The Department of Computer Science offers the following undergraduate and program certificates. Specific requirements for these programs are listed within this Department of Computer Science section in the following order:

**Undergraduate Majors (B.S.)**
- Computer Science (p. 1)
- Networking and System Administration (p. 2)

**Undergraduate Major (B.A.)**
- Computer Science (p. 2)

**Minor**
- Computer Science (p. 3)

**Program Certificates**
- Computer Applications (p. 3)
- Computer Science (p. 4)

**Notes:**
1. Undergraduate students who have been admitted to the university provisionally because of non-satisfaction of the high school mathematics requirements may not enroll in any computer science credit course before this requirement has been met.
2. All courses counting toward a major or minor in the Department of Computer Science must be passed with a grade of C- or better.
3. Prerequisite courses in the Department of Computer Science must be passed with a grade of C before taking a subsequent course.
4. All majors in the Department of Computer Science require a project course (marked with asterisk in the degree statements). The course used to meet this requirement is to be taken in the area of specialization, i.e., an area in which at least three courses are taken.
5. All courses in a prerequisite chain to a course are considered regressive to it - students may not take them for credit after passing the later course. Additionally, CS 1120, CS 1130, CS 1140, CS 1150, and CS 1160 are regressive to CS 1520 and any course having it as prerequisite.
6. A student with a major in the Department of Computer Science cannot also receive a Computer Science minor.
7. A student with a major in the Department of Computer Science cannot also receive a Certificate in Computer Science.

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**Bachelor of Science Degree Programs**

**Computer Science Major**

The B.S. Computer Science major requires a minimum of 126 total hours to graduate. This total includes Liberal Arts Core requirements and the following specified major requirements, plus electives to complete the minimum of 126 hours.

**Required**

**Computer Science:**
- CS 1410 (810:041) Computer Organization 3
- CS 1510 (810:051) Introduction to Computing 4
- CS 1520 (810:052) Data Structures 4
- CS 1800 (810:080) Discrete Structures 3
- CS 2530 (810:053) Intermediate Computing 3
- CS 3730/5730 (810:173g) Project Management 1

**Research:**
- CS 4800 (810:180) Undergraduate Research in Computer Science (topic pre-approved by department) 1

**Electives**

**Mathematics:**

Select four from the following: 13
- MATH 1420 (800:060) Calculus I ^\# 3
- MATH 1421 (800:061) Calculus II \# 3
- MATH 2500 (800:076) Linear Algebra for Applications 3
- MATH 3440/5440 (800:176g) Numerical Analysis 3
- MATH 3530/5530 (800:143g) Combinatorics 3
- MATH 3752/5752 (800:152g) Introduction to Probability 3
- STAT 1772 (800:072) Introduction to Statistical Methods 3

**Computer Science:**

Eight courses including:
- A specialty of three courses from the Foundations area
- A specialty of three courses from one other area
- One course from each of the remaining two areas
- One of the specialty areas must include a project course (marked with an asterisk *)

**Foundations:**
- CS 3530 (810:153) Design and Analysis of Algorithms 3
- CS 3540 (810:154) Programming Languages and Paradigms 3
- CS 3810/5810 (810:181g) Theory of Computation 3
- CS 4550/5550 (810:155g) Translation of Programming Languages 3
# Department of Computer Science

## Data and Applications:
- **CS 3140/5140 (810:114g)** Database Systems
- **CS 3150/5150 (810:115g)** Information Storage and Retrieval
- **CS 3610/5610 (810:161g)** Artificial Intelligence
- **CS 3650/5650 (810:166g)** Computational Biology
- **CS 4620/5620 (810:162g)** Intelligent Systems
- **CS 4880/5880 (810:188g)** Topics in Computer Science

## Software Engineering:
- **CS 2720 (810:172)** Software Engineering
- **CS 3120/5120 (810:112g)** User Interface Design
- **CS 3750/5750 (810:175g)** Software Verification and Validation
- **CS 4740/5740 (810:174g)** Real-Time Embedded Systems
- **CS 4880/5880 (810:188g)** Topics in Computer Science

## Systems:
- **CS 2420 (810:142)** Computer Architecture and Parallel Programming
- **CS 3430/5430 (810:143g)** Operating Systems
- **CS 3470/5470 (810:147g)** Networking
- **CS 4400/5400 (810:140g)** System Administration
- **CS 4410/5410 (810:141g)** System Security
- **CS 4420** Applied Systems Forensics
- **CS 4880/5880 (810:188g)** Topics in Computer Science

## Electives:
- Two courses selected from among the Computer Science "area" courses and 2000-level or above courses meeting the Mathematics requirements.

### Total Hours: 62

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## Networking and System Administration Major
The B.S. Networking and System Administration major requires a minimum of 126 total hours to graduate. This total includes Liberal Arts Core requirements and the following specified major requirements, plus electives to complete the minimum of 126 hours.

### Required
- **Mathematics:**
  - MATH 1420 (800:060) Calculus I ^
  - MATH 1421 (800:061) Calculus II

### Computer Science:
- **CS 1410 (810:041)** Computer Organization
- **CS 1510 (810:051)** Introduction to Computing
- **CS 1520 (810:052)** Data Structures
- **CS 1800 (810:080)** Discrete Structures
- **CS 3430/5430 (810:143g)** Operating Systems
- **CS 3470/5470 (810:147g)** Networking
- **CS 3730/5730 (810:173g)** Project Management
- **CS 4400/5400 (810:140g)** System Administration
- **CS 4410/5410 (810:141g)** System Security
- **CS 4420** Applied Systems Forensics
- **CS 4880 (810:180)** Undergraduate Research in Computer Science (1 hr.)

### Physics:
- **PHYSICS 4300/5300 (880:152g)** Introduction to Electronics

### Electives:
- **Total Hours: 57**

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## Bachelor of Arts Degree Programs Computer Science Major
The B.A. Computer Science major requires a minimum of 120 total hours to graduate. This total includes Liberal Arts Core requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

### Required
- **Computer Science:**
  - CS 1410 (810:041) Computer Organization
  - CS 1510 (810:051) Introduction to Computing
  - CS 1520 (810:052) Data Structures
  - CS 1800 (810:080) Discrete Structures
  - CS 3430/5430 (810:143g) Operating Systems
  - CS 3470/5470 (810:147g) Networking
  - CS 3730/5730 (810:173g) Project Management
  - CS 4400/5400 (810:140g) System Administration
  - CS 4410/5410 (810:141g) System Security
  - CS 4420** Applied Systems Forensics**
  - **CS 4880 (810:180)** Undergraduate Research in Computer Science (1 hr.)

### Technology:
- TECH 1037 (330:037) Introduction to Circuits
- TECH 1039 (330:039) Circuits and Systems
- TECH 2041 (330:041) Introduction to Analog Electronics
- TECH 3152 (330:152) Advanced Analog Electronics
- TECH 3156 (330:156) Advanced Digital Electronics
- TECH 4103/5103 (330:103g) Electronic Communications
- TECH 4104/5104 (330:104g) Applied Digital Signal Processing

### Electives:
- **Total Hours: 6**

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^ Has prerequisite of satisfactory score on ALEKS exam or subsequent remediation.
Department of Computer Science

CS 1510 (810:051)  Introduction to Computing  4
CS 1520 (810:052)  Data Structures  4
CS 1800 (810:080)  Discrete Structures  3
CS 2530 (810:053)  Intermediate Computing  3
CS 3730/5730 (810:173g)  Project Management  1

Electives
Mathematics:
Select two of the following:  6
MATH 1420 (800:060)  Calculus I ^ #
MATH 1421 (800:061)  Calculus II ^
MATH 2500 (800:076)  Linear Algebra for Applications
MATH 3440/5440 (800:176g)  Numerical Analysis (800:176g)
MATH 3530/5530 (800:143g)  Combinatorics
MATH 3752/5752 (800:152g)  Introduction to Probability
STAT 1772 (800:072)  Introduction to Statistical Methods

Computer Science:  18
Six courses including:
Three courses from one specialty area
One course from each of the remaining three areas
Specialty area must include a project course (*)

Foundations:
CS 3530 (810:153)  Design and Analysis of Algorithms
CS 3540 (810:154)  Programming Languages and Paradigms
CS 3810/5810 (810:181g)  Theory of Computation
CS 4550/5550 (810:155g)  Translation of Programming Languages *
CS 4880/5880 (810:188g)  Topics in Computer Science †

Data and Applications:
CS 3140/5140 (810:114g)  Database Systems
CS 3150/5150 (810:115g)  Information Storage and Retrieval
CS 3610/5610 (810:161g)  Artificial Intelligence #
CS 3650/5650 (810:166g)  Computational Biology
CS 4620/5620 (810:162g)  Intelligent Systems *
CS 4880/5880 (810:188g)  Topics in Computer Science †

Software Engineering:
CS 2720 (810:172)  Software Engineering
CS 3120/5120 (810:112g)  User Interface Design
CS 3750/5750 (810:175g)  Software Verification and Validation
CS 4740/5740 (810:174g)  Real-Time Embedded Systems *,#
CS 4880/5880 (810:188g)  Topics in Computer Science †

Systems:
CS 2420 (810:142)  Computer Architecture and Parallel Programming
CS 3430/5430 (810:143g)  Operating Systems
CS 3470/5470 (810:147g)  Networking
CS 4400/5400 (810:140g)  System Administration
CS 4410/5410 (810:141g)  System Security *
CS 4420  Applied Systems Forensics *
CS 4880/5880 (810:188g)  Topics in Computer Science †

Electives
One course selected from among the Computer Science "area" courses and 2000-level or above courses meeting the Mathematics requirement.

Total Hours  45

^  MATH 1420 (800:060) has prerequisite of MATH 1140 (800:046), or MATH 1110 (800:043) and MATH 1130 (800:044), or equivalent.
*  A project course must be taken as one of the three in the specialty area.
#  MATH 1420 (800:060), MATH 1421 (800:061), and CS 4740/5740 (810:174g) are 4-hour courses. CS 3610/5610 (810:161g) is a 4-hour course if taken with lab.
†  CS 4880 may be counted in a specialty area with department approval for the specific topic.

Minors

Computer Science Minor
A student with a major in the Department of Computer Science cannot also receive a Computer Science minor.

Required
Computer Science:
CS 1410 (810:041)  Computer Organization  3
CS 1510 (810:051)  Introduction to Computing  4
CS 1520 (810:052)  Data Structures  4
CS 1800 (810:080)  Discrete Structures  3
CS 2530 (810:053)  Intermediate Computing  3

Electives
any Computer Science course that counts toward the Computer Science B.A. major  9

Total Hours  26

Program Certificates
The University of Northern Iowa makes available, in addition to traditional programs, the opportunity for students to earn program certificates. Program certificates provide an alternative to programs leading to a degree, a major, or a minor; they certify that an individual has completed a program approved by the university. For information on the following certificates, contact the Department of Computer Science or the Office of the Registrar, which serves as the centralized registry.

Certificate in Computer Applications

Required
CS 1000 (810:021)  Computing Skills and Concepts  3

Certificate in Computer Applications

Required
CS 1000 (810:021)  Computing Skills and Concepts  3
Department of Computer Science

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CS 1010 (810:022)</td>
<td>Microcomputer Applications and Systems Integration</td>
<td>3</td>
</tr>
<tr>
<td>CS 1020 (810:023)</td>
<td>Microcomputer Systems</td>
<td>3</td>
</tr>
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**Electives**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>CS 1130 (810:030)</td>
<td>Visual BASIC Programming</td>
</tr>
<tr>
<td>CS 2880 (810:088)</td>
<td>Topics in Computing</td>
</tr>
</tbody>
</table>

Other courses pre-approved by the Computer Science Department

Total Hours 12

**Certificate in Computer Science**

A student with a major in the Department of Computer Science cannot also receive a Certificate in Computer Science.

**Required**

Computer Science:

one course from the following: 3-4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CS 1120 (810:056)</td>
<td>Media Computation</td>
</tr>
<tr>
<td>CS 1130 (810:030)</td>
<td>Visual BASIC Programming</td>
</tr>
<tr>
<td>CS 1140</td>
<td>Programming Environments for Secondary Education</td>
</tr>
<tr>
<td>CS 1150</td>
<td>Programming Environments for Elementary Education</td>
</tr>
<tr>
<td>CS 1160 (810:036)</td>
<td>C/C++ Programming</td>
</tr>
<tr>
<td>CS 1510 (810:051)</td>
<td>Introduction to Computing</td>
</tr>
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</table>

CS 1520 (810:052) | Data Structures 4

Two courses, from ONE of the following groups: 6

**Group 1:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
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<tbody>
<tr>
<td>CS 1800 (810:080)</td>
<td>Discrete Structures</td>
</tr>
<tr>
<td>CS 2530 (810:053)</td>
<td>Intermediate Computing</td>
</tr>
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</table>

**Group 2:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1410 (810:041)</td>
<td>Computer Organization</td>
</tr>
<tr>
<td>CS 2420 (810:142)</td>
<td>Computer Architecture and Parallel Programming</td>
</tr>
</tbody>
</table>

Total Hours 13-14