Computer Science

Degree Offered
• Bachelor of Science

Nature of the Program
Computer scientists are distinguished from other computer professionals, such as information technology specialists and system administrators, by the higher level of theoretical expertise, the innovation they apply to complex problems, and the extensive knowledge and experience they possess in software engineering. A computer scientist can often expect to work on multidisciplinary projects such as robotics, human-computer interaction, advanced computer graphics, and artificial intelligence based systems.

The first two years of study in the Bachelor of Science in Computer Science (BS CS) program focus on the fundamentals of computer science concepts and provide a firm foundation in mathematics. During the junior and senior years, students are introduced to advanced concepts in the science of computation and are presented the opportunity to take elective courses such as video game development, cryptography, computer graphics, artificial intelligence and image processing. The two semester senior project sequence provides the culminating experience for the Computer Science students. Students may also have the opportunity to participate in undergraduate research projects with the computer science faculty.

Educational Objectives
In three to five years after graduation, the graduates of the WVU Tech BS degree program in Computer Science will do the following:
• Demonstrate success in the professional practice of Computer Science through recognition of their contributions to an organization or entrepreneurial accomplishments.
• Alternatively or additionally, demonstrate success in the field of computing by continuing formal education through earning post graduate degrees, technical certificates, or other technical training.
• Demonstrate lifelong learning habits either as a professional or a researcher in their field.

FACULTY
CHAIR
• Don Smith - M.S. (West Virginia University); M.A. (Marshall University)

PROFESSOR
• Ranjith Munasinghe - Ph.D. (University of Wyoming)

ASSOCIATE PROFESSOR
• Afrin Naz - Ph.D. (University of North Texas)

ASSISTANT PROFESSORS
• Bhanukiran Gurijala - Ph.D. (University of Texas)
• Sanish Rai - Ph.D. (Georgia State University)

General Education Foundations
Please use this link to view a list of courses that meet each GEF requirement. (http://registrar.wvu.edu/gef)

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

General Education Foundations

<table>
<thead>
<tr>
<th>Foundation</th>
<th>Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1 - Composition &amp; Rhetoric</td>
<td>ENGL 101 &amp; ENGL 102 Introduction to Composition and Rhetoric or ENGL 103 Accelerated Academic Writing</td>
<td>3-6</td>
</tr>
<tr>
<td>F2A/F2B - Science &amp; Technology</td>
<td></td>
<td>4-6</td>
</tr>
<tr>
<td>F3 - Math &amp; Quantitative Reasoning</td>
<td></td>
<td>3-4</td>
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<tr>
<td>F4 - Society &amp; Connections</td>
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<td>3</td>
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<tr>
<td>F5 - Human Inquiry &amp; the Past</td>
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</tbody>
</table>
Please note that not all of the GEF courses are offered at all campuses. Students should consult with their advisor or academic department regarding the GEF course offerings available at their campus.

**Curriculum Requirements**

A minimum GPA of 2.0 is required.

**GEF Elective Requirements (2, 5, 6, 7, and 8)**

- Laboratory Science, GEF 2 and 8 (a total of 8 credit hours required) - Students may select any of the two courses from the following list:
  - BIOL 111 General Biology
  - BIOL 112 General Biology
  - CHEM 111 Survey of Chemistry 1
    & 111L and Survey of Chemistry 1 - Laboratory
  - CHEM 112 Survey of Chemistry 2
    & 112L and Survey of Chemistry 2 - Laboratory
  - CHEM 115 Fundamentals of Chemistry
    & 115L and Fundamentals of Chemistry 1 - Laboratory
  - CHEM 116 Fundamentals of Chemistry
    & 116L and Fundamentals of Chemistry 2 - Laboratory
  - PHYS 101 Introductory Physics 1
  - PHYS 102 Introductory Physics 2
  - PHYS 111 General Physics
  - PHYS 112 General Physics
  - ENGL 101 Introduction to Composition and Rhetoric
    & ENGL 102 and Composition, Rhetoric, and Research (GEF 1)
  - ENGL 305 Technical Writing
  - MATH 155 Calculus 1 (GEF 3)
  - MATH 156 Calculus 2
  - MATH 251 Multivariable Calculus
  - MATH 441 Applied Linear Algebra
  - MATH 448 Probability and Statistics
  - ECON 401 Managerial Economics (GEF 4)
  - WVUE 191 First Year Seminar
  - CS 121 Computer Science 1
  - CS 122 Computer Science 2
  - CS 201 Data Structures
  - CS 220 Discrete Mathematics
  - CS 221 Analysis of Algorithms
  - CS 222 Intro Software Engineering
  - CS 231 Introduction to Computer Organization
  - CS 265 C Programming
  - CS 310 Principles of Programming Languages
  - CS 321 Introduction to Networking
  - CS 324 Database Management
  - CS 355 Computer Concepts
  - CS 410 Compiler Construction
  - CS 450 Operating Systems Structure
  - CS 479 Advanced Computer Science Mathematics
  - CS 480 Capstone Project - Design
Approved Technical Electives

Accounting
- ACCT 201 Principles of Accounting
- ACCT 202 Principles of Accounting

Biology
- BIOL 111 General Biology **
- BIOL 112 General Biology **

Chemistry
- CHEM 111 Survey of Chemistry 1
- CHEM 111L Survey of Chemistry 1 - Laboratory **
- CHEM 112 Survey of Chemistry 2
- CHEM 112L Survey of Chemistry 2 - Laboratory **
- CHEM 115 Fundamentals of Chemistry
- CHEM 115L Fundamentals of Chemistry 1 - Laboratory **
- CHEM 116 Fundamentals of Chemistry
- CHEM 116L Fundamentals of Chemistry 2 - Laboratory **

Computer Engineering
- CPE 271 Introduction to Digital Logic Design

Computer Science
- CS 300+ or 400+ (Except CS 491)

Electrical Engineering
- EE 221 Introduction to Electrical Engineering
- EE 223 Electrical Circuits
- MAE 241 Statics
- MAE 242 Dynamics
- MAE 243 Mechanics of Materials
- MAE 331 Fluid Mechanics
- ISYS 270 Linux
- ISYS 325 C#
- ISYS 366 e-Commerce
- MATH 261 Elementary Differential Equations

Physics
- PHYS 101 Introductory Physics 1 **
- PHYS 102 Introductory Physics 2 **
- PHYS 111 General Physics **
- PHYS 112 General Physics **

** Unless taken as a science requirement

Other courses are accepted as technical electives only with advance approval from the department. Most of the 300-400 level ACCT, BIOL, CHEE, CHEM, CPE, CE, EE, MAE, MATH, and PHYS courses are considered acceptable.

Suggested Plan of Study

First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 101 (GEF 1)</td>
<td>3</td>
<td>ENGL 102 (GEF 1)</td>
<td>3</td>
</tr>
<tr>
<td>CS 121</td>
<td>4</td>
<td>CS 122</td>
<td>4</td>
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<tr>
<td>WVUE 191</td>
<td>1</td>
<td>GEF 6</td>
<td>3</td>
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</table>
### General Elective
3 GEF 7  
3 GEF 8

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<thead>
<tr>
<th>Second Year</th>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
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<tbody>
<tr>
<td>MATH 155 (GEF 3)</td>
<td>4 MATH 156</td>
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<tr>
<td>CS 201</td>
<td>3 CS 220</td>
<td>3</td>
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<tr>
<td>CS 231</td>
<td>3 CS 222</td>
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<tr>
<td>CS 265</td>
<td>2 CS 310</td>
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<tr>
<td>GEF 2 (Laboratory Science)</td>
<td>4 GEF 8 (Laboratory Science)</td>
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<tr>
<th>Third Year</th>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ECON 401 (GEF 4)</td>
<td>3 ENGL 305</td>
<td>3</td>
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<tr>
<td>MATH 251</td>
<td>4 MATH 441</td>
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<tr>
<td>CS 221</td>
<td>3 CS 324</td>
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<tr>
<td>CS 321</td>
<td>3 CS 355</td>
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<tr>
<td>Computer Science Elective</td>
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<thead>
<tr>
<th>Fourth Year</th>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 448</td>
<td>3 CS 410</td>
<td>3</td>
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<tr>
<td>CS 450</td>
<td>3 CS 479</td>
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<tr>
<td>CS 480</td>
<td>2 CS 481</td>
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</tr>
<tr>
<td>Computer Science Elective</td>
<td>3 Computer Science Elective</td>
<td>3</td>
<td></td>
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</tr>
<tr>
<td>Technical Elective</td>
<td>3 Technical Elective</td>
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</table>

Total credit hours: 120

### Major Learning Outcomes

**COMPUTER SCIENCE**

The BS degree in Computer Science at WVU Tech enables students to attain:

- An ability to apply knowledge of computing and mathematics appropriate to the program’s student outcomes and to the discipline
- An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- An ability to function effectively on teams to accomplish a common goal
- An understanding of professional, ethical, legal, security and social issues and responsibilities
- An ability to communicate effectively with a range of audiences
- An ability to analyze the local and global impact of computing on individuals, organizations, and society
- Recognition of the need for and an ability to engage in continuing professional development
- An ability to use current techniques, skills, and tools necessary for computing practice.
- An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- An ability to apply design and development principles in the construction of software systems of varying complexity.

### Computer Science Minor

**MINOR CODE - UT24**

Student must earn a grade of C or better for each of the courses counted towards the minor.

<table>
<thead>
<tr>
<th>Required Courses</th>
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<tbody>
<tr>
<td>CS 121</td>
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<tr>
<td>CS 122</td>
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</tbody>
</table>
Complete the requirements for one of the following tracks:

<table>
<thead>
<tr>
<th>Programming Track</th>
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<tbody>
<tr>
<td>CS 201 Data Structures</td>
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<tr>
<td>CS 222 Intro Software Engg.</td>
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<tr>
<td>CS 310 Principles of PL</td>
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<tr>
<th>Systems Track</th>
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<tbody>
<tr>
<td>CS 231 Intro to Comp Org</td>
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<tr>
<td>CS 265 C Programming</td>
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<tr>
<td>CS 350 Computer Sys Concepts</td>
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Select two of the following courses:

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<tbody>
<tr>
<td>CS 321 Intro to Networking</td>
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<tr>
<td>CS 324 Database Management</td>
</tr>
<tr>
<td>CS 410 Compiler Construction</td>
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<tr>
<td>CS 450 Operating Sys Structure</td>
</tr>
<tr>
<td>CS 465 Cybersecurity Principles and Practice</td>
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<tr>
<td>CS 472 Artificial Intelligence</td>
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</tbody>
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Total Hours 22-23