COMPUTER SCIENCE TRANSFER PATHWAY (AS) - 60 CREDITS

OVERVIEW

WHY CHOOSE COMPUTER SCIENCE?

The Computer science program prepares you to work on computing problems and solutions. The program will also keep you updated on current trends with computers, and give you skills for a variety of areas within the field.

SKILLS ACQUIRED

(See.org)

Computer science programs include topics such as:

- Computer theory
- Computer system design
- Computer development and programming
- Computer applications

CAREERS IN COMPUTER SCIENCE

Projected Job Growth

Here is the projected job growth for a variety of professions that use skills from Computer Science (according to the Bureau of Labor Statistics):

- Computer and information research scientists is projected to grow 15% from 2012 to 2022, faster than the average for all occupations
- Computer network architects is projected to grow 15% from 2012 to 2022, faster than the average for all occupations
- Computer programers is projected to grow 8% from 2012 to 2022
- Computer support specialists is projected to grow 17% from 2012 to 2022, faster than the average for all occupations
- Computer systems analysts is projected to grow 25% from 2012 to 2022, much faster than the average for all occupations;
- Database administrators (DBAs) is projected to grow 15% from 2012 to 2022
- Information security analysts is projected to grow 37% from 2012 to 2022, much faster than the average for all occupations
- Network and computer systems administrators is projected to grow 12% from 2012 to 2022
- Software developers is projected to grow 22% from 2012 to 2022, much faster than the average for all occupations
- Web developers is projected to grow 20% from 2012 to 2022, faster than the average for all occupations.

Types of Jobs

(See.org)

The following is a list of careers in Computer Science:

- Computer and Information Research Scientists
- Computer Network Architects
- Computer Programmers
- Computer Support Specialists
- Computer System Analysts
- Database Administrators
- Information Security Analysts
- Network and Computer System Administrators
- Software Developers
- Web Developers

Average State Pay

The average median national pay for the following positions are (according to the Bureau of Labor Statistics):

- Computer and Information Research Scientists - $102,190 ($49.13 per hour)
- Computer Network Architects - $91,000 ($44.75 per hour)
- Computer Programmers - $74,260 ($35.71 per hour)
- Computer Support Specialists - $48,900 ($23.51 per hour)
Description

(Seek.org)

Computer science programs prepare people to work on computing problems and solutions. These programs are sometimes called computer information and science or computer science and engineering.

DEGREES & CERTIFICATES IN COMPUTER SCIENCE

The Associate of Science Degree in Computer Science is designed to give the student sufficient knowledge to enter the job market as a programmer. In addition, it will provide the student with a sound foundation in courses which are commonly the core of baccalaureate programs in computer science and will enable the student to transfer to a four-year institution.

REQUIREMENTS

The Computer Science Transfer Pathway (AS) offers students a powerful option: the opportunity to complete an Associate of Science degree with course credits that directly transfer to designated Computer Science bachelor's degree programs at Minnesota State universities. The curriculum has been specifically designed so that students completing this pathway degree and transferring to one of the seven Minnesota State universities enter the university with junior-year status. All courses in the Transfer Pathway associate degree will directly transfer and apply to the designated bachelor's degree programs in a related field.

*Universities within the Minnesota State system include Bemidji State University, Metropolitan State University, Minnesota State University Mankato; Minnesota State University Moorhead; Southwest Minnesota State University; St. Cloud State University; and Winona State University.

CORE COURSES - 28 CREDITS

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CSCI 1101</td>
<td>Introduction to Computing and Problem Solving</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 1111</td>
<td>Introduction to Programming in C</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 2001</td>
<td>Computer Programming Concepts</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 2002</td>
<td>Algorithms and Data Structures</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 2021</td>
<td>Machine Architecture and Organization</td>
<td>4</td>
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COMPLETE ONE OF THE FOLLOWING COURSES:

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CSCI 2011</td>
<td>Discrete Structures of Computer Science</td>
<td>4</td>
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<tr>
<td>MATH 2011</td>
<td>Discrete Structures of Computer Science</td>
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COMPLETE ONE OF THE FOLLOWING COURSES:

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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>CSCI 1202</td>
<td>Introduction to Object-Oriented Programming in C++</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 1203</td>
<td>Introduction to Computer Programming in Java</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 2033</td>
<td>Elementary Computational Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2033</td>
<td>Elementary Computational Linear Algebra</td>
<td>4</td>
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ADDITIONAL REQUIRED COURSES - 32 CREDITS

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGC 1101</td>
<td>Freshman Composition</td>
<td>4</td>
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<tr>
<td>COMM 1100</td>
<td>Introduction to Human Communication</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 1101</td>
<td>Fundamentals of Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 1111</td>
<td>Intercultural Communication</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1010</td>
<td>Calculus I</td>
<td>5</td>
</tr>
</tbody>
</table>

Complete a minimum of 20 additional credits from at least 4 of the MnTC Goal Areas: 3, 5, 6, 7, 8, 9, or 10 in order to have completed courses from at least 6 of the 10 goal areas.

(Check with your transfer institution for specific requirements)

OTHER DEGREE REQUIREMENTS

• If needed, complete additional courses to reach 60 credits total
• Earn a minimum cumulative grade point average (GPA) of 2.0 for college-level coursework (courses numbered 1000 and above) completed at Normandale.
• Earn a minimum of 20 college-level credits at Normandale.

Coursework in this degree program satisfies a portion of the Minnesota Transfer Curriculum (MnTC). Please see MnTC Degree Audit Report.

The University of Minnesota is not part of this transfer pathway agreement. Students who wish to transfer to the University of Minnesota should check with the admissions office at the University of Minnesota for current degree requirements, and plan to include MATH 1230, PHYS 1121, and PHYS 1122 or CHEM 1061.

COURSES

COMM 1100 INTRODUCTION TO HUMAN COMMUNICATION | 3 CR

Recommended: Eligible for ENGC 1101, and READ 1106 MnTC Goals: 1
A broad-based communication course which introduces the student to three areas of skills: interpersonal communication, public speaking, and small group communication. Students may still register for COMM 1101, 1111, or 1121 after taking 1100.

Credits: 3 Semesters: Fall, Spring

**CSCI 1111 INTRODUCTION TO PROGRAMMING IN C | 4 CR**

Prereq: CSCI 1101

Problem solving using the C programming language. Topics will include the syntax of the language, operators and expressions, control structures, looping rules, functions, parameter passing, arrays, strings, pointers, structures, type definitions, file handling, libraries.

Credits: 4 Semesters: Fall, Spring

**CSCI 1202 INTRODUCTION TO OBJECT-ORIENTED PROGRAMMING IN C++ | 4 CR**

Prereq: CSCI 1111

Programming in C++ and concepts of C++, with an emphasis on programming techniques and object-oriented programming. Must be completed within the last 7 years prior to receiving the AAS degree in Computer Technology.

Credits: 4 Semesters: Fall, Spring

**CSCI 1203 INTRODUCTION TO COMPUTER PROGRAMMING IN JAVA | 4 CR**

Prereq: CSCI 1111

Introduction to object-oriented programming using the Java programming language. Use of Java for developing conventional applications and Internet-based applications will be examined. Must be completed within the last seven years prior to receiving the AAS degree in Computer Technology.

Credits: 4 Semesters: Spring

**CSCI 2001 COMPUTER PROGRAMMING CONCEPTS | 4 CR**

Prereq: CSCI 1101 , and MATH 1510 , or concurrent registration

Introduces students to the fundamental principles of programming. Procedures, recursion, and iteration will be presented as algorithm development techniques. Abstract data types, modularity, and the use of abstraction to hide program details will be emphasized throughout the course. The computer language Python is used as a formal way of expressing algorithms and data.

Credits: 4 Semesters: Fall, Spring

**CSCI 2002 ALGORITHMS AND DATA STRUCTURES | 4 CR**

Prereq: CSCI 1111 , and CSCI 2001

Reinforces the concepts presented in CSCI 2001, such as data abstractions, from a functional/programming perspective. Introduces data structures such as stacks, queues, and trees, and introduces sorting algorithms. Students will implement data structures and their operations as abstract data types using an object-oriented approach. The computer language Python is used as a formal way of expressing algorithms and data.

Credits: 4 Semesters: Fall, Spring

**CSCI 2011 DISCRETE STRUCTURES OF COMPUTER SCIENCE | 4 CR**

Prereq: MATH 1510 MCTC Goals: 4

Concepts fundamental to the analysis of algorithms. Topics include logic, sets, methods of proof including mathematical induction, combinatorics, relations, solution of recurrence relations, graphs, trees.

Credits: 4 Semesters: Fall, Spring

**CSCI 2021 MACHINE ARCHITECTURE AND ORGANIZATION | 4 CR**

Prereq: CSCI 1101 , and experience with C, C++, or Java

Introduction to computer organization, machine language, and use of assembly language programming using the Motorola 68000.

Credits: 4 Semesters: Fall, Spring

**CSCI 2033 ELEMENTARY COMPUTATIONAL LINEAR ALGEBRA | 4 CR**

Prereq: MATH 1510


Credits: 4 Semesters: Fall, Spring

**ENGC 1101 FRESHMAN COMPOSITION | 4 CR**

Prereq: ENGC 0900 , (C or higher) and eligible for READ 1106 , or eligible for ENGC 1101 and READ 1106 MCTC Goals: 1

In this essential college-level writing course, students will practice the skills necessary for success in college and professional writing. Students will develop and apply critical reading and thinking skills in a variety of research and writing assignments, including analysis and argument, with some essays based on literary texts and other sources.

Credits: 4 Semesters: Fall, Spring

**MATH 1510 CALCULUS 1 | 5 CR**
MATH 1520 CALCULUS 2 | 5 CR
Prereq: MATH 1510, (C or higher) MATH 1500, (C or higher) or eligible for MATH 1510 MnTC Goals: 4

Continued development of the properties and applications of integration. Topics include infinite sequences and series, introduction to differential equations, calculus of polar coordinates, and parametric equations. Applications include but are not limited to science, engineering, economics, and ecology.

Credits: 5 Semesters: Fall, Spring

PHYS 1121 PHYSICS 1 FOR SCIENTISTS AND ENGINEERS | 5 CR
Prereq: MATH 1510, (C or higher) MATH 1520, (C or higher) or concurrent registration and eligible for READ 1106 MnTC Goals: 3

This is the first semester of a two-semester sequence of calculus-based introductory physics. This course uses calculus. Topics include kinematics, dynamics, rotational motion, gravitation, conservation laws of momentum and energy, thermal physics, and periodic motion. Optional topics include fluids and thermodynamics. This course meets requirements for students majoring in engineering, mathematics, computer science, or the sciences. Lecture 4 hours, lab 2 hours.

Credits: 5 Semesters: Fall, Spring

PHYS 1122 PHYSICS 2 FOR SCIENTISTS AND ENGINEERS | 5 CR
Recommended: MATH 2510, or concurrent registration in (preferred) or concurrent registration or MATH 2520, (C or higher) or concurrent registration. Prereq: PHYS 1121, (C or higher) and MATH 1520, (C or higher) MnTC Goals: 3

This course is a continuation of PHYS 1121. This course uses calculus. Topics include wave phenomena, electricity, magnetism, an introduction to Maxwell's equations, electromagnetic waves, and optics. This course meets requirements for students majoring in engineering, mathematics, computer science, or the sciences. Lecture 4 hours, lab 2 hours.

Credits: 5 Semesters: Fall, Spring

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