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

Code	Title	Hours
Prerequisite Courses		
CHEM 101 & 101L	General Descriptive Chemistry I and Quantitative Chemistry Laboratory I [H, F]	4
MATH 231	Calculus of Functions of One Variable I [H, F]	4
MATH 232	Calculus of Functions of One Variable II [H, F]	4
Select one:		4
PHYS 114	General Physics I: For Students of the Life Sciences [F]	
PHYS 118	Introductory Calculus-based Mechanics and Relativity [H, F]	
Select one:		4
PHYS 115	General Physics II: For Students of the Life Sciences [F]	
PHYS 119	Introductory Calculus-based Electromagnetism and Quanta [1, H, F]	
COMP 110	Introduction to Programming and Data Science [H]	3
or COMP 116	Introduction to Scientific Programming	
Total Hours		**23**

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 PHYS 119 requires MATH 233 as a pre- or corequisite.

Core Courses

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

Code	Title	Hours
Core Requirements		
APPL 101	Exploring Engineering	3
APPL 110	Design and Making for Engineers: Developing Your Personal Design Potential [F]	3
Select one course from the following list:		3-4
APPL 240	Electronics from Sensors to Indicators: Circuits that Interact with the Physical World	
APPL 260	Materials Science and Engineering: Living in a Material World	
APPL 285	Engineering Fundamentals of Force, Motion, and Energy	
APPL 385	Thermodynamics for Engineers	
PHYS 231	Physical Computing [H]	
ENVR 205	Engineering Tools for Environmental Problem Solving	
Select two engineering topic courses from the list below.		6
Total Hours		**15-16**

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

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Engineering Topic Classes

Code	Title	Hours
Applied Physical Sciences		
APPL 350	Data Science for Applied Science and Engineering	3

APPL 405	Convergent Engineering: Team-Science Approaches to Discovery and Innovation	3
APPL 412	Turning Your Entrepreneurial Ideas Into Reality	3
APPL 430	Optoelectronics from Materials to Devices	3
APPL 435	Nanophotonics	3
APPL 462	Engineering Materials: Properties, Selection and Design	3
APPL 463	Bioelectronic Materials	3
APPL 465	Engineering of Soft Materials: SpongeBob Squarepants and Other Squishy Things	3
Biology		
BIOL 226	Mathematical Methods for Quantitative Biology	3
BIOL 431/ BMME 435/ PHYS 405	Biological Physics	3
BIOL 534/ MATH 564	Mathematical Modeling in the Life Sciences	3
BIOL 537	Biotechnology and Synthetic Biology	3
BIOL 551	Comparative Biomechanics	3
BIOL/MATH 553	Mathematical and Computational Models in Biology	3
BIOL 554	Introduction to Computational Neuroscience	3
Chemistry		
CHEM 441 & 441L	Intermediate Analytical Chemistry and Intermediate Analytical Chemistry Laboratory	5
CHEM 445	Electroanalytical Chemistry	3
CHEM 448	Mass Spectrometry	3
CHEM 449	Microfabricated Chemical Measurement Systems	3
CHEM 470	Fundamentals of Materials Science	3
CHEM/PHYS 472	Chemistry and Physics of Electronic Materials Processing	3
Computer Science		
COMP 433	Mobile Computing Systems	3
COMP/PHYS 447	Quantum Computing	3
COMP 523	Software Engineering Laboratory	4
COMP 541	Digital Logic and Computer Design	4
COMP 560	Artificial Intelligence	3
COMP 562	Introduction to Machine Learning [H]	3
COMP 581	Introduction to Robotics [H]	3
Earth, Marine, and Environmental Science		
EMES 415	Environmental Systems Modeling	3
EMES 560	Fluid Dynamics	3
EMES 561	Time Series and Spatial Data Analysis	3
Environmental Sciences and Engineering		
ENVR 451	Introduction to Environmental Modeling	3
ENVR 452/ EMES 560/ PHYS 660	Fluid Dynamics	3
ENVR 453	Groundwater Hydrology	3
ENVR/ENEC 468	Temporal GIS and Space/Time Geostatistics for the Environment and Public Health	3
ENVR/ENEC 470	Environmental Risk Assessment	3
ENVR 671	Environmental Physics I	3
ENVR 672	Environmental Physics II	3
Mathematics		
MATH 347	Linear Algebra for Applications	3
MATH 528	Mathematical Methods for the Physical Sciences I	3
MATH 529	Mathematical Methods for the Physical Sciences II	3
MATH/BIOL 553	Mathematical and Computational Models in Biology	3
MATH/BIOL 534	Elements of Modern Algebra	3
MATH 566	Introduction to Numerical Analysis	3
Neurosciences (restricted to NSCI minors and majors)		
NSCI 421	Principles of Brain Circuits	3
NSCI 423	Cellular and Molecular Neurotechnology	3
Physics		
PHYS 331	Numerical Techniques for the Sciences I	4
PHYS 332	Numerical Techniques for the Sciences II	4
PHYS 401	Mechanics I	3
PHYS 405/ BIOL 431/ BMME 435	Biological Physics	3
PHYS/BMME 441	Thermal Physics	3
PHYS/COMP 447	Quantum Computing	3
PHYS 461	Introduction to Medical Physics	3
PHYS/CHEM 472	Chemistry and Physics of Electronic Materials Processing	3
PHYS 515	Optics	3
PHYS 529	Introduction to Magnetic Resonance	3
PHYS 660/ ENVR 452/ EMES 560	Fluid Dynamics	3

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

Department Programs

Minor

- Applied Sciences Major, B.S. (https://catalog.unc.edu/undergraduate/programs-study/applied-sciences-major-bs/)
- Applied Sciences and Engineering Minor (p. 1)

Graduate Programs

- Ph.D. in Materials Science (https://catalog.unc.edu/graduate/schools-departments/applied-physical-sciences/#programstext)

Contact Information

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