# COMPUTER SCIENCE, BACHELOR OF ARTS (B.A.)

The Bachelor of Arts in Computer Science is a multidisciplinary program that integrates a curriculum of computer science courses with other areas of study. The program provides a foundation in the computer science discipline and encourages students to integrate different perspectives in order to formulate new ideas and solutions for today's computing challenges.

The degree requires a minimum of 120 credit hours. Students are required to attain a second major or a minor in another content area.

Student learning outcomes

**Upon completing this program, students will know and know how to do the following:**

1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline
3. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline
4. Apply computer science theory and software development fundamentals to produce computing-based solutions
5. Respond to complex problems, issues and ideas by proposing new ideas or solutions that understand and integrate the perspectives of multiple disciplines and stakeholders

## Special requirements

The B.A. in Computer Science requires a minimum of 120 credits. Students must receive a minimum grade of C in all computer science courses in order to graduate.

## Degree requirements for Computer Science, Bachelor of Arts (B.A.)

| Course | Title | Hours |
|---|---|---|
| **General education (http://bulletin.vcu.edu/undergraduate/undergraduate-study/general-education-curriculum/)** | | |
| Select 30 credits of general education courses in consultation with an adviser. | | 30 |
| **Major requirements** | | |
| • Major core requirements | | |
| CMSC 235 | Computing and Data Ethics | 3 |
| CMSC 254 | Introduction to Problem-solving | 4 |
| CMSC 255 | Introduction to Object-oriented Programming | 4 |
| CMSC 256 | Introduction to Data Structures | 4 |
| CMSC 302 | Introduction to Discrete Structures | 3 |
| CMSC 311 | Computer Organization | 3 |
| CMSC 355 | Fundamentals of Software Engineering | 3 |
| CMSC 401 | Algorithm Analysis with Advanced Data Structures | 3 |
| • Restricted electives | | |
| Select four courses from the following: | | 12-13 |
| CMSC 257 | Computer Systems | |
| CMSC 303 | Introduction to the Theory of Computation | |
| CMSC 304 | Programming Languages | |
| CMSC 312 | Introduction to Operating Systems | |
| CMSC 404 | Compiler Construction | |
| CMSC 408 | Databases | |
| CMSC 410 | Introduction to Quantum Computing | |
| CMSC 411 | Computer Graphics | |
| CMSC 412 | Social Network Analysis and Cybersecurity Risks | |
| CMSC 413 | Introduction to Cybersecurity | |
| CMSC 414 | Computer and Network Security | |
| CMSC 415 | Introduction to Cryptography | |
| CMSC 420 | Software Project Management | |
| CMSC 425 | Introduction to Software Analysis and Testing | |
| CMSC 426 | Software as a Service | |
| CMSC 427 | Design and Implementation of User Interfaces | |
| CMSC 428 | Mobile Programming: iOS | |
| CMSC 435 | Introduction to Data Science | |
| CMSC 436 | Artificial Intelligence | |
| CMSC 437 | Introduction to Natural Language Processing | |
| CMSC 438 | Machine Learning | |
| CMSC 440 | Data Communication and Networking | |
| **Ancillary requirements** | | |
| IDST 301 | Interdisciplinary Theory and Practice | 3 |
| MATH 211 | Mathematical Structures | 3 |
| MATH 310 | Linear Algebra | 3 |
| STAT 212 | Concepts of Statistics (satisfies general education quantitative foundations) | 3 |
| **Required minor** | | |
| Select a minor. | | 18 |
| **Open electives** | | |
| Select any course. | | 20-24 |
| **Total Hours** | | **120** |

**The minimum number of credit hours required for this degree is 120.**

What follows is a sample plan that meets the prescribed requirements within a four-year course of study at VCU. Please contact your adviser before beginning course work toward a degree.

**Freshman year**

| **Fall semester** | | **Hours** |
|---|---|---|
| CMSC 235 | Computing and Data Ethics | 3 |
| CMSC 254 | Introduction to Problem-solving | 4 |
| MATH 151 | Precalculus Mathematics | 4 |

| | | |
|---|---|---|
| UNIV 111 Play course video for Focused Inquiry I | Focused Inquiry I (satisfies general education UNIV foundations) | 3 |
| | **Term Hours:** | **14** |
| **Spring semester** | | |
| CMSC 255 | Introduction to Object-oriented Programming | 4 |
| MATH 211 | Mathematical Structures | 3 |
| UNIV 112 Play course video for Focused Inquiry II | Focused Inquiry II (satisfies general education UNIV foundations) | 3 |
| General education courses | | 6 |
| | **Term Hours:** | **16** |
| **Sophomore year** | | |
| **Fall semester** | | |
| CMSC 256 | Introduction to Data Structures | 4 |
| CMSC 302 | Introduction to Discrete Structures | 3 |
| UNIV 200 | Advanced Focused Inquiry: Literacies, Research and Communication (satisfies general education UNIV foundations) | 3 |
| General education courses | | 6 |
| | **Term Hours:** | **16** |
| **Spring semester** | | |
| CMSC 311 | Computer Organization | 3 |
| STAT 212 | Concepts of Statistics (satisfies general education quantitative foundations) | 3 |
| General education courses | | 6 |
| Minor course | | 3 |
| | **Term Hours:** | **15** |
| **Junior year** | | |
| **Fall semester** | | |
| CMSC 355 | Fundamentals of Software Engineering | 3 |
| MATH 310 | Linear Algebra | 3 |
| Minor course | | 3 |
| Open elective | | 3 |
| Restricted elective | | 3 |
| | **Term Hours:** | **15** |
| **Spring semester** | | |
| CMSC 401 | Algorithm Analysis with Advanced Data Structures | 3 |
| IDST 301 | Interdisciplinary Theory and Practice | 3 |
| Minor course | | 3 |
| Open elective | | 3 |
| Restricted elective | | 3 |
| | **Term Hours:** | **15** |
| **Senior year** | | |
| **Fall semester** | | |
| Minor courses | | 6 |
| Open electives | | 6 |
| Restricted elective | | 3 |
| | **Term Hours:** | **15** |
| **Spring semester** | | |
| Minor course | | 3 |
| Open electives | | 8 |
| Restricted elective | | 3 |
| | **Term Hours:** | **14** |
| | **Total Hours:** | **120** |

**The minimum number of credit hours required for this degree is 120.**