

## Astrophysics Major Requirements

Catalog Year: 2015-16

Degree: Bachelor of Science

Credit Hours: 58+

"PR" indicates a pre-requisite. "CO" indicates a co-requisite.

Courses within this major may also satisfy general education requirements. Please consult <http://registrar.cofc.edu/general-edu> for more information.

### Required Courses

- PHYS 111 General Physics I (3) PR or CO: MATH 120 or equivalent or instructor permission; CO: PHYS 111L
  - PHYS 111L General Physics I Lab (1) CO: PHYS 111
  
  - PHYS 112\* General Physics II (3) PR: PHYS 111 or HONS 157; CO or PR: MATH 220 or equivalent or instructor permission; CO: PHYS 112L
  - PHYS 112L General Physics II Lab (1) CO: PHYS 112
  
  - PHYS 230 Introduction to Modern Physics I (3) PR: PHYS 112 or HONS 158; CO or PR: MATH 221 or instructor permission
  - PHYS 301 Classical Mechanics (3) PR: PHYS 112 or HONS 158 and MATH 323 or PHYS 272 or permission of instructor
  - PHYS 403 Introductory Quantum Mechanics (3) PR: PHYS 230 and MATH 323 or PHYS 272, or instructor permission
  - PHYS 405 Thermal Physics (3) PR: PHYS 230 and MATH 323 or PHYS 272, or instructor permission
  - PHYS 409 Electricity and Magnetism (3) PR PHYS 112 or HONS 158 and MATH 323 or PHYS 272 or permission of instructor
  - PHYS 419 Research Seminar (1) PR or CO: PHYS 370 or ASTR 377 or instructor and department chair permission
  - PHYS 420\*\* Senior Research (3) PR: PHYS 419 and instructor and department chair permission
- OR**
- PHYS 499\*\*\* Bachelor's Essay (6) PR: PHYS 419 or department chair permission; credit will not be awarded for both PHYS 420 and PHYS 499
  - ASTR 231 Introduction to Astrophysics (3) PR: PHYS 112 or HONS 158
  - ASTR 377 Experimental Astronomy (4) PR: ASTR 231

**Note:** \* Upon completion of PHYS 101 with a grade of B or better and successful completion of MATH 120, a student may transfer to PHYS 112. \*\*Credit will not be awarded for both PHYS 420 and PHYS 499. \*\*\*With department approval, PHYS 499 may be substituted for PHYS 420.

### Complete 9 additional credit hours. At least 6 credit hours must be selected from:

- \_\_\_\_\_  \_\_\_\_\_
- ASTR 306 Planetary Astronomy (3) PR: ASTR 231
- ASTR 311 Stellar Astronomy and Astrophysics (3) PR: ASTR 231 and MATH 221
- ASTR 312 Galactic/Extragalactic Astronomy (3) PR: ASTR 231 and MATH 221
- ASTR 413 Astrophysics (3) PR: PHYS 301 and MATH 323 or instructor permission
- PHYS 412 Special Topics (Astronomy topic required) (3) PR: Instructor permission

### Select 3 additional credit hours from the following:

- \_\_\_\_\_
- ASTR 306\* Planetary Astronomy (3) PR: ASTR 231
- ASTR 311\* Stellar Astronomy and Astrophysics (3) PR: ASTR 231 and MATH 221
- ASTR 312\* Galactic/Extragalactic Astronomy (3) PR: ASTR 231 and MATH 221

ASTR 410	Black Holes: Advanced Topics (1) <i>PR: PHYS 112 or instructor permission; CO: ASTR 210</i>
ASTR 413*	Astrophysics (3) <i>PR: PHYS 301 and MATH 323 or instructor permission</i>
ASTR 460L	NASA Space Mission Design Leadership Lab (1) <i>PR: Instructor permission; CO: ASTR 260</i>
PHYS 390	Research (astronomy topic required) (1-3; repeatable up to 6 credit hours) <i>PR: Instructor and department chair permission</i>
PHYS 394	Digital Signal and Image Processing with Biomedical Applications (3) <i>PR: PHYS 112 and 112L or HONS 158 and 158L; CO: PHYS 394L</i>
PHYS 394L	Digital Signal and Image Processing with Biomedical Applications Laboratory (1) <i>PR: PHYS 112 and 112L or HONS 158 and 158L; CO: PHYS 394</i>
PHYS 404	Introductory Quantum Mechanics II (3) <i>PR: Instructor permission</i>
PHYS 407	Introduction to Nuclear Physics (3) <i>PR: PHYS 230 or instructor permission</i>
PHYS 410	Electricity and Magnetism (3) <i>PR: PHYS 409</i>
PHYS 412*	Special Topics (Astronomy topic required) (3) <i>PR: Instructor permission</i>
PHYS 415	Fluid Mechanics (3) <i>PR: MATH 323 and PHYS 301 or instructor permission</i>

*Note: \*When not used to fulfill the above requirements.*

### **Math Requirement**

- MATH 120    Introductory Calculus (4) *PR: Placement or C- or better in MATH 111*
- MATH 220    Calculus II (4) *PR: MATH 120 or HONS 115*
- MATH 221    Calculus III (4) *PR: MATH 220*
- MATH 323    Differential Equations (3) *PR: MATH 221 and either MATH 203 or instructor permission*

### **Notes:**

- Computer Programming I (CSCI 220 and 220L) is strongly recommended.
- With department approval, completion with grades of at least "B" in PHYS 101/101L and PHYS 102/102L, together with MATH 120 and MATH 220 may be substituted for PHYS 111/111L and PHYS 112/112L.
- Except for the substitution of ASTR 377 for PHYS 370, this program comes within 3 credit hours of fulfilling the requirements for the B.S. in Physics. If the student takes ASTR 377 and PHYS 370 plus 3 additional credit hours of 300- or 400-level PHYS or ASTR, then they have a double major in Physics and Astronomy.
- Suggested programs of study leading to graduate school in physics, astronomy, astrophysics, meteorology and engineering are available from the department.