COMPUTER SCIENCE, BA

Degree: Bachelor of Arts (BA)
Major: Computer Science

Program Overview

This program provides students with a strong background in the fundamentals of mathematics and science. Students can use their technical and open electives to pursue concentrations in software engineering, algorithms, artificial intelligence, databases, data mining, bioinformatics, security, computer systems, and computer networks. In addition to an excellent technical education, all students in the department are exposed to societal issues, ethics, professionalism, and have the opportunity to develop leadership and creativity skills.

The Bachelor of Arts degree program in computer science is a combination of a liberal arts program and a computing major. It is a professional program in the sense that graduates can be employed as computer professionals, but it is less technical than the Bachelor of Science degree program in computer science. This degree is particularly suitable for students with a wide range of interests. For example, students can major in another discipline in addition to computer science and routinely complete all of the requirements for the double major in a 4 year period. This is possible because over a third of the courses in the program are open electives. Furthermore, if a student is majoring in computer science and a second technical field such as mathematics or physics many of the technical electives will be accepted for both majors. Another example of the utility of this program is that it routinely allows students to major in computer science and take all of the pre-med courses in a four-year period.

Mission

The mission of the Bachelor of Arts degree program in computer science is to graduate students who have fundamental technical knowledge of their profession and the requisite technical breadth and communications skills to become leaders in creating the new techniques and technologies which will advance the field of computer science and its application to other disciplines.

Program Educational Objectives

a. To educate and train students in the fundamentals of computer science and mathematics
b. To educate students with an understanding of real-world computing needs
c. To train students to work effectively, professionally and ethically in computing-related professions

Learning Outcomes

As preparation for achieving the above educational objectives, the Bachelor of Arts degree program in computer science is designed so that students attain the ability to:

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

Core and breadth courses provide our students with the flexibility to work across many disciplines and prepare them for a variety of professions. Our curriculum is designed to teach fundamental skills and knowledge needed by all CS graduates while providing the greatest flexibility in selecting topics.

Undergraduate Policies

For undergraduate policies and procedures, please review the Office of Undergraduate Studies section of the General Bulletin.

Accelerated Master's Programs

Undergraduate students may participate in accelerated programs toward graduate or professional degrees. For more information and details of the policies and procedures related to accelerated studies, please visit the Office of Undergraduate Studies section of the General Bulletin.

Program Requirements

Students seeking to complete this major and degree program must meet the general requirements for bachelor's degrees and the general requirements of the College of Arts and Sciences. Students completing this program as a secondary major while completing another undergraduate degree program do not need to satisfy the latter set of requirements.

Students are required to complete a total of 13 computer science and computer science related courses, totaling at least 42 credits. The 13 courses for a total of 42 credits must include all 6 core courses and at least 3 computer science breadth courses. The remaining 4 courses may be any CS Course, defined below, plus at most 3 courses from either the group 1 or the group 3 list of approved technical electives. There is no depth requirement for the Computer Science BA degree.

Required Courses

Code	Title	Hours
Mathematics Requirement		
BA students must complete two of the following calculus courses:		8
MATH 121	Calculus for Science and Engineering I	
or MATH 123		
or MATH 125	Math and Calculus Applications for Life, Managerial, and Social Sci I	
MATH 122	Calculus for Science and Engineering II	
or MATH 124	Calculus II	
or MATH 126	Math and Calculus Applications for Life, Managerial, and Social Sci II	
Core Requirement		
All computer science majors are required to complete the following 6 courses:		21
CSDS 132	Programming in Java	
CSDS 233	Introduction to Data Structures	

CSDS 281	Logic Design and Computer Organization	
CSDS 302	Discrete Mathematics	
CSDS 310	Algorithms	
CSDS 395	Senior Project in Computer Science	

Breadth Requirement

BA students must complete at least 3 of the 7 following courses:		9-10
CSDS 314	Computer Architecture	
CSDS 325	Computer Networks I	
CSDS 338	Intro to Operating Systems and Concurrent Programming	
CSDS 341	Introduction to Database Systems	
CSDS 345	Programming Language Concepts	
CSDS 391	Introduction to Artificial Intelligence	
CSDS 393	Software Engineering	

Computer Science Courses

BA students must complete at least one additional CS Course for a total of 10. The remaining 3 courses to complete the major may come from the CS Courses or Technical Elective lists below.		12
Total Hours		**50**

CS Courses

Code	Title	Hours
Any computer science core course (see above)		
Any computer science breadth course (see above)		
CSDS 234	Structured and Unstructured Data	3
CSDS 293	Software Craftsmanship	4
CSDS 312	Introduction to Data Science Systems	3
CSDS 313	Introduction to Data Analysis	3
CSDS 337	Compiler Design	4
CSDS 339		3
CSDS 343	Theoretical Computer Science	3
CSDS 344	Computer Security	3
CSDS 356	Data Privacy	3
CSDS 392	App Development for iOS	3
CSDS 394	Introduction to Information Theory	3
CSDS 405	Data Structures and File Management	3
CSDS 427	Internet Security and Privacy	3
CSDS 428	Computer Communications Networks II	3
CSDS 433	Database Systems	3
CSDS 435	Data Mining	3
CSDS 438	High Performance Data and Computing	3
CSDS 440	Machine Learning	3
CSDS 442	Causal Learning from Data	3
CSDS 448	Smartphone Security	3
CSDS 455	Applied Graph Theory	3
CSDS 458	Introduction to Bioinformatics	3
CSDS 459	Bioinformatics for Systems Biology	3
CSDS 465	Computer Vision	3
CSDS 477	Advanced Algorithms	3
CSDS 491	Artificial Intelligence: Probabilistic Graphical Models	3
CSDS 496	Artificial Intelligence: Sequential Decision Making	3
CSDS 497	Artificial Intelligence: Statistical Natural Language Processing	3
CSDS 499	Algorithmic Robotics	3
ECSE 484	Computational Intelligence I: Basic Principles	3
MATH 382	High Dimensional Probability	3
MATH 406	Mathematical Logic and Model Theory	3
MATH 408	Introduction to Cryptology	3
MATH 444	Mathematics of Data Mining and Pattern Recognition	3
PHIL 306	Mathematical Logic and Model Theory	3

Approved Technical Electives

For Computer Science BA students, up to 3 of the 13 computer science and computer science related courses may come from the group 1 and group 3 lists. Computer science related courses not listed below may be used as a technical elective but require prior permission from the student's academic advisor.

Group 1

Code	Title	Hours
Any CSDS course		
ECSE 301	Digital Logic Laboratory	2
ECSE 303	Embedded Systems Design and Laboratory	3
ECSE 317	Computer Design - FPGAs	3
ECSE 318	VLSI/CAD	4
ECSE 419	Computer System Architecture	3
ECSE 485	VLSI Systems	3
ECSE 488	Embedded Systems Design	3
MATH 330	Introduction to Scientific Computing	3
MATH 431	Introduction to Numerical Analysis I	3

Group 3

Code	Title	Hours
MATH 201 or MATH 307	Introduction to Linear Algebra for Applications Linear Algebra	3
MATH 380	Introduction to Probability	3

Sample Plan of Study

First Year

Fall

		Hours
CSDS 132	Programming in Java	3
Breadth elective [**]		3
Select one of the following:		4
MATH 125	Math and Calculus Applications for Life, Managerial, and Social Sci I	
MATH 123		
MATH 121	Calculus for Science and Engineering I	
Open elective		3
PHED (2 half semester courses) [*]		0
SAGES First Year Seminar [*]		4
	Hours	**17**

Spring

		Hours
Select one of the following:		4
MATH 126	Math and Calculus Applications for Life, Managerial, and Social Sci II	

MATH 124	Calculus II	
MATH 122	Calculus for Science and Engineering II	
Breadth elective [**]		3
Open elective		3
Open elective		3
PHED (2 half semester courses) [*]		0
SAGES University Seminar [*]		3
	Hours	**16**
Second Year		
Fall		
CSDS 281	Logic Design and Computer Organization	4
Breadth elective [**]		3
Open elective		3
Open elective		3
SAGES University Seminar [*]		3
	Hours	**16**
Spring		
CSDS 233	Introduction to Data Structures	4
CSDS 302	Discrete Mathematics	3
Breadth elective [**]		3
Open elective		3
Open elective		3
	Hours	**16**
Third Year		
Fall		
Computer science breadth course [a]		3
Computer science breadth course [a]		3
Open elective		3
SAGES Department Seminar		3
	Hours	**12**
Spring		
Computer science breadth course [a]		3
Open elective		3
Technical elective [b]		3
Technical elective [b]		3
	Hours	**12**
Fourth Year		
Fall		
CSDS 310	Algorithms	3
Open elective		3
Open elective		3
Open elective		3
Technical elective [b]		3
	Hours	**15**
Spring		
CSDS 395	Senior Project in Computer Science	4
Open elective		3
Open elective		3
Open elective		3

Technical elective [b]		3
	Hours	**16**
	Total Hours	**120**

[*]   University general education requirement.
[**]   Arts and Sciences general education requirement.
[a]   Each student must complete 3 of the 7 following courses: CSDS 314, CSDS 325, CSDS 338, CSDS 341, CSDS 345, CSDS 391. CSDS 338 is a 4 unit course.
[b]   Chosen from the list of CS Courses or the list of approved technical electives. Any other course used as a technical elective must be approved by the student's advisor.