COMPUTER SCIENCE - BACHELOR OF SCIENCE

The Bachelor of Science in Computer Science is the traditional undergraduate degree in Computer Science. It is rigorously focused on educating the student in the fundamental disciplines of Computer Science. It prepares the student for any technological field in industry, and also provides the preparation for graduate studies in Computer Science. It is the main undergraduate degree in the Computer Science department, and should be the choice of a single-major Computer Science student. This degree is accredited by the ABET Computing Accreditation Commission (CAC) under the General and Computer Science Program Criteria (through 9/30/2022).

General Requirements Exception

A grade of at least C- must be earned in each of the courses taken to satisfy the departmental and non-departmental requirements. No course may be counted as satisfying both a departmental and a non-departmental requirement. No course taken to satisfy either a departmental or a non-departmental requirement may be taken S/U.

Requirements

Students must complete all University degree requirements, which include: General Education requirements, Viewing a Wider World requirements, and elective credits to total at least 120 credits with 48 credits in courses numbered 300 or above. Developmental coursework will not count towards the degree requirements and/or elective credits, but may be needed in order to take the necessary English and Mathematics coursework.

Prefix | Title | Credits
--- | --- | ---
General Education Requirement

**Area I: Communications**

English Composition - Level 1 | 2

Choose one from the following:

ENGL 218G Technical and Scientific Communication | 3
ENGL 311G Advanced Composition
ENGL 318G Advanced Technical and Professional Communication

**Oral Communication**

Choose one from the following:

COMM 253G Public Speaking
COMM 265G Principles of Human Communication
HON 265G Principles of Human Communication Honors

**Area II: Mathematics**

MATH 191G Calculus and Analytic Geometry I | 4

**Area III/IV: Laboratory Sciences and Social/Behavioral Sciences**

Area III: Laboratory Sciences

Choose two different courses from the following:

ASTR 110G Introduction to Astronomy
BIOL 111G Natural History of Life

Area IV: Social/Behavioral Sciences (3 credits)

**Area V: Humanities**

**Area VI: Creative and Fine Arts**

General Education Elective

MATH 192G Calculus and Analytic Geometry II | 4

Viewing a Wider World

**Departmental/College Requirements**

C S 172 Computer Science I | 4
C S 271 Object Oriented Programming
C S 272 Introduction to Data Structures
C S 273 Machine Programming and Organization
C S 278 Discrete Mathematics for Computer Science
C S 370 Compilers and Automata Theory
C S 371 Software Development
C S 372 Data Structures and Algorithms
C S 419 Computing Ethics and Social Implications of Computing
C S 448 Senior Project or C S 449 Senior Thesis
C S 471 Programming Language Structure I
C S 474 Operating Systems I
C S 482 Database Management Systems I

Select 6 credits from the following:

C S 473 Architectural Concepts I
C S 475 Artificial Intelligence I
C S 476 Computer Graphics I
C S 477 Digital Game Design
C S 478 Computer Security
C S 479 Special Topics
C S 480 Linux System Administration
C S 481 Visual Programming
C S 483 Introduction to Robotics
C S 484 Computer Networks I
C S 485 User Interface Design
C S 486 Bioinformatics
C S 487 Applied Machine Learning I
C S 488 Introduction to Data Mining
C S 489 Bioinformatics Programming
C S 491 Parallel Programming
C S 494 Introduction to Smart Grids
C S 496 Cloud and Edge Computing

Non-Departmental Requirements (in addition to Gen.Ed/ VWW)
MATH 280 Introduction to Linear Algebra 3
or MATH 480 Matrix Theory and Applied Linear Algebra
Select one from the following: 3
MATH 331 Introduction to Modern Algebra
MATH 332 Introduction to Analysis
MATH 377 Introduction to Numerical Methods
MATH 392 Introduction to Ordinary Differential Equations
MATH 454 Logic and Set Theory
MATH 455 Elementary Number Theory
Select one from the following: 3
A ST 311 Statistical Applications
STAT 371 Statistics for Engineers and Scientists I
STAT 470 Probability: Theory and Applications

Lab Science Courses
Select one from the following: 5
BIOL 111G Natural History of Life
& 111GL and Natural History of Life Laboratory
BIOL 211G Cellular and Organismal Biology
& 211GL and Cellular and Organismal Biology Laboratory
CHEM 111G General Chemistry I
CHEM 112G General Chemistry II
PHYS 211G General Physics I
& 211GL and General Physics I Laboratory
PHYS 212G General Physics II
& 212GL and General Physics II Laboratory
PHYS 213 Mechanics
& 213 L and Experimental Mechanics
PHYS 214 Electricity and Magnetism
& 214 L and Electricity and Magnetism Laboratory
PHYS 215G Engineering Physics I
& 215GL and Engineering Physics I Laboratory
PHYS 216G Engineering Physics II
& 216GL and Engineering Physics II Laboratory

Second Language Requirements: (not required)
Electives, to bring the total credits to 120 7
Students who plan to seek employment at the bachelor level are advised to use their elective credits to complete one of the concentration areas below

Concentrations
Students who plan to seek employment at the bachelor level are advised to take one of the concentration area curricula in addition to the general and departmental requirements. An elective course cannot be used for more than two focuses. A course that is required for one concentration cannot be used as an elective course of another one. Below are the list of possible concentrations.

**Concentration: Algorithm Theory**

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select 3-4 credits from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C S 372</td>
<td>Data Structures and Algorithms</td>
<td>3-4</td>
</tr>
<tr>
<td>C S 343</td>
<td>Algorithm Design &amp; Implementation</td>
<td></td>
</tr>
<tr>
<td>Select 9 credits from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C S 475</td>
<td>Artificial Intelligence I</td>
<td></td>
</tr>
<tr>
<td>C S 476</td>
<td>Computer Graphics I</td>
<td></td>
</tr>
<tr>
<td>C S 487</td>
<td>Applied Machine Learning I</td>
<td></td>
</tr>
<tr>
<td>C S 488</td>
<td>Introduction to Data Mining</td>
<td></td>
</tr>
<tr>
<td>Total Credits</td>
<td>12-13</td>
<td></td>
</tr>
</tbody>
</table>

**Concentration: Artificial Intelligence**

<table>
<thead>
<tr>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Select 3-4 credits from the following:</td>
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<td></td>
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<tr>
<td>C S 372</td>
<td>Data Structures and Algorithms</td>
<td>3-4</td>
</tr>
<tr>
<td>C S 343</td>
<td>Algorithm Design &amp; Implementation</td>
<td></td>
</tr>
<tr>
<td>Select 9 credits from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C S 475</td>
<td>Artificial Intelligence I</td>
<td></td>
</tr>
<tr>
<td>C S 483</td>
<td>Introduction to Robotics</td>
<td></td>
</tr>
<tr>
<td>C S 487</td>
<td>Applied Machine Learning I</td>
<td></td>
</tr>
<tr>
<td>C S 488</td>
<td>Introduction to Data Mining</td>
<td></td>
</tr>
<tr>
<td>Total Credits</td>
<td>12-13</td>
<td></td>
</tr>
</tbody>
</table>

**Concentration: Big Data and Data Science**

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required course:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C S 371</td>
<td>Software Development</td>
<td></td>
</tr>
<tr>
<td>C S 482</td>
<td>Database Management Systems I</td>
<td></td>
</tr>
<tr>
<td>Select 6 credits from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C S 487</td>
<td>Applied Machine Learning I</td>
<td></td>
</tr>
<tr>
<td>Total Credits</td>
<td>12-13</td>
<td></td>
</tr>
</tbody>
</table>
## A Suggested Plan of Study for Students

This roadmap assumes student placement in MATH 191G Intermediate Algebra and ENGL 111G Rhetoric and Composition. The contents and order of this roadmap may vary depending on initial student placement in mathematics and English. It is only a suggested plan of study for students and is not intended as a contract. Course availability may vary from fall to spring semester and may be subject to modification or change.

### Course Title Credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>C S 172</td>
<td>Computer Science I</td>
<td>4</td>
</tr>
<tr>
<td>C S 271</td>
<td>Object Oriented Programming</td>
<td>4</td>
</tr>
<tr>
<td>C S 273</td>
<td>Machine Programming and Organization</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 111G</td>
<td>Rhetoric and Composition</td>
<td>4</td>
</tr>
<tr>
<td>MATH 191G</td>
<td>Calculus and Analytic Geometry I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 192G</td>
<td>Calculus and Analytic Geometry II</td>
<td>4</td>
</tr>
</tbody>
</table>

### Area IV: Social/Behavioral Sciences Course

| Area VI: Creative and Fine Arts | 2 |
| Select one from the following: | 3 |
| A ST 311 | Statistical Applications | 3 |
| STAT 371 | Statistics for Engineers and Scientists I | 3 |
| STAT 470 | Probability, Theory and Applications | 3 |

### Elective credits if needed for financial aid requirements

| Elective credits if needed for financial aid requirements | 3 |

| Credits | 31-34 |

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### Second Language Requirement

For the Bachelor of Science with a major in Computer Science (including all Concentration Areas), there is no second language requirement for the degree.
### Computer Science - Bachelor of Science

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>C S 419</td>
<td>Computing Ethics and Social Implications of Computing</td>
<td>1</td>
</tr>
<tr>
<td>C S 474</td>
<td>Operating Systems I</td>
<td>3</td>
</tr>
<tr>
<td>Lab Science Elective</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Computer Science 400-level Elective</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Upper division electives to bring total upper division to 48</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Electives as needed to meet minimum credit requirements</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credits</th>
<th>26</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Credits</td>
<td>120-123</td>
</tr>
</tbody>
</table>

1. MATH 191G Calculus and Analytic Geometry I is required for the degree but students may need to take any prerequisites needed to enter MATH 191G first.

2. See the General Education (http://nmsu-preview.courseleaf.com/nmsu/arts-sciences/computer-science/computer-science-bachelor-science) section of the catalog for a full list of courses.

3. Students who plan to seek employment at the bachelor level are advised to use their elective credits to complete one of the concentration areas below. Elective credit may vary based on prerequisites, dual credit, AP credit, double majors, and/or minor coursework. The amount indicated in the requirements list is the amount needed to bring the total to 120 credits and may appear in variable form based on the degree. However, students may end up needing to complete more or less on a case-by-case basis and students should discuss elective requirements with their advisor.

4. See list of Computer Science electives (https://catalogs.nmsu.edu/nmsu/arts-sciences/computer-science/computer-science-bachelor-science/#requirementstext) in Degree Requirement Section.

5. **Math Electives:**
   - MATH 331 Introduction to Modern Algebra
   - MATH 332 Introduction to Analysis
   - MATH 377 Introduction to Numerical Methods
   - MATH 392 Introduction to Ordinary Differential Equations
   - MATH 454 Logic and Set Theory
   - MATH 455 Elementary Number Theory


7. See the Viewing a Wider World (http://catalogs.nmsu.edu/nmsu/essential-information-students/general-education-courses/viewingawiderworldtext) section of the catalog for a full list of courses.

Students planning to undertake graduate work in computer science are encouraged to consult with their advisor regarding the possibility of taking other computer science electives to satisfy their departmental requirements.