Physics Major with Concentration in Energy Production Requirements
Catalog Year: 2014-15
Degree: Bachelor of Science
Physics Major Credit Hours: 76+

“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 211 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 370  Experimental Physics (4) PR: PHYS 230 or instructor permission
☐ PHYS 403  Introductory Quantum Mechanics (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 (1-6) PR: PHYS 419 or department chair permission. Credit will not be awarded for both PHYS 420 and PHYS 499

Notes: * 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.

☐ Select 15 credit hours from the following electives with department approval. Please note a maximum of 6 credit hours are allowed from PHYS 381, 390 and 399.

ASTR 306  Planetary Astronomy (3) PR: ASTR 231
ASTR 311  Stellar Astronomy and Astrophysics (3) PR: ASTR 231 and MATH 221
ASTR 312  Galactic and Extragalactic Astronomy (3) PR: ASTR 231 and MATH 221
ASTR 377  Experimental Astronomy (4) PR: ASTR 231
ASTR 410  Black Holes: Advanced Topics (1) PR: PHYS 112, PHYS 112L or instructor permission; PR or 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; PR or CO: ASTR 260
PHYS 296  Biophysics Model and Excitable Cells (3) PR: (BIOL 111 or HONS 152 or PHYS 112 or HONS 158) OR (BIOL 211 and BIOL 305 and PHYS 102) or instructor permission
PHYS 302  Classical Mechanics (3) PR: PHYS 301
PHYS 308  Atmospheric Physics (3) PR: PHYS 112, PHYS 112L or HONS 158 or instructor permission

PHYS 320  Intro to Electronics (4) PR: PHYS 102 and MATH 120 or PHYS 112 or HONS 158 or instructor permission

PHYS 331  Intro to Modern Physics II (3) PR: PHYS 230

PHYS 340  Photonics (4) PR: PHYS 112, PHYS 112L or HONS 158

PHYS 350  Energy Production (4) PR: CHEM 111, CHEM 111L; (PHYS 112, 112L or HONS 158) or (PHYS 102, 102L and MATH 120)

PHYS 381  Internship (1-4) PR: Declared PHYS major, PHYS 370, and coordinator permission

PHYS 390  Research (1-3; repeatable up to 6) PR: Department chair and instructor 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 397  Research Experience Physics and Astronomy (0) PR: Only declared majors can take a Zero Credit Research course. Instructor and department chair permission required.

PHYS 399  Tutorial (3, repeatable up to 12) PR: Junior standing and department chair and instructor permission

PHYS 405  Thermal Physics (3) PR: PHYS 230 and MATH 323 or PHYS 272, or instructor permission

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

PHYS 408  Introduction to Solid State Physics (3) PR: PHYS 230 and MATH 323 or PHYS 272, or instructor permission

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

PHYS 412  Special Topics (1-3) PR: Instructor permission

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

PHYS 456  Air Pollution Meteorology (4) PR: PHYS 112, PHYS 112L or (PHYS 102, PHYS 102L and MATH 120) or HONS 158; CHEM 112, CHEM 112L or instructor permission

PHYS 457  Satellite Meteorology (3) PR: PHYS 308 or PHYS 456 or (PHYS 105 and PHYS 112, PHYS 112L) or (PHYS 105 and PHYS 102, PHYS 102L and MATH 120) or (PHYS 105 and HONS 158)

PHYS 458  Climate Change (4) PR: PHYS 112, PHYS 112L or HONS 158

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

Mathematics 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 or equivalent
- [ ] MATH 323 Differential Equations (3) PR: MATH 221 and MATH 203 or equivalent or permission of instructor

Optional: Students may also select a concentration in Computational Neuroscience, Energy Production or Meteorology.
Energy Production Concentration (Credit Hours: 18+)

Required Courses

☐ CHEM 111  Principles of Chemistry (3) PR or CO: MATH 111 or equivalent; CO: CHEM 111L
☐ CHEM 111L  Principles of Chemistry Lab (1) CO: CHEM 111

☐ PHYS 350  Energy Production (4) PR: CHEM 111, CHEM 111L; (PHYS112, 112L or HONS 158) or (PHYS 102, 102L and MATH 120)
☐ PHYS 350L  Energy Production Lab (0) PR: CHEM 111, CHEM 111L; (PHYS112, 112L or HONS 158) or (PHYS 102, 102L and MATH 120); CO: PHYS 350

☐ Complete 10 credit hours from the following PHYS electives groups including at least two courses totaling a minimum of 6 credit hours from Group I.

Group I

PHYS 320  Intro to Electronics (4) PR: PHYS 102, PHYS 102L or PHYS 112, PHYS 112L or HONS 158
PHYS 340  Photonics (4) PR: PHYS 112, PHYS 112L or HONS 158
PHYS 405  Thermal Physics (3) PR: PHYS 230
PHYS 407  Introduction to Nuclear Physics (3) PR: PHYS 230 or instructor permission
PHYS 408  Introduction to Solid State Physics (3) PR: PHYS 230 or instructor permission

Group II

CHEM 341  Physical Chemistry I (3) PR: CHEM 221 and MATH 220; CO: CHEM 341L (MATH 221 is strongly recommended.)
CHEM 341L  Physical Chemistry I Laboratory (1) CO: CHEM 341
CHEM 528  Nuclear and Radiochemistry (3) PR: CHEM 221 or CHEM 231
GEOL 320  Earth Resources (3) PR: GEOL 101, GEOL 101L or GEOL 103, GEOL 103L; GEOL 105, GEOL 105L or HONS 155 and 156 or instructor permission
PHYS 308  Atmospheric Physics (3) PR: PHYS 112, PHYS 112L or HONS 158 or instructor permission
PHYS 381  Internship (1-4) PR: Declared PHYS major, PHYS 370, and coordinator permission
PHYS 390  Research (1-3; repeatable up to 6) PR: Department chair and instructor permission
PHYS 409  Electricity and Magnetism (3) PR: PHYS 112, PHYS 112L or HONS 158 and MATH 323 or instructor permission
PHYS 412  Special Topics (Energy Related) (1-3) PR: Instructor permission
PHYS 415  Fluid Mechanics (3) PR: MATH 323 and PHYS 301 or instructor permission
PHYS 456  Air Pollution Meteorology (4) PR: PHYS 112, PHYS 112L or (PHYS 102, PHYS 102L and MATH 120) or HONS 158; CHEM 112, CHEM 112L or instructor permission
PHYS 457  Satellite Meteorology (3) PR: PHYS 308 or PHYS 456 or (PHYS 105 and PHYS 112, PHYS 112L) or (PHYS 105 and PHYS 102, PHYS 102L and MATH 120) or (PHYS 105 and HONS 158)

PHYS 458  Climate Change (4) PR: PHYS 112, PHYS 112L or HONS 158

Notes:

- 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.

- Suggested programs of study leading to graduate school in physics, astronomy, astrophysics, meteorology and engineering are available from the department.