COMPUTER SCIENCE MAJOR, B.S.

Contact Information

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The bachelor of science with a major in computer science is the preferred
degree both for graduate study in computer science and for technical
careers in software development, computational science, networking,
information systems, and electronic commerce. Graduates of the
program are well-suited for professional employment in traditional
computer and communications industries, as well as in such diverse
industries as financial services and consulting practices in which
computing and information management are central to the operation
of the enterprise. Students who desire a more in-depth knowledge
of computing have the option of receiving a bachelor’s degree and a
master’s degree in as few as five years.

Department Programs

Majors

- Computer Science Major, B.A. (http://catalog.unc.edu/
  undergraduate/programs-study/computer-science-major-ba)
- Computer Science Major, B.S. (p. 1)

Minor

- Computer Science Minor (http://catalog.unc.edu/undergraduate/
  programs-study/computer-science-minor)

Graduate Programs

- M.S. in Computer Science (http://catalog.unc.edu/graduate/schools-
  departments/computer-science)
- Ph.D. in Computer Science (http://catalog.unc.edu/graduate/schools-
  departments/computer-science)

Student Learning Outcomes

Upon completion of the computer science program (B.S.), students
should be able to:

- Understand major concepts, theoretical perspectives, empirical
  findings, and historical trends in the core of computer science
- Gain technical employment in computing or related fields, or gain
  admission to high-quality graduate programs, either in computing or
  related professions
- Use critical and creative thinking skills in their approach to analyzing
  and solving computational problems

- Apply their knowledge, research skills, and critical thinking in the
  completion of a significant research project

Requirements

In addition to the program requirements, students must

- attain a final cumulative GPA of at least 2.0
- complete a minimum of 45 academic credit hours earned from UNC–
  Chapel Hill courses
- take at least half of their major course requirements (courses and
  credit hours) at UNC–Chapel Hill
- earn a minimum of 18 hours of C or better in the major core
  requirements (some majors require 21 hours).

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 401</td>
<td>Foundation of Programming $^{1, H}$</td>
<td>4</td>
</tr>
<tr>
<td>COMP 410</td>
<td>Data Structures $^{1}$</td>
<td>3</td>
</tr>
<tr>
<td>COMP 411</td>
<td>Computer Organization $^{1}$</td>
<td>4</td>
</tr>
<tr>
<td>COMP 283</td>
<td>Discrete Structures $^{1}$</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 381</td>
<td>Discrete Mathematics</td>
<td></td>
</tr>
<tr>
<td>COMP 455</td>
<td>Models of Languages and Computation</td>
<td>3</td>
</tr>
<tr>
<td>COMP 550</td>
<td>Algorithms and Analysis</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Five additional three-or-more credit hour COMP courses numbered 426 or higher (excluding courses for honors thesis, internships, independent study, and COMP 690). $^{2}$</td>
<td>15</td>
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</tbody>
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Additional Requirements

- MATH 231 Calculus of Functions of One Variable $^{1, H}$ | 4 |
- MATH 232 Calculus of Functions of One Variable II $^{1, H}$ | 4 |
- MATH 233 Calculus of Functions of Several Variables $^{1, H}$ | 4 |
- MATH 547 Linear Algebra for Applications | 3 |
- or MATH 577 Linear Algebra | |
- STOR 435 Introduction to Probability | 3 |
- PHYS 116 Mechanics $^{1, H}$ | 4 |
- or PHYS 118 Introductory Calculus-based Mechanics and Relativity | |

A second science course chosen from: $^{1}$

- ASTR 101 Introduction to Astronomy: The Solar System and Introduction to Astronomy Laboratory: Our Place in Space $^{H}$ | 4 |
- BIOL 101 Principles of Biology and Introductory Biology Laboratory $^{H}$ | |
- BIOL 202 Molecular Biology and Genetics $^{H}$ | |
- BIOL 205 Cellular and Developmental Biology $^{H}$ | |
- CHEM 101 General Descriptive Chemistry I and Quantitative Chemistry Laboratory I | |
- CHEM 102 General Descriptive Chemistry II and Quantitative Chemistry Laboratory II $^{H}$ | |
- GEOL 101 Planet Earth and Planet Earth Laboratory | |
- PHYS 115 General Physics II: For Students of the Life Sciences | |
- PHYS 117 Electromagnetism and Optics $^{H}$ | |
The following is a suggested plan of study for B.S. majors.

**Course** | **Title** | **Hours**
--- | --- | ---
**First Year**
ENGL 105 | English Composition and Rhetoric | 3
Foreign language level 2 and 3 (Foundations) | 6
COMP 110 | Introduction to Programming | 3
COMP 401 | Foundation of Programming | 4
MATH 231 | Calculus of Functions of One Variable I (quantitative reasoning Foundations course) | 4
MATH 232 | Calculus of Functions of One Variable II (Quantitative intensive Connections course) | 4
Additional General Education (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements) | 6
**Sophomore Year**
COMP 283 | Discrete Structures | 3
COMP 410 | Data Structures | 3

**Junior Year**
COMP 411 | Computer Organization | 4
MATH 233 | Calculus of Functions of Several Variables | 4
PHYS 116 | Mechanics | 4
PHYS 118 | or Introductory Calculus-based Mechanics and Relativity | 4
The second science course (see requirement course list) | 4
Three additional Approaches (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements) and Connections (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements) courses | 9
**Senior Year**
STOR 435 | Introduction to Probability | 3
Three courses numbered COMP 426 or greater | 6
Connections (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements) and free elective courses (four courses) | 12
Electives | 5
**Total Hours** | **61**

Computer science (COMP) course descriptions (http://catalog.unc.edu/undergraduate/departments/computer-science/#coursertext).

### 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.

The following is a suggested plan of study for B.S. majors.

### Notes on the Suggested Plan of Study

A first formal course in computer programming (such as COMP 110) or equivalent experience is a prerequisite for COMP 401. Students with no programming experience should begin their program of study with COMP 110. Students who are unsure if their background preparation enables them to begin their studies with COMP 401 are encouraged to consult a departmental advisor.

Students who are able to begin with COMP 401 may take it in their first semester and either advance the suggested program of study by one semester (giving themselves an extra free elective in their junior/senior years) or take another appropriate course such as a first-year seminar. In either case, neither COMP 110 nor a first-year seminar is a required course in the major.

This plan of study further assumes that students will place out of foreign language 1. If this is not the case, then the student should start with foreign language 1 (and have one fewer free elective in the senior year).
Special Opportunities in Computer Science

Honors in Computer Science

Students are eligible for graduation with honors if they complete the following requirements:

- A cumulative grade point average of 3.3 or better
- A grade point average of 3.3 or better from among the set of COMP, MATH, PHYS, and STOR courses taken to fulfill the graduation requirements for the major
- Graduation with honors requires the completion of two semesters of research (COMP 691H and COMP 692H). As part of COMP 692H, students must submit a written honors thesis and complete an oral public presentation of the thesis. Graduation with highest honors in computer science is possible for those students whose honors project and thesis are judged by a faculty committee to be particularly distinguished.

Students interested in pursuing honors in computer science are encouraged to contact the director of undergraduate studies.

Experiential Education

When arranged in advance with a supervising faculty member, COMP 293 can be used to earn credit for appropriate work experience in the summer. COMP 293 satisfies the experiential education requirement. COMP 495 and COMP 691H can also be used to satisfy the experiential education requirement. Another possibility is through study abroad (see below).

Assistantships and Internships

In addition to their classroom experiences, undergraduates may enhance their learning experience as research assistants or teaching assistants. Students also can participate in nationally recognized research programs or use the department’s facilities to pursue self-directed research with a faculty member.

Work-study students can gain valuable work experience as assistants on the department’s computer services staff. The department also encourages students to pursue internship experiences. Carolina’s proximity to Research Triangle Park means that computer science majors have many internship and postgraduation opportunities available in their own backyard.

Study Abroad

Study abroad opportunities with priority for computer science students are offered through University College London (UCL) and the National University of Singapore (NUS) School of Computing.

UCL can accept UNC-Chapel Hill students for either a semester or yearlong exchange. For semester-only programs, UCL recommends registering for spring semester rather than fall as it better matches their academic calendar. Many courses satisfying the computer science B.A. or B.S. requirements can be completed at UCL. UCL is located in the heart of London and is just a few blocks away from UNC-Chapel Hill’s European Study Center in Winston House.

NUS can accept UNC-Chapel Hill students for fall or spring semester, or a yearlong exchange. This exchange allows Carolina students to enroll directly into the NUS School of Computing and choose their courses from among the full offering. On a case-by-case basis, students may also be able to take other courses at NUS outside of the School of Computing. Study abroad at NUS is eligible for the Phillips Ambassadors Scholarship.