PHYSICS MAJOR, B.A.

Everything around you is influenced or governed by physics — the study of matter, energy, and their interactions with one another. Physics seeks to understand the way the universe "works," from the smallest neutrinos to the structure of the cosmos. It is the foundation of all other natural sciences, including chemistry, biology, oceanography, geography, and radiography.

The Department of Physics and Astronomy offers six B.A. and two B.S. degree tracks:

• B.A. Tracks
  • Physics
  • Astronomy
  • Computational Physics
  • Energy
  • Medical and Biological Physics
  • Quantitative Finance

• B.S. Tracks
  • Physics
  • Astrophysics

Consider a B.A. degree if you’re interested in physics but want to apply your training toward a wider variety of career paths after graduation. Students who completed this program have launched careers as lab researchers, application engineers, data scientists, and financial analysts, among other occupations. Some have also pursued an advanced degree in physics, medical physics, business, law, or computer science.

Consider a B.S. degree if you intend to pursue graduate study in physics, astronomy, or a related field, or a career practicing physics.

Student Learning Outcomes

Upon completion of the physics program, students should be able to:

• Demonstrate knowledge of major concepts, theoretical reasoning, and empirical findings in physics and/or astronomy — Knowledge Base in Physics
• Apply knowledge of physics and mathematics to solve problems — Critical Thinking and Problem Solving
• Effectively conduct research under guidance of faculty member — Research and the Advancement of Physics and Astronomy
• Gain entry to top graduate programs, employment as physicists in industry, teaching positions in high school physics and astronomy, or apply their skills in other rewarding careers — Preparation for Future Career

Requirements

In addition to the program requirements, students must:

• earn a minimum final cumulative GPA of 2.000
• complete a minimum of 45 academic credit hours earned from UNC-Chapel Hill courses
• take at least half of their major core requirements (courses and credit hours) at UNC-Chapel Hill

• earn a minimum cumulative GPA of 2.000 in the major core requirements. Some programs may require higher standards for major or specific courses.

For more information, please consult the degree requirements section of the catalog (http://catalog.unc.edu/undergraduate/degree-requirements/).

Physics Major, B.A. – Standard Option

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 118</td>
<td>Introductory Calculus-based Mechanics and Relativity [^{H,F}]</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 119</td>
<td>Introductory Calculus-based Electromagnetism and Quanta [^{H,F}]</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 281L</td>
<td>Experimental Techniques in Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 331</td>
<td>Numerical Techniques for the Sciences I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 201</td>
<td>Basic Mechanics [^{2}]</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>or PHYS 401 Mechanics I</td>
<td></td>
</tr>
<tr>
<td>PHYS 211</td>
<td>Intermediate Electromagnetism [^{1}]</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>or PHYS 311 Electromagnetism I</td>
<td></td>
</tr>
<tr>
<td>PHYS 421</td>
<td>Introduction to Quantum Mechanics [^{2}]</td>
<td>3</td>
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</table>

Nine additional credits chosen from ASTR (numbered above 300) and PHYS (numbered above 200)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
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<tbody>
<tr>
<td>MATH 231</td>
<td>Calculus of Functions of One Variable I [^{H,F}]</td>
<td>4</td>
</tr>
<tr>
<td>MATH 232</td>
<td>Calculus of Functions of One Variable II [^{H,F}]</td>
<td>4</td>
</tr>
<tr>
<td>MATH 233</td>
<td>Calculus of Functions of Several Variables [^{H,F}]</td>
<td>4</td>
</tr>
<tr>
<td>MATH 383</td>
<td>First Course in Differential Equations [^{H}]</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 101 &amp; 101L</td>
<td>General Descriptive Chemistry I [^{H,F}] &amp; Quantitative Chemistry Laboratory I [^{H,F}]</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Hours 52

\[^{H}\] Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.

\[^{F}\] FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.

\[^{1}\] Fall course.
\[^{2}\] Spring course.

Astronomy (ASTR) and Physics (PHYS) course descriptions (http://catalog.unc.edu/undergraduate/departments/physics-astronomy/#coursestext).

Physics Major, B.A. – Astronomy Option

<table>
<thead>
<tr>
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<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 118</td>
<td>Introductory Calculus-based Mechanics and Relativity [^{H,F}]</td>
<td>4</td>
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</table>
## Physics Major, B.A. – Computational Physics Option

<table>
<thead>
<tr>
<th>Code</th>
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<th>Hours</th>
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<tbody>
<tr>
<td>PHYS 118</td>
<td>Introductory Calculus-based Mechanics and Relativity (^H,^F)</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 119</td>
<td>Introductory Calculus-based Electromagnetism and Quanta (^H,^F)</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 281L</td>
<td>Experimental Techniques in Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 331</td>
<td>Numerical Techniques for the Sciences I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 201</td>
<td>Basic Mechanics (^2)</td>
<td>3</td>
</tr>
<tr>
<td>or PHYS 401</td>
<td>Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 211</td>
<td>Intermediate Electromagnetism (^1)</td>
<td>3</td>
</tr>
<tr>
<td>or PHYS 311</td>
<td>Electromagnetism I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 421</td>
<td>Introduction to Quantum Mechanics (^2)</td>
<td>3</td>
</tr>
<tr>
<td>Six additional credits chosen from ASTR (numbered above 300)</td>
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<tr>
<td>Three additional credits chosen from:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ASTR (numbered above 300)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PHYS 231</td>
<td>Physical Computing (^2,^H)</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 295</td>
<td>Research with Faculty Mentor I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 395</td>
<td>Research with Faculty Mentor II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 585</td>
<td>Imaging Science: From Cells to Stars</td>
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<tr>
<td>PHYS 691H</td>
<td>Senior Honor Thesis Research I</td>
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</tr>
<tr>
<td>PHYS 692H</td>
<td>Senior Honor Thesis Research II</td>
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</tbody>
</table>

### Additional Requirements

One of the following courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ASTR 100</td>
<td>Understanding the Universe</td>
<td>3</td>
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<tr>
<td>or ASTR 101</td>
<td>Introduction to Astronomy: The Solar System</td>
<td>3</td>
</tr>
<tr>
<td>or ASTR 102</td>
<td>Introduction to Astronomy: Stars, Galaxies &amp; Cosmology</td>
<td>3</td>
</tr>
<tr>
<td>or ASTR 103</td>
<td>Alien Life in the Universe</td>
<td>3</td>
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<tr>
<td>ASTR 100L</td>
<td>Astronomy with Skynet: Our Place in Space</td>
<td>1</td>
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<tr>
<td>or ASTR 111</td>
<td>Educational Research in Radio Astronomy</td>
<td>1</td>
</tr>
<tr>
<td>ASTR 202</td>
<td>Introduction to Astrophysics (^1)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 231</td>
<td>Calculus of Functions of One Variable (^1,^H,^F)</td>
<td>4</td>
</tr>
<tr>
<td>MATH 232</td>
<td>Calculus of Functions of One Variable II (^1,^H,^F)</td>
<td>4</td>
</tr>
<tr>
<td>MATH 233</td>
<td>Calculus of Functions of Several Variables (^1,^H,^F)</td>
<td>4</td>
</tr>
<tr>
<td>MATH 383</td>
<td>First Course in Differential Equations (^H)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Hours** 55

\(^H\) Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.

\(^F\) FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.

\(^1\) Fall course.

\(^2\) Spring course.

Astronomy (ASTR) and Physics (PHYS) course descriptions (http://catalog.unc.edu/undergraduate/departments/physics-astronomy/#coursedtext).
## Physics Major, B.A. – Energy Option

**Core Requirements**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 118</td>
<td>Introductory Calculus-based Mechanics and Relativity</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 281L</td>
<td>Experimental Techniques in Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 581</td>
<td>Renewable Electric Power Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

**Additional Requirements**

- Any three additional credits chosen from:
  - MATH 383 First Course in Differential Equations

**Total Hours**: 57

- **H**: Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.
- **F**: FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.
- **1**: Fall course.
- **2**: Spring course.

---

## Physics Major, B.A. – Medical and Biological Physics Option

**Core Requirements**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 118</td>
<td>Introductory Calculus-based Mechanics and Relativity</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 281L</td>
<td>Experimental Techniques in Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 581</td>
<td>Renewable Electric Power Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

**Additional Requirements**

- Any three additional credits chosen from:
  - BIOL (numbered above 200)
  - CHEM 301 Introduction to Organic Chemistry
  - CHEM 430 Introduction to Biological Chemistry

**Total Hours**: 58

- **H**: Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.
- **F**: FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.
- **1**: Fall course.
- **2**: Spring course.
- **3**: PHYS 295 and PHYS 395 with research projects in medical and biological physics, and Introduction to Magnetic Resonance (PHYS 529) are recommended.
Physics Major, B.A. – Quantitative Finance Option

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 118</td>
<td>Introductory Calculus-based Mechanics and Relativity</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 119</td>
<td>Introductory Calculus-based Electromagnetism and Quanta</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 281L</td>
<td>Experimental Techniques in Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 331</td>
<td>Numerical Techniques for the Sciences I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 201</td>
<td>Basic Mechanics 2</td>
<td>3</td>
</tr>
<tr>
<td>or PHYS 401</td>
<td>Mechanics I</td>
<td></td>
</tr>
<tr>
<td>PHYS 211</td>
<td>Intermediate Electromagnetism 1</td>
<td>3</td>
</tr>
<tr>
<td>or PHYS 311</td>
<td>Electromagnetism I</td>
<td></td>
</tr>
<tr>
<td>PHYS 421</td>
<td>Introduction to Quantum Mechanics 2</td>
<td>3</td>
</tr>
<tr>
<td>PHYS/BMME 441</td>
<td>Thermal Physics 1</td>
<td>3</td>
</tr>
<tr>
<td>or CHEM 481</td>
<td>Physical Chemistry I</td>
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<td></td>
<td>Three additional credits chosen from the following options 2</td>
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<tr>
<td>BUSI 407</td>
<td>Financial Accounting 3</td>
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<tr>
<td>BUSI 410</td>
<td>Business Analytics</td>
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<tr>
<td>BUSI 584</td>
<td>Financial Modeling</td>
<td></td>
</tr>
<tr>
<td>MATH courses numbered above 200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS courses numbered above 200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP courses numbered above 200</td>
<td></td>
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</tbody>
</table>

Additional Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSI 408</td>
<td>Corporate Finance 4</td>
<td>3</td>
</tr>
<tr>
<td>BUSI 580</td>
<td>Investments H</td>
<td>3</td>
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<tr>
<td>BUSI 588</td>
<td>Introduction to Derivative Securities and Risk Management 5, H</td>
<td>1.5</td>
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<tr>
<td>BUSI 589</td>
<td>Fixed Income 5, H</td>
<td>1.5</td>
</tr>
<tr>
<td>BUSI 600</td>
<td>Risk Management 5</td>
<td>1.5</td>
</tr>
<tr>
<td>BUSI 688</td>
<td>Applied Trading Strategies 5, H</td>
<td>1.5</td>
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<tr>
<td>MATH 231</td>
<td>Calculus of Functions of One Variable I H,F</td>
<td>4</td>
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<tr>
<td>MATH 232</td>
<td>Calculus of Functions of One Variable II H,F</td>
<td>4</td>
</tr>
<tr>
<td>MATH 233</td>
<td>Calculus of Functions of Several Variables</td>
<td>4</td>
</tr>
<tr>
<td>MATH 383</td>
<td>First Course in Differential Equations H</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Hours 57

H Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.

FYLaunch class sections may be available. A FYLaunch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.

1 Fall course.
2 Spring course.
3 Students are strongly encouraged to take BUSI 407.
4 ECON 101 and one of BUSI 101, BUSI 102, or BUSI 107 are prerequisites for BUSI 408, but these prerequisites may be waived for students in the Quantitative Finance program.
5 Half-semester course.

Students must maintain a minimum cumulative GPA of at least 2.85. Students majoring in the quantitative finance option cannot pursue the minor in business.

Business Administration (BUSI) course descriptions (http://catalog.unc.edu/undergraduate/schools-college/kenan-flagler-business-school/#coursestext).

Mathematics (MATH) course descriptions (http://catalog.unc.edu/undergraduate/departments/mathematics/#coursestext).

Physics (PHYS) course descriptions (http://catalog.unc.edu/undergraduate/departments/physics-astronomy/#coursestext).

Sample Plan of Study

Sample plans can be used as a guide to identify the courses required to complete the major and other requirements needed for degree completion within the expected eight semesters. The actual degree plan may differ depending on the course of study selected (second major, minor, etc.). Students should meet with their academic advisor to create a degree plan that is specific and unique to their interests. The sample plans represented in this catalog are intended for first-year students entering UNC–Chapel Hill in the fall term. Some courses may not be offered every term.

Standard Option

First Year

Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>IDST 101 (College Thriving)</td>
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<tr>
<td>First-Year Seminar or First-Year Launch (<a href="http://catalog.unc.edu/undergraduate/ideas-in-action/first-year-seminars-launches/">http://catalog.unc.edu/undergraduate/ideas-in-action/first-year-seminars-launches/</a>) F</td>
<td>3</td>
</tr>
<tr>
<td>Global Language through level 3 (<a href="http://catalog.unc.edu/undergraduate/ideas-in-action/global-language/">http://catalog.unc.edu/undergraduate/ideas-in-action/global-language/</a>) varies</td>
<td></td>
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Major Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 231 Calculus of Functions of One Variable I H,F</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 101 &amp; 101L General Descriptive Chemistry I and Quantitative Chemistry Laboratory I H,F</td>
<td>4</td>
</tr>
</tbody>
</table>

Spring Semester

First-Year Foundation Courses
Physics Major, B.A.

**ENGL 105**
- English Composition and Rhetoric
- English Composition and Rhetoric (Interdisciplinary)
  

**Major Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 232</td>
<td>Calculus of Functions of One Variable II H, F</td>
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<tr>
<td>MATH 233</td>
<td>Calculus of Functions of Several Variables H, F</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 118</td>
<td>Introductory Calculus-based Mechanics and Relativity H, F</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 331</td>
<td>Numerical Techniques for the Sciences I</td>
<td>4</td>
</tr>
</tbody>
</table>

**Sophomore Year**

**Fall Semester**
- PHYS 118
- MATH 233

**Spring Semester**
- PHYS 119
- MATH 383
- PHYS 331

**Junior Year**

**Fall Semester**
- PHYS 281L
- PHYS 211 or PHYS 311

**Spring Semester**
- PHYS 201 or PHYS 401
- PHYS 421
- One course (3 hours) chosen from ASTR (numbered above 300) and PHYS (numbered above 200)

**Senior Year**

**Fall Semester**
- One course (3 hours) chosen from ASTR (numbered above 300) and PHYS (numbered above 200)

**Spring Semester**
- One course (3 hours) chosen from ASTR (numbered above 300) and PHYS (numbered above 200)

**Total Hours** 63

F FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.

### Astronomy Option

**First Year**

**Fall Semester**
- PHYS 118
- MATH 232

**Spring Semester**
- PHYS 201 or PHYS 401
- MATH 383
- PHYS 331

**Hours** 13

**Sophomore Year**

**Fall Semester**
- PHYS 119
- MATH 233

**Spring Semester**
- PHYS 281L
- MATH 383
- PHYS 331

**Hours** 10

**Junior Year**

**Fall Semester**
- ASTR 202
- PHYS 211 or PHYS 311

**Hours** 6

F Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Spring Semester</td>
<td>PHYS 201</td>
<td>Basic Mechanics or Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYS 401</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PHYS 421</td>
<td>Introduction to Quantum Mechanics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>Hours</td>
<td></td>
<td></td>
<td>9</td>
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<tr>
<td>Senior Year</td>
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<tr>
<td>Fall Semester</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>One additional elective course</td>
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<tr>
<td>Hours</td>
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<td>Total Hours</td>
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<td></td>
<td>66</td>
</tr>
</tbody>
</table>

H Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.

F FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.

1 Three credits chosen from ASTR (numbered above 300) and PHYS 231, PHYS 295, PHYS 395, PHYS 585, PHYS 691H, PHYS 692H.

### Computational Physics Option

#### First Year

<table>
<thead>
<tr>
<th>Semester</th>
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<tr>
<td>Fall Semester</td>
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<tr>
<td>First-Year Foundation Courses</td>
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<td>IDST 101</td>
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<td>College Thriving</td>
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<td>Triple-I and Data Literacy (<a href="http://catalog.unc.edu/undergraduate/ideas-in-action/triple-i/">link</a>)</td>
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<td>Global Language through level 3 (<a href="http://catalog.unc.edu/undergraduate/ideas-in-action/global-language/">link</a>)</td>
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<td>Major Courses</td>
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<tr>
<td>MATH 231</td>
<td></td>
<td>Calculus of Functions of One Variable I</td>
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<tr>
<td>COMP 110</td>
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<td>Introduction to Programming and Data Science</td>
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<td>(if needed as prerequisite)</td>
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<td>Spring Semester</td>
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<td>First-Year Foundation Courses</td>
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<tr>
<td>ENGL 105 or ENGL 105I</td>
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<td>English Composition and Rhetoric or English Composition and Rhetoric (Interdisciplinary)</td>
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<td>First-Year Seminar or First-Year Launch (<a href="http://catalog.unc.edu/undergraduate/ideas-in-action/first-year-seminars-launches/">link</a>)</td>
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<td>Major Courses</td>
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<tr>
<td>PHYS 118</td>
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<td>Introductory Calculus-based Mechanics and Relativity</td>
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<tr>
<td>MATH 232</td>
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<td>Calculus of Functions of One Variable II</td>
<td>4</td>
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<tr>
<td>Hours</td>
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H Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.

F FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.

1 Three credits chosen from ASTR 202, ASTR (numbered above 300), PHYS (numbered above 200), COMP (numbered above 420), MATH 347 or MATH 577, and STOR 435.

2 Courses may be chosen from PHYS 447 or COMP 447 or COMP 301.
## Energy Option

### First Year

#### Fall Semester

**First-Year Foundation Courses**

- **IDST 101** College Thriving (1 credit)
- **Triple-I and Data Literacy** ([link](http://catalog.unc.edu/undergraduate/ideas-in-action/triple-i/)) (4 credits)
- **Global Language through level 3** ([link](http://catalog.unc.edu/undergraduate/ideas-in-action/global-language/)) (varies)

**Major Courses**

- **MATH 231** Calculus of Functions of One Variable I \(H,F\) (4 credits)

**Hours**

- 15 credits

#### Spring Semester

**First-Year Foundation Courses**

- **ENGL 105** or **ENGL 105I** English Composition and Rhetoric (Interdisciplinary) (3 credits)
- **First-Year Seminar or First-Year Launch** ([link](http://catalog.unc.edu/undergraduate/ideas-in-action/first-year-seminars-launches/)) (3 credits)

**Major Courses**

- **PHYS 118** Introductory Calculus-based Mechanics and Relativity \(H,F\) (4 credits)
- **MATH 232** Calculus of Functions of One Variable I \(H,F\) (4 credits)

**Hours**

- 14 credits

### Sophomore Year

#### Fall Semester

**PHYS 119** Introductory Calculus-based Electromagnetism and Quanta \(H,F\) (4 credits)

**MATH 233** Calculus of Functions of Several Variables \(H,F\) (4 credits)

**PHYS 131** Energy: Physical Principles and the Quest for Alternatives to Dwindling Oil and Gas (3 credits)

**PHYS 131L** Energy: Physical Principles and the Quest for Alternatives to Dwindling Oil and Gas (1 credit)

**Hours**

- 12 credits

#### Spring Semester

**PHYS 281L** Experimental Techniques in Physics (3 credits)

**MATH 383** First Course in Differential Equations \(H\) (3 credits)

**PHYS 331** Numerical Techniques for the Sciences I (4 credits)

**Hours**

- 10 credits

### Junior Year

#### Fall Semester

**PHYS 211** or **PHYS 311** Intermediate Electromagnetism or Electromagnetism I (3 credits)

**PHYS 351** Electronics I (4 credits)

**Hours**

- 7 credits

#### Spring Semester

**PHYS 201** or **PHYS 401** Basic Mechanics or Mechanics I (3 credits)

**PHYS 231** Physical Computing \(H\) (4 credits)

**Hours**

- 4 credits

### Senior Year

#### Fall Semester

**PHYS 421** Introduction to Quantum Mechanics (3 credits)

**Hours**

- 10 credits

#### Spring Semester

**PHYS 441** Thermal Physics (3 credits)

**Hours**

- 3 credits

**Total Hours**

- 68 credits

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**Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.**

**FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.**

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## Medical and Biological Physics Option

### First Year

#### Fall Semester

**First-Year Foundation Courses**

- **IDST 101** College Thriving (1 credit)
- **ENGL 105** or **ENGL 105I** English Composition and Rhetoric (Interdisciplinary) (3 credits)
- **Triple-I and Data Literacy** ([link](http://catalog.unc.edu/undergraduate/ideas-in-action/triple-i/)) (4 credits)

**Major Courses**

- **MATH 231** Calculus of Functions of One Variable I \(H,F\) (4 credits)

**Hours**

- 15 credits

#### Spring Semester

**First-Year Seminar or First-Year Launch** ([link](http://catalog.unc.edu/undergraduate/ideas-in-action/first-year-seminars-launches/)) (3 credits)

**Major Courses**

- **PHYS 118** Introductory Calculus-based Mechanics and Relativity \(H,F\) (4 credits)

**Hours**

- 15 credits

### Sophomore Year

#### Fall Semester

**PHYS 119** Introductory Calculus-based Electromagnetism and Quanta \(H,F\) (4 credits)

**MATH 233** Calculus of Functions of Several Variables \(H,F\) (4 credits)

**CHEM 101 & 101L** General Descriptive Chemistry I and Quantitative Chemistry Laboratory \(H,F\) (4 credits)

**Hours**

- 15 credits

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**Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.**

**FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.**
### Sophomore Year

#### Fall Semester
- **PHYS 119**  Introductory Calculus-based Electromagnetism and Quanta \[^{H, F}\] 4
- **MATH 233**  Calculus of Functions of Several Variables \[^{H, F}\] 4
- **CHEM 102**  General Descriptive Chemistry II \[^{H, F}\] 3

**Hours** 11

#### Spring Semester
- **PHYS 281L**  Experimental Techniques in Physics 3
- **MATH 383**  First Course in Differential Equations \[^{H}\] 3
- **PHYS 331**  Numerical Techniques for the Sciences I 4

**Hours** 10

### Junior Year

#### Fall Semester
- **PHYS 211**  Intermediate Electromagnetism \[^{H, F}\] 3
- **PHYS 441**  or **CHEM 481**  Thermal Physics \[^{H}\] or Physical Chemistry I 3
- **BUSI 408**  Corporate Finance 3

**Hours** 9

#### Spring Semester
- **PHYS 201**  or **PHYS 401**  Basic Mechanics \[^{H}\] or Mechanics I 3
- **PHYS 421**  Introduction to Quantum Mechanics 3

**Hours** 6

### Senior Year

#### Fall Semester
- **PHYS 211**  or **PHYS 311**  Intermediate Electromagnetism \[^{H, F}\] 3
- **PHYS 461**  Introduction to Medical Physics \[^{H}\] or Introduction to Biomedical Imaging Science 3
- **CHEM 481**  3

**Hours** 3

**Total Hours** 69

\[^{H}\] Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.

\[^{F}\] FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.

\[^{1}\] Courses may be chosen from BIOL (numbered above 200), CHEM 261, CHEM 262, CHEM 430, PHYS (numbered above 200).

### Quantitative Finance Option

#### First Year

#### Fall Semester
- **BUSI 589**  Fixed Income \[^{H}\] 1.5
- **BUSI 588**  Introduction to Derivative Securities and Risk Management \[^{H}\] 1.5

**Hours** 9

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### English Composition

- **ENGL 105**  or **ENGL 105I**  English Composition and Rhetoric 3
- **ENGL 105I**  Interdisciplinary 3

**Hours** 3

### Calculus of Functions of One Variable

- **MATH 231**  Calculus of Functions of One Variable I \[^{H, F}\] 4

**Hours** 12

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### First-Year Foundation Courses

- **First-Year Seminar or First-Year Launch** \[^{F}\] 3

**Hours** 3

### Major Courses

- **PHYS 118**  Introductory Calculus-based Mechanics and Relativity \[^{H, F}\] 4
- **MATH 232**  Calculus of Functions of One Variable II \[^{H, F}\] 4

**Hours** 11

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### Corporate Finance

- **BUSI 408**  Corporate Finance 3

**Hours** 3

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### Investments

- **BUSI 580**  Investments \[^{H}\] 3

**Hours** 3

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### Senior Year

#### Fall Semester
- **BUSI 588**  Introduction to Derivative Securities and Risk Management \[^{H}\] 1.5
- **BUSI 589**  Fixed Income \[^{H}\] 1.5
The students each year. The society invites visitors to give talks and sponsors a number of events for between undergraduates, graduate students, faculty, and alumni. The open to anyone interested in physics and is meant to build connections undergraduate/student-organizations/society-of-physics-students/.

**Departmental Involvement**

The Society of Physics Students (https://physics.unc.edu/undergraduate/student-organizations/society-of-physics-students/) is open to anyone interested in physics and is meant to build connections between undergraduates, graduate students, faculty, and alumni. The society invites visitors to give talks and sponsors a number of events for students each year.

The Visibility in Physics (https://physics.unc.edu/undergraduate/student-organizations/visibility-in-physics/) is a student organization that aims to provide resources, advice, and a welcoming and encouraging social atmosphere for underrepresented minorities and allies in the field of physics.

**UNC–BEST**

The UNC Baccalaureate Education in Science and Teaching (UNC–BEST) Program is a collaboration between the School of Education and the College of Arts and Sciences and is designed to allow undergraduate science majors interested in teaching high school science the opportunity to earn their science degree and obtain licensure as a North Carolina high school science teacher in four years. UNC–BEST students also fulfill teaching licensure coursework requirements as well as many General Education and elective requirements as they complete courses in teaching and learning.

**Undergraduate Awards**

The department gives awards each year to the senior (Shearin Award) and junior (Johnson Award) who demonstrate the greatest academic achievement. In addition, the department awards the major with the most research achievement the Robert Sheldon Award for Undergraduate Research.

**Department Programs**

**Majors**

- Physics Major, B.A. (p. 1)
- Physics Major, B.S. (http://catalog.unc.edu/undergraduate/programs-study/physics-major-bs/)

**Minors**

- Astronomy Minor (http://catalog.unc.edu/undergraduate/programs-study/astronomy-minor/)
- Physics Minor (http://catalog.unc.edu/undergraduate/programs-study/physics-minor/)

**Graduate Programs**

- M.S. in Physics (http://catalog.unc.edu/graduate/schools-departments/physics-astronomy/)
- Ph.D. in Physics (http://catalog.unc.edu/graduate/schools-departments/physics-astronomy/)

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<th>Title</th>
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<tr>
<td>EDUC 760</td>
<td>Methods and Materials for Teaching Secondary/ K-12 Subjects I</td>
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<td>EDUC 532</td>
<td>Human Development and Learning</td>
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<td>EDUC 615</td>
<td>Schools and Community Collaboration</td>
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<td>EDUC 689</td>
<td>Foundations of Special Education</td>
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<td>EDUC 593</td>
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<tr>
<td>EDUC 601</td>
<td>Education Workshops (must be completed during student teaching semester)</td>
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**Total Hours**

- 25
Contact Information

Department of Physics and Astronomy
Visit Program Website (http://physics.unc.edu)
Phillips Hall, CB# 3255
(919) 962-2078

Chair
Frank Tsui
ftsui@physics.unc.edu

Academic Affairs Coordinator
Jacob Hurst
hurstj@email.unc.edu

Director of Undergraduate Studies
Tamara Branca
rtbranca@unc.edu

Physics Advisor (Students with Last Names Beginning with A–M)
Lu-Chang Qin
lcqin@email.unc.edu

Physics Advisor (Astrophysics and Astronomy Majors and Minors with Last Names Beginning with A-L)
Andrew Mann
awmann@physics.unc.edu

Physics Advisor (Students with Last Names Beginning with N-R, and Astrophysics and Astronomy Majors and Minors with Last Names Beginning with M-Z)
Dan Reichart
reichart@physics.unc.edu

Physics Advisor (Quantitative Finance Majors)
Stefan Jeglinski
jeglin@physics.unc.edu

Physics Advisor and Associate Director of Undergraduate Studies (Students with Last Names Beginning with S-Z)
Jennifer Weinberg-Wolf
jweinber@physics.unc.edu