Astrophysics Major Requirements
Catalog Year: 2014-15
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**

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

**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) PR: PHYS 112 or instructor permission; CO: ASTR 210

ASTR 413*  Astrophysics (3) PR: PHYS 301 and MATH 323 or instructor permission

ASTR 460L  NASA Space Mission Design Leadership Lab (1) PR: Instructor permission; CO: ASTR 260

PHYS 390  Research (astronomy topic required) (1-3; repeatable up to 6 credit hours) PR: Instructor and department chair permission

PHYS 394  Digital Signal and Image Processing with Biomedical Applications (3) PR: PHYS 112 and 112L or HONS 158 and 158L; CO: PHYS 394L

PHYS 394L  Digital Signal and Image Processing with Biomedical Applications Laboratory (1) PR: PHYS 112 and 112L or HONS 158 and 158L; CO: PHYS 394

PHYS 404  Introductory Quantum Mechanics II (3) PR: Instructor permission

PHYS 407  Introduction to Nuclear Physics (3) PR: PHYS 230 or instructor permission

PHYS 410  Electricity and Magnetism (3) PR: PHYS 409

PHYS 412*  Special Topics (Astronomy topic required) (3) PR: Instructor permission

PHYS 415  Fluid Mechanics (3) PR: MATH 323 and PHYS 301 or instructor permission

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.