

Computer Science BS

Overview

Science and technology are the foundations of our future. The Department of Computer and Information Sciences (CIS) is focused on the understanding of fundamental scientific principles and the application of these principles to solving complex problems, using computing technology.

The **Bachelor of Science in Computer Science** provides an in-depth study of the science of computing, including mathematical/theoretical foundations as well as systems and application software development. Students take electives (4-5 courses) in topics such as artificial intelligence, machine learning, robotics, computer vision, graphics, game programming, bioinformatics, databases, big data, mobile and web application development, cloud computing, high performance computing, wireless and sensor networks, network and information security, and digital forensics. The program is for students with an interest in the fundamentals of computing, who want to be able to contribute to innovative research and product development. Our graduates have careers in software development, systems analysis, and consulting; they are also prepared for graduate study and research in Computer and Information Sciences.

Campus Location: Main

Program Code: ST-CSCI-BS

Distinction in Major

To graduate with distinction in this major, a student must satisfy the following criteria:

- have a minimum 3.50 major GPA and
- have a minimum 3.50 cumulative GPA.

Accelerated Programs

Accelerated programs provide a pathway for students to pursue both an undergraduate degree and an advanced degree in a shorter amount of time. Below is a list of available accelerated programs for students in the BS in Computer Science.

- BS in Computer Science / MS in Computer Science
- BS in Computer Science / MS in Computational Data Science

Undergraduate Contact Information

Jamie Payton, Chair
Science, Education and Research Center, Room 304
215-204-8450

Gene Kwatny, Vice Chair
Science, Education and Research Center, Room 304
215-204-8450

Sally Kyvernitis, Faculty Advisor
Science, Education and Research Center, Room 330
215-204-2030
sallyk@temple.edu

Learn more about the Bachelor of Science in Computer Science.

These requirements are for students who matriculated in academic year 2023-2024. Students who matriculated prior to fall 2023 should refer to the Archives to view the requirements for their Bulletin year.

Bachelor of Science Requirements

Summary of Requirements for the Degree

1. University Requirements (123 total s.h.)
 - Students must complete all University requirements including those listed below.
 - All undergraduate students must complete at least two writing-intensive courses for a total of at least six credits at Temple as part of their major. The specific writing-intensive course options for this major are:

| Code | Title | Credit Hours |
|------|-------|--------------|
|------|-------|--------------|

All students MUST take:

| | | |
|----------|-----------------|---|
| CIS 3296 | Software Design | 4 |
|----------|-----------------|---|

Second writing-intensive course can be chosen from:

| | | |
|----------|--|---|
| CIS 4397 | Independent Research in Computer Science | 3 |
|----------|--|---|

| | | |
|----------|------------------------------|---|
| CIS 4398 | Projects in Computer Science | 3 |
|----------|------------------------------|---|

- Students must complete the General Education (GenEd) requirements.
 - See the General Education section of the *Undergraduate Bulletin* for the GenEd curriculum.
 - Students who complete CST majors receive a waiver for 2 Science & Technology (GS) and 1 Quantitative Literacy (GQ) GenEd courses.
- Students must satisfy general Temple University residency requirements.

2. College Requirements

- A minimum of 90 total credits within the College of Science & Technology (CST), the College of Liberal Arts (CLA), and/or the College of Engineering (ENG).
 - A minimum of 45 of these credits must be upper-level (courses numbered 2000 and above).
- Complete a one-credit first-year or transfer seminar.
 - SCTC 1001 CST First Year Seminar for every entering first-year CST student.
 - SCTC 2001 CST Transfer Seminar for every entering transfer CST student.

3. Major Requirements for Bachelor of Science (73-74 s.h.)

At least 9 courses required for the major must be completed at Temple. At least 7 CIS courses must be completed at Temple.

| Code | Title | Credit Hours |
|------|-------|--------------|
|------|-------|--------------|

Computer & Information Science courses

| | | |
|-------------|---|---|
| CIS 1001 | Introduction to Academics in Computer Science | 1 |
| CIS 1051 | Introduction to Problem Solving and Programming in Python | 4 |
| or CIS 1057 | Computer Programming in C | |
| CIS 1068 | Program Design and Abstraction | 4 |
| or CIS 1968 | Honors Program Design and Abstraction | |
| CIS 1166 | Mathematical Concepts in Computing I | 4 |
| or CIS 1966 | Honors Mathematical Concepts in Computing I | |
| CIS 2033 | Computational Probability and Statistics | 3 |
| CIS 2107 | Computer Systems and Low-Level Programming | 4 |
| CIS 2166 | Mathematical Concepts in Computing II | 4 |
| CIS 2168 | Data Structures | 4 |
| CIS 3207 | Introduction to Systems Programming and Operating Systems | 4 |
| CIS 3223 | Data Structures and Algorithms | 3 |
| CIS 3296 | Software Design | 4 |
| CIS 4398 | Projects in Computer Science ¹ | 3 |
| or CIS 4397 | Independent Research in Computer Science | |

Computer Science Electives

Select 15-16 credits from the following CS elective courses: ² 15-16

| | | |
|----------|---|--|
| CIS 3100 | Special Topics in CIS | |
| CIS 3203 | Introduction to Artificial Intelligence | |
| CIS 3211 | Automata, Computability, and Languages | |
| CIS 3217 | Computer Architecture | |
| CIS 3219 | Computer Graphics and Image Processing | |
| CIS 3242 | Discrete Structures | |
| CIS 3308 | Web Application Programming | |
| CIS 3319 | Wireless Networks and Security | |
| CIS 3374 | Quality Assurance & Testing | |
| CIS 3381 | Cooperative Education Experience in Computer Science ³ | |
| CIS 3441 | Software Security | |
| CIS 3515 | Introduction to Mobile Application Development | |

| | | |
|---|--|--------------|
| CIS 3603 | User Experience Design | |
| CIS 3605 | Introduction to Digital Forensics | |
| CIS 3715 | Principles of Data Science | |
| CIS 4282 | Independent Study ³ | |
| CIS 4305 | Real Time Computer Systems (Not offered every year) | |
| CIS 4307 | Introduction to Distributed Systems and Networks (Not offered every year) | |
| CIS 4308 | Development of Multi-tier Client/Server Systems (Not offered every year) | |
| CIS 4319 | Computer Networks and Communications | |
| CIS 4324 | Compiler Design (Not offered every year) | |
| CIS 4331 | Principles of Database Systems | |
| CIS 4345 | Introduction to Cloud Computing | |
| CIS 4350 | Seminar on Topics in Computer Science | |
| CIS 4360 | Seminar on Topics in Computer Science | |
| CIS 4382 | Independent Study ³ | |
| CIS 4397 or CIS 4398 | Independent Research in Computer Science (if not taken as capstone requirement) ¹ Projects in Computer Science | |
| CIS 4419 | Securing the Internet of Things | |
| CIS 4515 | Advanced Mobile Application Development | |
| CIS 4517 | Data-Intensive and Cloud Computing | |
| CIS 4523 | Knowledge Discovery and Data Mining | |
| CIS 4524 | Analysis and Modeling of Social and Information Networks | |
| CIS 4526 | Foundations of Machine Learning | |
| CIS 4615 | Ethical Hacking and Intrusion Forensics | |
| Mathematics | | |
| MATH 1041 or MATH 1941 | Calculus I Honors Calculus I | 4 |
| MATH 1042 or MATH 1942 | Calculus II Honors Calculus II | 4 |
| Laboratory Science courses | | |
| Two (2) laboratory science courses ⁴ | | 8 |
| Total Credit Hours | | 73-74 |

1

GPA and other requirements are needed to register for CIS 4397.

2

Students can count one of the following as a CS elective course: MATH 2101 Linear Algebra, MATH 2103 Linear Algebra with Computer Lab, MATH 2043 Calculus III.

3

A maximum of eight (8) credits may be taken from CIS 3381, CIS 4282 and/or CIS 4382 to fulfill Computer Science elective requirements. In addition, a maximum of four (4) credits may be taken from CIS 3381 to fulfill Computer Science elective requirements.

4

Must select one Lab Science Sequence from the options listed below. Lab Science A and Lab Science B must be taken from the same department.

Sequenced Computer Science BS Laboratory Science Requirements

| Code | Title | Credit Hours |
|--|---|--------------|
| Biology Sequence | | |
| Select one Biology Lab Science A: | | |
| BIOL 1011 | General Biology I | |
| BIOL 1111 | Introduction to Organismal Biology | |
| BIOL 1911 | Honors Introduction to Organismal Biology | |
| Select one Biology Lab Science B: | | |

| | |
|-----------|--|
| BIOL 1012 | General Biology II |
| BIOL 1112 | Introduction to Biomolecules, Cells and Genomes |
| BIOL 1912 | Honors Introduction to Biomolecules, Cells and Genomes |
| BIOL 2112 | Introduction to Cellular and Molecular Biology |
| BIOL 2912 | Honors Introduction to Cellular and Molecular Biology |

Chemistry Sequence ¹**Select one Chemistry Lab Science A:**

| | |
|--------------------------|---|
| CHEM 1021 & CHEM 1023 | Introduction to Chemistry I and Introduction to Chemistry Laboratory I |
| CHEM 1031 & CHEM 1033 | General Chemistry I and General Chemistry Laboratory I |
| CHEM 1951 & CHEM 1953 | Honors General Chemical Science I and Honors Chemical Science Laboratory I |

Select one Chemistry Lab Science B:

| | |
|--------------------------|---|
| CHEM 1022 & CHEM 1024 | Introduction to Chemistry II and Introduction to Chemistry Laboratory II |
| CHEM 1032 & CHEM 1034 | General Chemistry II and General Chemistry Laboratory II |
| CHEM 1952 & CHEM 1954 | Honors General Chemical Science II and Honors Chemical Science Laboratory II |

Earth & Environmental Science Sequence ²**Select this Lab Science A:**

| | |
|----------|------------------|
| EES 2001 | Physical Geology |
|----------|------------------|

Select one Lab Science B:

| | |
|----------|--|
| EES 2011 | Mineralogy I (with CHEM 1031 prerequisite) |
| EES 2021 | Sedimentary Environments (no CHEM 1031 prerequisite) |
| EES 2061 | Introduction to Geochemistry (with CHEM 1031 prerequisite) |

Physics Sequence ³**Select one Physics Lab Science A:**

| | |
|-----------|---------------------------------------|
| PHYS 1021 | Introduction to General Physics I |
| PHYS 1061 | Elementary Classical Physics I |
| PHYS 1961 | Honors Elementary Classical Physics I |
| PHYS 2021 | General Physics I |
| PHYS 2921 | Honors General Physics I |

Select one Physics Lab Science B:

| | |
|-----------|--|
| PHYS 1022 | Introduction to General Physics II |
| PHYS 1062 | Elementary Classical Physics II |
| PHYS 1962 | Honors Elementary Classical Physics II |
| PHYS 2022 | General Physics II |
| PHYS 2922 | Honors General Physics II |

1

Students can choose to mix-and-match the Chemistry Sequence A and B courses. However, they must take at least 1 course from Chemistry Sequence A and 1 from Chemistry Sequence B. Note: Chemistry courses consist of a three-credit lecture plus a one-credit lab.

2

For the EES Sequence, two of the three Lab Science B options require students to take CHEM 1031 as a prerequisite, but EES 2021 does not.

3

Students can choose to mix-and-match the Physics Sequence A and B courses. However, they must take at least 1 course from Physics Sequence A and 1 from Physics Sequence B.

Suggested Academic Plan

Bachelor of Science in Computer Science

Suggested Plan for New Students Starting in the 2023-2024 Academic Year

| Year 1 | | |
|--|--|--------------|
| Fall | | Credit Hours |
| CIS 1001 | Introduction to Academics in Computer Science | 1 |
| Select one of the following: | | 4 |
| CIS 1051 | Introduction to Problem Solving and Programming in Python | |
| CIS 1057 | Computer Programming in C | |
| MATH 1041 or MATH 1941 | Calculus I or Honors Calculus I | 4 |
| SCTC 1001 | CST First Year Seminar | 1 |
| ENG 0802 or ENG 0812 or ENG 0902 | Analytical Reading and Writing or Analytical Reading and Writing: ESL or Honors Writing About Literature | 4 |
| Elective | | 1 |
| Credit Hours | | 15 |
| Spring | | |
| CIS 1166 or CIS 1966 | Mathematical Concepts in Computing I or Honors Mathematical Concepts in Computing I | 4 |
| CIS 1068 or CIS 1968 | Program Design and Abstraction or Honors Program Design and Abstraction | 4 |
| MATH 1042 or MATH 1942 | Calculus II or Honors Calculus II | 4 |
| IH 0851 or IH 0951 | Intellectual Heritage I: The Good Life or Honors Intellectual Heritage I: The Good Life | 3 |
| Credit Hours | | 15 |
| Year 2 | | |
| Fall | | |
| CIS 2168 | Data Structures | 4 |
| IH 0852 or IH 0952 | Intellectual Heritage II: The Common Good or Honors Intellectual Heritage II: The Common Good | 3 |
| GenEd Breadth Course | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Credit Hours | | 16 |
| Spring | | |
| CIS 2033 | Computational Probability and Statistics | 3 |
| CIS 2107 | Computer Systems and Low-Level Programming | 4 |
| GenEd Breadth Course | | 3 |
| GenEd Breadth Course | | 3 |
| Elective | | 3 |
| Credit Hours | | 16 |
| Year 3 | | |
| Fall | | |
| CIS 2166 | Mathematical Concepts in Computing II | 4 |
| CIS 3207 | Introduction to Systems Programming and Operating Systems | 4 |
| CS BS Laboratory Science A | | 4 |
| GenEd Breadth Course | | 3-4 |
| Elective | | 1-0 |
| Credit Hours | | 16 |

| | | |
|--|--|------------|
| Spring | | |
| CIS 3223 | Data Structures and Algorithms | 3 |
| Computer Science Elective ¹ | | 4 |
| CS BS Laboratory Science B | | 4 |
| GenEd Breadth Course | | 3 |
| Elective | | 1 |
| Credit Hours | | 15 |
| Year 4 | | |
| Fall | | |
| CIS 3296 | Software Design | 4 |
| Computer Science Elective ¹ | | 4 |
| Computer Science Elective ¹ | | 4 |
| Elective | | 3 |
| Credit Hours | | 15 |
| Spring | | |
| Select one of the following: | | 3 |
| CIS 4397 | Independent Research in Computer Science | |
| CIS 4398 | Projects in Computer Science | |
| Computer Science Elective ¹ | | 3-4 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3-2 |
| Credit Hours | | 15 |
| Total Credit Hours | | 123 |

1

Select from the Computer Science Electives list under Requirements.