APPLIED SCIENCES AND ENGINEERING MINOR

Are you interested in using technology to make a difference in the world? From big problems like global warming to focused needs in your home or community, engineering is all about solving problems. The applied sciences and engineering minor trains students with an engineering and entrepreneurial mindset. You will build on the foundation from your math and science courses, and engage in hands-on engineering applications of real-world challenges.

Join the minor to learn about materials sciences, optics, fluid mechanics, sensors, and more.

- Model and simulate systems using modern engineering tools and software
- Design and build systems for real-world applications using engineering tools in the BeAM makerspace and across campus
- Use fundamental principles in math and sciences to address applications in at least one area of engineering, such as material science, environmental engineering, instrumentation, or optics
- Communicate to a wide range of audiences in both oral and written form
- Understand the ethical and professional responsibilities of engineers
- Work within teams to design solutions and solve problems

Requirements

In addition to the program requirements listed below, students must:

- take at least nine hours of their minor "core" requirements at UNC–Chapel Hill
- earn a minimum cumulative GPA of 2.000 in the minor core requirements. Some programs may require higher standards for minor or specific courses.

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

Prerequisite Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 101 &amp; 101L</td>
<td>General Descriptive Chemistry I and Quantitative Chemistry Laboratory I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 231</td>
<td>Calculus of Functions of One Variable I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 232</td>
<td>Calculus of Functions of One Variable II</td>
<td>4</td>
</tr>
<tr>
<td>Select one:</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>PHYS 114</td>
<td>General Physics I: For Students of the Life Sciences</td>
<td></td>
</tr>
<tr>
<td>PHYS 118</td>
<td>Introductory Calculus-based Mechanics and Relativity</td>
<td></td>
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</table>

Select one:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>PHYS 115</td>
<td>General Physics II: For Students of the Life Sciences</td>
<td></td>
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</tbody>
</table>

Core Courses

The minor consists of five courses for a total of 15 credit hours.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPL 101</td>
<td>Exploring Engineering</td>
<td>3</td>
</tr>
<tr>
<td>APPL 110</td>
<td>Introduction to Design and Making: Developing Your Personal Design Potential</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one course from the following list:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPL 240</td>
<td>Developing Your Sixth Sense: Designing Sensors and Electrical Circuits to Make Measurements</td>
<td>3-4</td>
</tr>
<tr>
<td>APPL 260</td>
<td>Materials Science and Engineering: Living in a Material World</td>
<td></td>
</tr>
<tr>
<td>APPL 285</td>
<td>Fluid Relationships: An Intuition Building Approach to Fluid Mechanics</td>
<td></td>
</tr>
<tr>
<td>APPL 385</td>
<td>Transport: Flow of Force, Matter, and Energy through the Biosphere</td>
<td></td>
</tr>
<tr>
<td>PHYS 231</td>
<td>Physical Computing</td>
<td></td>
</tr>
<tr>
<td>ENVR 205</td>
<td>Engineering Tools for Environmental Problem Solving</td>
<td></td>
</tr>
</tbody>
</table>

Select two engineering topic courses from the list below.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPL 101</td>
<td>Exploring Engineering</td>
<td>3</td>
</tr>
<tr>
<td>APPL 110</td>
<td>Introduction to Design and Making: Developing Your Personal Design Potential</td>
<td>3</td>
</tr>
<tr>
<td>Select one course from the following list:</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>APPL 240</td>
<td>Developing Your Sixth Sense: Designing Sensors and Electrical Circuits to Make Measurements</td>
<td></td>
</tr>
<tr>
<td>APPL 260</td>
<td>Materials Science and Engineering: Living in a Material World</td>
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<td>Fluid Relationships: An Intuition Building Approach to Fluid Mechanics</td>
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<td>APPL 385</td>
<td>Transport: Flow of Force, Matter, and Energy through the Biosphere</td>
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<td>PHYS 231</td>
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</tr>
<tr>
<td>ENVR 205</td>
<td>Engineering Tools for Environmental Problem Solving</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours | 15-16

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.

Engineering Topic Classes

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPL 350</td>
<td>Data Science for Applied Science and Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>APPL 405</td>
<td>Convergent Engineering: Team-Science Approaches to Discovery and Innovation</td>
<td>3</td>
</tr>
<tr>
<td>APPL 412</td>
<td>Turning Your Entrepreneurial Ideas Into Reality</td>
<td>3</td>
</tr>
<tr>
<td>APPL 430</td>
<td>Optical Instrumentation for Scientists and Engineers</td>
<td>3</td>
</tr>
<tr>
<td>APPL 435</td>
<td>Nanophotonics</td>
<td>3</td>
</tr>
<tr>
<td>APPL 462</td>
<td>Engineering Materials: Properties, Selection and Design</td>
<td>3</td>
</tr>
<tr>
<td>APPL 463</td>
<td>Bioelectronic Materials</td>
<td>3</td>
</tr>
<tr>
<td>APPL 465</td>
<td>Sponge Bob Square Pants and Other Soft Materials</td>
<td>3</td>
</tr>
<tr>
<td>APPL/CHEM 470</td>
<td>Fundamentals of Materials Science</td>
<td>3</td>
</tr>
<tr>
<td>APPL/CHEM/PHYS 472</td>
<td>Chemistry and Physics of Electronic Materials Processing</td>
<td>3</td>
</tr>
<tr>
<td>APPL 495</td>
<td>Mentored Research in Applied Physical Sciences</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 226</td>
<td>Mathematical Methods for Quantitative Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 431/ BMME 435/ PHYS 405</td>
<td>Biological Physics</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 534/ MATH 564</td>
<td>Mathematical Modeling in the Life Sciences</td>
<td>3</td>
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<tr>
<td>BIOL 537</td>
<td>Biotechnology and Synthetic Biology</td>
<td>3</td>
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<tr>
<td>BIOL 551</td>
<td>Comparative Biomechanics</td>
<td>3</td>
</tr>
<tr>
<td>BIOL/MATH 553</td>
<td>Mathematical and Computational Models in Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 554</td>
<td>Introduction to Computational Neuroscience</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 441</td>
<td>Intermediate Analytical Chemistry and Intermediate Analytical Chemistry Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 445</td>
<td>Electroanalytical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 448</td>
<td>Mass Spectrometry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 449</td>
<td>Microfabricated Chemical Measurement Systems</td>
<td>3</td>
</tr>
<tr>
<td>CHEM/APPL 470</td>
<td>Fundamentals of Materials Science</td>
<td>3</td>
</tr>
<tr>
<td>CHEM/APPL/PHYS 472</td>
<td>Chemistry and Physics of Electronic Materials Processing</td>
<td>3</td>
</tr>
<tr>
<td>COMP 433</td>
<td>Mobile Computing Systems</td>
<td>3</td>
</tr>
<tr>
<td>COMP/PHYS 447</td>
<td>Quantum Computing</td>
<td>3</td>
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<tr>
<td>COMP 523</td>
<td>Software Engineering Laboratory</td>
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<tr>
<td>COMP 541</td>
<td>Digital Logic and Computer Design</td>
<td>4</td>
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<tr>
<td>COMP 560</td>
<td>Artificial Intelligence</td>
<td>3</td>
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<tr>
<td>COMP 562</td>
<td>Introduction to Machine Learning</td>
<td>3</td>
</tr>
<tr>
<td>COMP 581</td>
<td>Introduction to Robotics</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 441</td>
<td>Intermediate Analytical Chemistry and Intermediate Analytical Chemistry Laboratory</td>
<td>5</td>
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<tr>
<td>CHEM 445</td>
<td>Electroanalytical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 448</td>
<td>Mass Spectrometry</td>
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<td>CHEM 449</td>
<td>Microfabricated Chemical Measurement Systems</td>
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<tr>
<td>CHEM/APPL 470</td>
<td>Fundamentals of Materials Science</td>
<td>3</td>
</tr>
<tr>
<td>CHEM/APPL/PHYS 472</td>
<td>Chemistry and Physics of Electronic Materials Processing</td>
<td>3</td>
</tr>
<tr>
<td>Computer Science</td>
<td></td>
<td></td>
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<tr>
<td>Earth, Marine, and Environmental Science</td>
<td></td>
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<tr>
<td>Environmental Sciences and Engineering</td>
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<tr>
<td>ENVR 451</td>
<td>Introduction to Environmental Modeling</td>
<td>3</td>
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<tr>
<td>ENVR 452/ EMES 560/ PHYS 660</td>
<td>Fluid Dynamics</td>
<td>3</td>
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<tr>
<td>ENVR 453</td>
<td>Groundwater Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>ENVR/ENEC 468</td>
<td>Temporal GIS and Space/Time Geostatistics for the Environment and Public Health</td>
<td>3</td>
</tr>
<tr>
<td>ENVR/ENEC 470</td>
<td>Environmental Risk Assessment</td>
<td>3</td>
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<tr>
<td>ENVR 671</td>
<td>Environmental Physics I</td>
<td>3</td>
</tr>
<tr>
<td>ENVR 672</td>
<td>Environmental Physics II</td>
<td>3</td>
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<tr>
<td>Mathematics</td>
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<tr>
<td>MATH 347</td>
<td>Linear Algebra for Applications</td>
<td>3</td>
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<tr>
<td>MATH 528</td>
<td>Mathematical Methods for the Physical Sciences I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 529</td>
<td>Mathematical Methods for the Physical Sciences II</td>
<td>3</td>
</tr>
<tr>
<td>MATH/BIOL 553</td>
<td>Mathematical and Computational Models in Biology</td>
<td>3</td>
</tr>
<tr>
<td>MATH/BIOL 534</td>
<td>Elements of Modern Algebra</td>
<td>3</td>
</tr>
<tr>
<td>Neurosciences (restricted to NSCI minors and majors)</td>
<td></td>
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</tr>
<tr>
<td>NSCI 421</td>
<td>Principles of Brain Circuits</td>
<td>3</td>
</tr>
<tr>
<td>NSCI 423</td>
<td>Neurotechnology in Modern Neuroscience Research</td>
<td>3</td>
</tr>
<tr>
<td>Physics</td>
<td></td>
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<tr>
<td>PHYS 331</td>
<td>Numerical Techniques for the Sciences I</td>
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</tr>
<tr>
<td>PHYS 332</td>
<td>Numerical Techniques for the Sciences II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 401</td>
<td>Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 405/ BIOL 431/ BMME 435</td>
<td>Biological Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS/BMME 441</td>
<td>Thermal Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS/COMP 447</td>
<td>Quantum Computing</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 461</td>
<td>Introduction to Medical Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS/APPL/ CHEM 472</td>
<td>Chemistry and Physics of Electronic Materials Processing</td>
<td>3</td>
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<tr>
<td>PHYS 515</td>
<td>Optics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 529</td>
<td>Introduction to Magnetic Resonance</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 660/ ENVR 452/ EMES 560</td>
<td>Fluid Dynamics</td>
<td>3</td>
</tr>
</tbody>
</table>

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

**Contact Information**

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