grade point average in all coursework in natural sciences and mathematics, honors are conferred.

Requirements for the Minor in Astronomy (AST)  
All courses offered for the minor must be passed with a letter grade of C or higher. Completion of the minor requires 23 to 24 credits.
1. AST 203 Astronomy