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. 3)

**Minor**

- Computer Science (p. 4)

**Program Certificates**

- Computer Applications (p. 4)
- 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 an 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:**

| Undergraduate Research in Computer Science (topic pre-approved by department) | 1 |

**Electives**

**Mathematics:**

Select four from the following:

| Mathematics |  
|-------------|--- |
| 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 |
| MATH 3530/5530 (800:143g) | Combinatorics |
| MATH 3752/5752 (800:152g) | Introduction to Probability |
| STAT 1772 (800:072) | Introduction to Statistical Methods |

**Computer Science:**

| Computer Science |  
|------------------|--- |
| CS 3530 (810:153) | Design and Analysis of Algorithms |
| CS 3540 (810:154) | Programming Languages and Paradigms |

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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:**

| Foundations |  
|-------------|--- |
| CS 3530 (810:153) | Design and Analysis of Algorithms |
| CS 3540 (810:154) | Programming Languages and Paradigms |
### 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 4800 (810:180) Undergraduate Research in Computer Science (1 hr.)  

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

Choose ONE of the following sequences:  

- PHYSICS 1511 General Physics I (880:054)  
- PHYSICS 1512 General Physics II (880:056)  

**OR**
- PHYSICS 1701 Physics I for Science and Engineering (880:130)  
- PHYSICS 1702 Physics II for Science and Engineering (880:131)  

**Electives:** 6

- Computer Science: from courses numbered 2420 or above, excluding CS 2880 (810:088), CS 3110, and CS 3510 (810:151) ^  

**Electives:** 6

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^ 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.
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 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

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
- MATH 3530/5530 (800:143g) Combinatorics
- MATH 3752/5752 (800:152g) Introduction to Probability
- STAT 1772 (800:072) Introduction to Statistical Methods

Computer Science:
Six courses including:
- Three courses from one specialty area

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>TECH 1037 (330:037)</td>
<td>Introduction to Circuits</td>
</tr>
<tr>
<td>TECH 1039 (330:039)</td>
<td>Circuits and Systems</td>
</tr>
<tr>
<td>TECH 2041 (330:041)</td>
<td>Introduction to Analog Electronics</td>
</tr>
<tr>
<td>TECH 3152 (330:152)</td>
<td>Advanced Analog Electronics</td>
</tr>
<tr>
<td>TECH 3156 (330:156)</td>
<td>Advanced Digital Electronics</td>
</tr>
<tr>
<td>TECH 4103/5103 (330:103g)</td>
<td>Electronic Communications</td>
</tr>
<tr>
<td>TECH 4104/5104 (330:104g)</td>
<td>Applied Digital Signal Processing</td>
</tr>
</tbody>
</table>

Total Hours 57

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

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.

<table>
<thead>
<tr>
<th>Course</th>
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</table>

Total Hours 45
Department of Computer Science

^ 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

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
  - CS 1120 (810:056) Media Computation
  - CS 1130 (810:030) Visual BASIC Programming
  - CS 1140 Programming Environments for Secondary Education
  - CS 1150 Programming Environments for Elementary Education
  - CS 1160 (810:036) C/C++ Programming
  - CS 1510 (810:051) Introduction to Computing
  - CS 1520 (810:052) Data Structures 4
- Two courses, from ONE of the following groups: 6
  - Group 1:
    - CS 1410 (810:056) Media Computation
    - CS 1520 (810:052) Data Structures
  - or Group 2:
    - CS 1800 (810:080) Discrete Structures
    - CS 2530 (810:053) Intermediate Computing

Total Hours 13-14

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
- CS 1010 (810:022) Microcomputer Applications and Systems Integration 3
- CS 1020 (810:023) Microcomputer Systems 3

Electives
Computer Science:
- CS 1130 (810:030) Visual BASIC Programming 3
- CS 2880 (810:088) Topics in Computing
- Other courses pre-approved by the Computer Science Department

Total Hours 12