

# Computer Science

## Computer Science Program Mission

The mission of the Computer Science BS program is to equip students with knowledge in, skills of, and values of computer science and the ability to apply and advance the knowledge, skills, and values of computer science.

## Computer Science Program Goals and Outcomes

Student Learning Goals	Student Learning Outcomes
SLG 1: Students will demonstrate competency in programming principles, including high-level language and the object-oriented paradigm	SLO 1.1 - Students can describe and utilize different datatypes, operators and common language features (conditionals, loops, functions, etc.) in at least one high level language
	SLO 1.2 - Students will design and implement an object hierarchy considering object-oriented encapsulation mechanisms (e.g. class hierarchies, interfaces, member data types, and functions of variable visibility)
SLG 2: Students will demonstrate knowledge of principles of computer data structures and algorithms	SLO 2.1 - Students will design and implement basic algorithmic methods for searching, sorting, and solving common industry problems utilizing an appropriate algorithm for the particular context.
	SLO 2.2 - Students will be able to develop and utilize common data structures (Linked Lists, Stacks/Queues, Trees)
SLG 3: Students will demonstrate knowledge of architecture and organization of computer systems	SLO 3.1 - Students will demonstrate knowledge of number systems, numerical operations, and the simplification of Boolean logic.
	SLO 3.2 - Students will understand how Boolean operations can be combined to create more complex digital circuits such as latches, shift registers, counters, and multiplexers
	SLO 3.3 - Students will understand how to develop programs using an assembly language
	SLO 3.4 - Students will understand how a computer functions at the machine level
SLG 4: Students will demonstrate knowledge of different network layers and protocols	SLO 4.1 - Students will explain how TCP, UDP, IP packets are structured and work in their corresponding layers
	SLO 4.2 - Students will describe concepts such as congestion and flow control, checksums, routing, and address resolution
SLG 5: Students will demonstrate knowledge pertaining to designing database systems for storage and management of data	SLO 5.1 - Students will structure SQL queries, represent them using relational algebra, and optimize them
	SLO 5.2 - Students will design a database representative of a real-world scenario and utilize normalization to reduce redundancy
SLG 6: Students will demonstrate knowledge of shared memory in a multitasking operating system	SLO 6.1 - Students will spawn processes and threads as well as understand the basics of inter-process communication.
	SLO 6.2 - Students will demonstrate how critical sections and semaphores can be utilized to ensure data integrity and manage system resources.
SLG 7: Students will demonstrate knowledge of computational grammar used to analyze a program	SLO 7.1 - Students will design a minimalistic deterministic finite state machine that accepts a specified language
	SLO 7.2 - Students will understand the design of a lexer and parser
	SLO 7.3 - Students will design a compiler and symbol table that can recognize more complex language functions including recognizing variable scope as well as leveraging procedures and functions
	SLO 7.4 - Students will utilize a parser to create assembly code for language features including basic instructions, conditionals, loops, and arrays
SLG 8: Students will demonstrate knowledge of computer science implications in modern society	SLO 8.1 - Students will describe to others the societal impact due to the development of a particular technology.
	SLO 8.2 - Students will critique a user interface for usability within context.
SLG 9: Students will demonstrate knowledge of mathematical structures, techniques, and reasoning as they apply to computer science	SLO 9.1 - Students will describe practical examples of an appropriate set, function, or relation model, and interpret the associated operations and terminology in context
	SLO 9.2 - Students will model real-world problems using appropriate graph strategies

## Bachelor of Science with a Major in Computer Science Option 1

### Option-1 Preparation for Graduate School

<b>General Education (38 cr.)</b>		
General Education Courses <sup>1</sup>		36
<b>Required Core</b>		<b>48</b>
CSCI 160	Computer Science I	
CSCI 161	Computer Science II	
CSCI 242	Algorithms and Data Structures I	
CSCI 275	Computer and Digital Hardware	
CSCI 331	Technology and Society	
CSCI 335	Theoretical Computer Science	
CSCI 340	Networking	
CSCI 356	Database Management	
CSCI 360	Systems Programming	
CSCI 370	Computer Organization	
CSCI 452	Compiler and Interpreter Construction	
CSCI 460	Capstone Project	
<b>Elect 2 or more credits from the following</b>		<b>2</b>
CSCI 221	Web Application Development and Security	
CSCI 260	UNIX and Linux Systems	
CSCI 323	Robotics	
CSCI 456	Machine Learning, Data Mining, and Artificial Intelligence	
CSCI 497	Internship	
DATA 240	Programming for Data Science	
<b>Graduate School Option</b>		<b>16</b>
CSCI 243	Algorithms and Data Structures II	
CSCI 321	Windows Programming	
CSCI 330	Software Engineering and Testing	
CSCI 450	Operating Systems	
<b>Required Support Math Courses (20 cr.)</b>		<b>20</b>
MATH 165	Calculus I	
MATH 166	Calculus II	
MATH 208	Discrete Mathematics I	
MATH 210	Elementary Statistics	
or DATA 211	Applied Statistics and Data Visualization	
MATH 305	Linear Algebra	
<b>Total Hours</b>		<b>122</b>

<sup>1</sup> Math 165 is required for the math general education requirement

## Bachelor of Science with a Major in Computer Science Option 2

### Option 2 - Software Development/Engineering

<b>General Education (38 cr.)</b>		
General Education Courses <sup>1</sup>		36
<b>Required Core</b>		<b>48</b>
CSCI 160	Computer Science I	
CSCI 161	Computer Science II	
CSCI 242	Algorithms and Data Structures I	
CSCI 275	Computer and Digital Hardware	
CSCI 331	Technology and Society	
CSCI 335	Theoretical Computer Science	

CSCI 340	Networking	
CSCI 356	Database Management	
CSCI 360	Systems Programming	
CSCI 370	Computer Organization	
CSCI 452	Compiler and Interpreter Construction	
CSCI 460	Capstone Project	
<b>Software Development/Engineering Option</b>		<b>20</b>
CSCI 221	Web Application Development and Security	
CSCI 243	Algorithms and Data Structures II	
CSCI 258	Software Security and Design	
CSCI 321	Windows Programming	
CSCI 330	Software Engineering and Testing	
<b>Elect 2 or more credits from the following</b>		<b>2</b>
CSCI 260	UNIX and Linux Systems	
CSCI 323	Robotics	
CSCI 450	Operating Systems	
CSCI 456	Machine Learning, Data Mining, and Artificial Intelligence	
CSCI 497	Internship	
DATA 240	Programming for Data Science	
<b>Required Support Math Course (15-16 cr.)</b>		<b>15-16</b>
MATH 146	Applied Calculus	
or MATH 165	Calculus I	
MATH 208	Discrete Mathematics I	
MATH 210	Elementary Statistics	
or DATA 211	Applied Statistics and Data Visualization	
MATH 305	Linear Algebra	
<b>Total Hours</b>		<b>121-122</b>

<sup>1</sup> Math 146 or 165 is required for the math general education requirement

## Bachelor of Science with a Major in Computer Science Option 3

### Option 3 - Computer/Network Security

<b>General Education (38 cr.)</b>		
General Education Courses <sup>1</sup>		36
<b>Required Core (48 cr.)</b>		<b>48</b>
CSCI 160	Computer Science I	
CSCI 161	Computer Science II	
CSCI 242	Algorithms and Data Structures I	
CSCI 275	Computer and Digital Hardware	
CSCI 331	Technology and Society	
CSCI 335	Theoretical Computer Science	
CSCI 340	Networking	
CSCI 356	Database Management	
CSCI 360	Systems Programming	
CSCI 370	Computer Organization	
CSCI 452	Compiler and Interpreter Construction	
CSCI 460	Capstone Project	
<b>Computer/Network Security Option</b>		<b>20</b>
CSCI 221	Web Application Development and Security	
CSCI 258	Software Security and Design	
CSCI 260	UNIX and Linux Systems	
CSCI 410	Defensive Network Security	

CSCI 450	Operating Systems	
<b>Elect 2 or more credits from the following</b>		<b>2</b>
CSCI 321	Windows Programming	
CSCI 323	Robotics	
CSCI 390	Ethical Hacking	
CSCI 456	Machine Learning, Data Mining, and Artificial Intelligence	
CSCI 497	Internship	
DATA 240	Programming for Data Science	
<b>Required Support Math Courses (15-16 cr.)</b>		<b>15-16</b>
MATH 146	Applied Calculus	
or MATH 165	Calculus I	
MATH 208	Discrete Mathematics I	
MATH 210	Elementary Statistics	
or DATA 211	Applied Statistics and Data Visualization	
MATH 305	Linear Algebra	
<b>Total Hours</b>		<b>121-122</b>

<sup>1</sup> Math 146 or 165 is required for the math general education requirement

## Bachelor of Science with a Major in Computer Science Option 4

### Option 4 - Artificial Intelligence/Machine Learning

<b>General Education (38 cr.)</b>		
General Education <sup>1</sup>		36
<b>Required Core (48 cr.)</b>		<b>48</b>
CSCI 160	Computer Science I	
CSCI 161	Computer Science II	
CSCI 242	Algorithms and Data Structures I	
CSCI 275	Computer and Digital Hardware	
CSCI 331	Technology and Society	
CSCI 335	Theoretical Computer Science	
CSCI 340	Networking	
CSCI 356	Database Management	
CSCI 360	Systems Programming	
CSCI 370	Computer Organization	
CSCI 452	Compiler and Interpreter Construction	
CSCI 460	Capstone Project	
<b>Artificial Intelligence/Machine Learning Option</b>		<b>20</b>
CSCI 221	Web Application Development and Security	
CSCI 258	Software Security and Design	
CSCI 260	UNIX and Linux Systems	
CSCI 456	Machine Learning, Data Mining, and Artificial Intelligence	
DATA 240	Programming for Data Science	
<b>Elect 2 or more credits from the following</b>		<b>2</b>
CSCI 243	Algorithms and Data Structures II	
CSCI 321	Windows Programming	
CSCI 323	Robotics	
CSCI 330	Software Engineering and Testing	
CSCI 450	Operating Systems	
CSCI 497	Internship	
<b>Required Support Math Courses (15-16 cr.)</b>		<b>15-16</b>
MATH 146	Applied Calculus	
or MATH 165	Calculus I	

MATH 208	Discrete Mathematics I
MATH 210	Elementary Statistics
or DATA 211	Applied Statistics and Data Visualization
MATH 305	Linear Algebra

**Total Hours** 121-122

<sup>1</sup> Math 146 or 165 is required for the math general education requirement.

## Bachelor of Science with a Major in Computer Science Option 5

### Option 5 - System Administration/Web Development

#### General Education (38 cr.)

General Education <sup>1</sup> 36

#### Required Core (48 cr.) 48

CSCI 160	Computer Science I
CSCI 161	Computer Science II
CSCI 242	Algorithms and Data Structures I
CSCI 275	Computer and Digital Hardware
CSCI 331	Technology and Society
CSCI 335	Theoretical Computer Science
CSCI 340	Networking
CSCI 356	Database Management
CSCI 360	Systems Programming
CSCI 370	Computer Organization
CSCI 452	Compiler and Interpreter Construction
CSCI 460	Capstone Project

#### System Administration/Web Development Option 16

CSCI 221	Web Application Development and Security
CSCI 258	Software Security and Design
CSCI 260	UNIX and Linux Systems
CSCI 330	Software Engineering and Testing

#### Elect 6 or more credits from the following 6

CSCI 243	Algorithms and Data Structures II
CSCI 321	Windows Programming
CSCI 323	Robotics
CSCI 450	Operating Systems
CSCI 456	Machine Learning, Data Mining, and Artificial Intelligence
CSCI 497	Internship
DATA 240	Programming for Data Science

#### Required Support Math Courses (15-16 cr.) 15-16

MATH 146	Applied Calculus
or MATH 165	Calculus I
MATH 208	Discrete Mathematics I
MATH 210	Elementary Statistics
or DATA 211	Applied Statistics and Data Visualization
MATH 305	Linear Algebra

**Total Hours** 121-122

<sup>1</sup> Math 146 or 165 is required for the math general education requirement.

## Computer Science Minor

### Required Core

CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 242	Algorithms and Data Structures I	4
CSCI 275	Computer and Digital Hardware	4
CSCI 340	Networking	4
Select two of the following:		7-8
Any CSCI 300-400 Level Course <small>excluding CSCI 324, CSCI 390, CSCI 410, CSCI 420, CSCI 425, and CSCI 432</small>		

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**Total Hours** **27-28**

## Computer Science Concentration

Elect at least 12 credits from CSCI courses. 12

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**Total Hours** **12**