

Astronomy/Planetary Sciences (AST)

Major and Minor in

Astronomy/Planetary Sciences

Department of Physics and Astronomy, College of Arts and Sciences

ACTING CHAIRPERSON: Paul Grannis DIRECTOR OF UNDERGRADUATE STUDIES: Chris Jacobsen ASTRONOMY COORDINATOR: James Lattimer

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Minors 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

Aaron Evans, *Assistant Professor, Ph.D., University of Hawaii*: Observational extragalactic astronomy.

Miriam Forman, *Adjunct Professor, Ph.D., Stony Brook University*: Cosmic rays.

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

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

Jack J. Lissauer, *Adjunct Professor, Ph.D., University of California, Berkeley*: Planetary science.

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

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

Philip M. Solomon, *Professor, Ph.D., University of Wisconsin*: Galactic and extragalactic astronomy.

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

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

Ralph A.M.J. Wijers, *Adjunct Professor, Ph.D., University of Amsterdam*: Highenergy astrophysics.

Amos Yahil, *Professor, Ph.D., California Institute of Technology*: Astronomy.

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 prepares 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 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)

[Changes in red are effective Fall 2005]

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 **63-66 credits**.

A. Required Departmental Courses:

1. AST 203 Astronomy
 - AST 341 Stars and Radiation
 - AST 346 Galaxies
 - AST 347 Cosmology
 - AST/PHY 277 Computation for Physics and Astronomy**
2. At least six credits from additional AST courses numbered 203 or higher (except AST 248, 277, 301, and 304). 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). At least 1 credit must be from AST 277 or a course in the area of applied numerical analysis.

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, laboratory reports, 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. 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

Sample Course Sequence for the Major in Astronomy/Planetary Sciences

Freshman Fall		Credits	
D.E.C. A		3	
AST 100		1	
PHY 131/133 or 141		4	
MAT 131 or 141		4	
D.E.C.		3	
Total		15	

Spring		Credits	
D.E.C. A		3	
PHY 132/134 or 142		4	
MAT 132 or 142		4	
MEC 111		3	
D.E.C.		3	
Total		17	

Sophomore Fall		Credits	
PHY 251/252		4	
MAT 205 or AMS 261		3	
AST 205 or D.E.C.		3	
AST/PHY 277		3	
D.E.C.		3	
Total		16	

Spring		Credits	
PHY 306		3	
MAT 305 or AMS 361		3	
AST 200		1	
AST 203		4	
D.E.C.		3	
Total		14	

Junior Fall		Credits	
AST 341 or 443*		3-4	
MAT elective		3	
PHY 301		3	
PHY 303		3	
D.E.C. or AST 205		3	
Total		15-16	

Spring		Credits	
AST 347 or 346*		3	
PHY 308		3	
D.E.C.		3	
D.E.C.		3	
Upper-Division elective		3	
Total		15	

Senior Fall		Credits	
AST 443 or 341*		4-3	
D.E.C.		3	
D.E.C.		3	
Elective		3	
Upper-Division elective		3	
Total		16-15	

Spring		Credits	
AST 346 or 347*		3	
D.E.C.		3	
D.E.C.		3	
Upper-Division elective		3	
Elective		3	
Total		15	

*AST 341 and 443 are offered in alternate fall semesters.
AST 346 and 347 are offered in alternate spring semesters.

student's advisor following petition by the student.

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
2. AST 205 Introduction to Planetary Sciences
3. Three additional AST courses at the 300 level or higher
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 AMS 151 Applied Calculus I