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### ASTR 311 Elements of Astrophysics French

Astrophysics is the application of physics to the study of the universe. We will use elements of mechanics, thermodynamics, electromagnetism, quantum mechanics, special relativity, and nuclear physics to investigate selected topics such as planets, the life stories of stars and galaxies, dark matter, and the origin of the universe. Our goals will be to develop insight into the physical underpinnings of the natural world, and to develop a 'universal toolkit' of practical astrophysical techniques that can be applied to the entire celestial menagerie. These tools include scaling analysis, numerical solutions to complex problems, and other research approaches advanced in professional literature. Normally offered in alternate years.

Prerequisite: PHYS 202 and 203  
Distribution: Mathematical Modeling or Natural and Physical Science  
Semester: Spring Unit: 1.0

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### ASTR 315 Seminar. Topics in Astrophysics

NOT OFFERED IN 2007-08. OFFERED IN 2008-09. Topic for 2008-09: TBA  
Normally offered in alternate years.

Prerequisite: PHYS 202 and 203 (or permission of the instructor for students who are taking this as a corequisite with PHYS 202).  
Distribution: Mathematical Modeling or Natural and Physical Science  
Semester: N/O. Offered in 2008-09. Unit: 1.0

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### ASTR 350 Research or Individual Study

Prerequisite: By permission of department.  
Distribution: None  
Semester: Fall, Spring Unit: 1.0

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### ASTR 360 Senior Thesis Research

Prerequisite: By permission of department. See Academic Distinctions.  
Distribution: None  
Semester: Fall, Spring Unit: 1.0

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### ASTR 370 Senior Thesis

Prerequisite: 360 and permission of department.  
Distribution: None  
Semester: Fall, Spring Unit: 1.0

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## Related Courses

For Credit Toward the Major

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PHYS 216 Mathematics for the Sciences II

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PHYS 202 Introduction to Quantum Mechanics and Thermodynamics with Laboratory

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PHYS 203 Vibrations, Waves, and Special Relativity with Laboratory

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## Directions for Election

The Astronomy Major consists of ten courses. Required courses include ASTR 101 or 110; ASTR 206; ASTR 301; PHYS 107; and either PHYS 106 or 108. The other five courses include one additional ASTR course at the 300-level; two in ASTR at the 200-level or above; one in MATH at the 200-level; and an additional course in ASTR or a related field. Students should consult with faculty about choosing electives and research opportunities appropriate for their fields of study. For example, students interested in earth science should elect ASTR 203 (Planetary Geology) and add courses in geosciences and chemistry. Students working towards teacher certification would add courses in other sciences and in Education, and might coordinate their fieldwork with ASTR 350, while those planning to enter the technical workforce might elect additional courses in computer science. Students planning to pursue graduate study in astronomy should instead elect an interdepartmental major in Astrophysics.

A minor in astronomy (five units) consists of: 101 or 110, 301, and three additional units in astronomy.

### Honors

To earn honors in the major, students must have a grade point average of at least 3.5 in all work in the major field above the 100-level; the department may petition on her behalf if her GPA in the major is between 3.0 and 3.5. The student must complete a significant research project culminating in a paper and an oral examination. The research component might be satisfied by a thesis, a summer internship, or a 350 project. See Academic Distinctions.

See description of Whittin Observatory and its equipment.

## Astrophysics

AN INTERDEPARTMENTAL MAJOR

Director: French (Astronomy)

Advisory Committee: Bauer<sup>A</sup> (Astronomy), French (Astronomy), McLeod (Astronomy), Stark (Physics)

The Departments of Astronomy and Physics offer an interdepartmental major in astrophysics, which combines the physics major with a foundation of course work in astronomy. This major should be considered by students interested in graduate study in astronomy or astrophysics, and by those who would like a coordinated astronomy extension to the physics major.

In addition to the nine courses required for the physics major, the student takes four astronomy courses. An astrophysics major consists of: PHYS 107, 108, 202, 203, 302, 305, 306, 314; and MATH 216/PHYS 216 as well as ASTR 101wL or 110wL, 206wL, 311, and either 315 or a 350 in either astronomy or astrophysics, or ASPH 370. PHYS 219 is strongly recommended. In planning the major, students should note that some of the courses have prerequisites in mathematics.

### Honors

To earn honors in Astrophysics, students must have a minimum grade point average of at least 3.5 in all work in the major field above the 100 level; the Advisory Committee may petition on her behalf if her GPA in the major is between 3.0 and 3.5. The student must complete a significant research project culminating in a paper and an oral examination. The research component might be satisfied by a thesis, a summer internship, or a 350 project. Honors projects conducted during the summer after the junior year, or during the senior academic year, are subject to the approval of the Astrophysics Advisory Committee. See Academic Distinctions.

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### ASPH 350 Research or Individual Study

Prerequisite: Open by permission to juniors and seniors.  
Distribution: None  
Semester: Fall, Spring Unit: 1.0

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### ASPH 360 Senior Thesis Research

Prerequisite: By permission of director. See Academic Distinctions.  
Distribution: None  
Semester: Fall, Spring Unit: 1.0

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### ASPH 370 Senior Thesis

Prerequisite: 360 and permission of department.  
Distribution: None  
Semester: Fall, Spring Unit: 1.0

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