PHYSICS, B.S.

Learning Outcomes

- Students will demonstrate an understanding of the physical phenomena and the use of scientific methods and theories.
- Students will demonstrate their ability to communicate effectively through written reports, which exhibit their ability to comprehend, analyze, and interrogate critically.
- Students will demonstrate their ability to communicate effectively through oral presentations, which exhibit their ability to comprehend, analyze, interrogate critically and present their work to others.
- Students will demonstrate effective use of computers and other technology.

Transfer Requirements

In addition to the minimum University and College of Arts and Sciences requirements, a student seeking to transfer to the physics major from another program within the University, or from another accredited college or university, is required to have earned a grade of "C" or higher in MATH 141.

Note: An AP or IB exam score that provides credit for MATH 141 also satisfies this requirement.

Admissions

Entrance Requirements

New freshmen who meet University admissions standards are eligible for admission to degree programs offered by the college. A student who wishes to enter the College of Arts and Sciences from another college on the Columbia campus must be in good standing and have a cumulative GPA of 2.00 or higher. A student who wishes to enter the College of Arts and Sciences from another UofSC campus must fulfill one of the following requirements:

1. Be in good standing, meet the admission requirements for a baccalaureate degree on the Columbia campus, and have a cumulative GPA of 2.00 or higher.
2. Be in good standing and have completed 30 semester hours with a GPA of 2.00 or higher on a UofSC campus.

Some programs in the College of Arts and Sciences have special admission requirements established by the department or committee that supervises the specific degree program, for example, Cardiovascular Technology, Biological Sciences, Chemistry, Biochemistry and Molecular Biology, Economics, Environmental Science, the Bachelor of Arts in Interdisciplinary Studies, and the Bachelor of Science in Interdisciplinary Studies. These requirements are listed in the sections of this bulletin that describe department and special degree programs.

Degree Requirements (120 hours)

Program of Study

Requirements	Credit Hours
1. Carolina Core	33-45
2. College Requirements	16-19
3. Program Requirements	24-39
4. Major Requirements	32-54

Founding Documents Requirement

All undergraduate students must take a 3-credit course or its equivalent with a passing grade in the subject areas of History, Political Science, or African American Studies that covers the founding documents including the United State Constitution, the Declaration of Independence, the Emancipation Proclamation and one or more documents that are foundational to the African American Freedom struggle, and a minimum of five essays from the Federalist papers. This course may count as a requirement in any part of the program of study including the Carolina Core, the major, minor or cognate, or as a general elective. Courses that meet this requirement are listed here (https://academicbulletins.sc.edu/undergraduate/founding-document-courses/).

1. Carolina Core Requirements (33-45 hours)

Effective, Engaged, and Persuasive Communication: Written — CMW (6 hours)

must be passed with a grade of C or higher

- any CC-CMW courses (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

ARP – Analytical Reasoning and Problem Solving (8 hours)

must be passed with a grade of C or higher

- MATH 141
- MATH 142

SCI – Scientific Literacy (7 hours)

must be passed with a grade of C or higher

- CHEM 111 & CHEM 111L
- PHYS 211

GFL – Global Citizenship and Multicultural Understanding: Foreign Language (0-6 hours)

Demonstration of proficiency in one foreign language equivalent to the minimal passing grade on the exit examination in the 122 course is required. Students can demonstrate this proficiency by successfully completing Phase II of the Proficiency Test or by successfully completing the 122 course, including the exit exam administered as part of that course.

- CC-GFL courses (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

It is strongly recommended that students continuing the study of a foreign language begin college-level study of that language in their first semester and continue in that language until their particular foreign language requirement is completed.

GHS – Global Citizenship and Multicultural Understanding: Historical Thinking (3 hours)

- any CC-GHS course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

GSS – Global Citizenship and Multicultural Understanding: Social Sciences (3 hours)

- any CC-GSS course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

AIU – Aesthetic and Interpretive Understanding (3 hours)

- any CC-AIU course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

CMS – Effective, Engaged, and Persuasive Communication: Spoken Component [1] (0-3 hours)

- any overlay or stand-alone CC-CMS course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

INF – Information Literacy [1] (0-3 hours)

- any overlay or stand-alone CC-INF course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

VSR – Values, Ethics, and Social Responsibility [1] (0-3 hours)

- any overlay or stand-alone CC-VSR course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

[1] **Carolina Core Stand Alone or Overlay Eligible**
Requirements — Overlay-approved courses offer students the option of meeting two Carolina Core components in a single course. A maximum of two overlays is allowed. The total Carolina Core credit hours must add up to a minimum of 31 hours. Some programs may have a higher number of minimum Carolina Core hours due to specified requirements.

2. College Requirements (16-19 hours)

Foreign Language (0-3 hours)

- only if needed to meet 122-level proficiency

Analytical Reasoning (7 hours)

must be passed with a grade of C or higher

Course	Title	Credits
CSCE 145	Algorithmic Design I	4
STAT 509	Statistics for Engineers	3
or STAT 515	Statistical Methods I	
Total Credit Hours		**7**

History (3 hours)

The College of Arts and Sciences requires one U.S. History and one non-U.S. History course. Whichever is not fulfilled through the Carolina Core GHS requirement must be fulfilled through this college requirement. Accordingly, please select one of the following:

- One Carolina Core GHS-approved course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/) primarily focused on U.S. History: HIST 111, HIST 112, HIST 214 or another GHS-approved course determined by the College of Arts and Science to fit this geographic category.
  or
- One Carolina Core GHS-approved course primarily focused on non-U.S. History: HIST 101, HIST 102, HIST 104, HIST 105, HIST 106, HIST 108, HIST 109, GERM 280, FAMS 300, or another GHS-approved course determined by the College of Arts and Sciences to fit this geographic category.

Social Science and Fine Arts or Humanities (6 hours)

Courses Acceptable for Social Science and Fine Arts or Humanities Credit in Degree Programs in the College of Arts and Sciences (https://academicbulletins.sc.edu/undergraduate/arts-sciences/courses-acceptable-social-science-fine-arts-humanities/)

- **Three** hours of Social Science
- **Three** hours of Fine Arts or Humanities

3. Program Requirements (24-39 hours)

Supporting Courses (24 hours)

must be passed with a grade of C or higher

Course	Title	Credits
CHEM 112 & 112L	General Chemistry II and General Chemistry II Lab	4
PHYS 199	Measurement and Analysis in Physics	2
PHYS 212	Essentials of Physics II	3
PHYS 306	Principles of Physics III	3
MATH 241	Vector Calculus	3
MATH 242	Elementary Differential Equations	3
or MATH 520	Ordinary Differential Equations	
Select six hours of the following:		6
MATH 300	Transition to Advanced Mathematics	
MATH 344	Applied Linear Algebra	
MATH 500-level and above (selected with advisor)		
Total Credit Hours		**24**

Cognate

The required mathematics courses satisfy the cognate requirement.

Electives (0-15 hours)

No courses of a remedial, developmental, skill-acquiring, or vocational nature may apply as credit toward degrees in the College of Arts and Sciences. The College of Arts and Sciences allows the use of the Pass-Fail option on elective courses. Further clarification on inapplicable courses can be obtained from the College of Arts and Sciences.

4. Major Requirements (32-54 hours)

A minimum grade of C is required in all major courses.

Major Courses (32 hours)

Course	Title	Credits
PHYS 307	Introduction to Modern Physics	3
Select one of the following:		4
PHYS 308 & 309	Classic Experiments in Physics I and Classic Experiments in Physics II	
PHYS 310	Intermediate Experimental Physics	
PHYS 501	Quantum Physics I	3
PHYS 502	Quantum Physics II	3
PHYS 503	Mechanics	4
PHYS 504	Electromagnetic Theory	4

PHYS 506	Thermal Physics and Statistical Mechanics	3
PHYS 541	Advanced Experimental Physics I	4
Select one of the following Experimental Physics courses:		4
PHYS 509	Solid State Electronics	
PHYS 510	Digital Electronics	
PHYS 511	Nuclear Physics	
PHYS 512	Solid State Physics	
PHYS 514	Optics, Theory, and Applications	
PHYS 521	Biophysics	
PHYS 542	Advanced Experimental Physics II	
Total Credit Hours		**32**

Engineering Physics Concentration (52-54 hours) *optional*

In order to select the Engineering Physics Concentration a student must have achieved a minimum overall GPA of 2.5 with at least 15 hours taken at USC-Columbia. In addition, the student must have passed MATH 141 with a grade of "C" or higher. (An AP or IB exam score that provides credit for MATH 141 also satisfies this requirement.)

Select either the Electrical or Mechanical Option.

Electrical Option (52-53 hours)

Course	Title	Credits
CSCE 211	Digital Logic Design	3
ELCT 102	Electrical Science	3
ELCT 201	Introductory Electrical Engineering Laboratory	3
ELCT 221	Circuits	3
ELCT 222	Signals and Systems	3
ELCT 301	Electronics Laboratory	3
ELCT 371	Electronics	3
PHYS 307	Introduction to Modern Physics	3
Select one of the following:		4
PHYS 308 & 309	Classic Experiments in Physics I and Classic Experiments in Physics II	
PHYS 310	Intermediate Experimental Physics	
PHYS 311	Introduction to Applied Numerical Methods	3
PHYS 501	Quantum Physics I	3
PHYS 503	Mechanics	4
PHYS 504	Electromagnetic Theory	4
PHYS 506	Thermal Physics and Statistical Mechanics	3
PHYS 541	Advanced Experimental Physics I	4
Physics Elective		
Select one of the following:		3-4
PHYS 502	Quantum Physics II	
PHYS 509	Solid State Electronics	
PHYS 511	Nuclear Physics	
PHYS 512	Solid State Physics	
PHYS 514	Optics, Theory, and Applications	
PHYS 521	Biophysics	
PHYS 542	Advanced Experimental Physics II	
Total Credit Hours		**52-53**

Mechanical Option (52-54 hours)

Course	Title	Credits
EMCH 200	Statics	3
EMCH 260	Solid Mechanics	3
EMCH 290	Thermodynamics	3
Select four courses (at least 12 hours) from EMCH 300 and above		12
PHYS 307	Introduction to Modern Physics	3
Select one of the following:		4
PHYS 308 & 309	Classic Experiments in Physics I and Classic Experiments in Physics II	
PHYS 310	Intermediate Experimental Physics	
PHYS 311	Introduction to Applied Numerical Methods	3
PHYS 501	Quantum Physics I	3
PHYS 503	Mechanics	4
PHYS 504	Electromagnetic Theory	4
PHYS 541	Advanced Experimental Physics I	4
Select two of the following Physics electives:		6-8
PHYS 502	Quantum Physics II	
PHYS 506	Thermal Physics and Statistical Mechanics	
PHYS 509	Solid State Electronics	
PHYS 511	Nuclear Physics	
PHYS 512	Solid State Physics	
PHYS 514	Optics, Theory, and Applications	
PHYS 521	Biophysics	
PHYS 542	Advanced Experimental Physics II	
Total Credit Hours		**52-54**

Major Map

A major map is a layout of required courses in a given program of study, including critical courses and suggested course sequences to ensure a clear path to graduation.

Major maps are only a suggested or recommended sequence of courses required in a program of study. Please contact your academic advisor for assistance in the application of specific coursework to a program of study and course selection and planning for upcoming semesters.

Physics, B.S. No Concentration

Physics, B.S. Engineering Physics (Electrical Option) Concentration

Physics, B.S. Engineering Physics (Mechanical Option) Concentration