

# BS in Computer Science with Human-Centered Computing Concentration

To earn a Bachelor of Science in Computer Science, with an HCC Concentration, students need to complete university, college, and department degree requirements. The Department of Computer Science degree requirements are outlined below. Students should consult the *College of Engineering* section for additional degree requirements and college academic policies.

## Degree Requirements

### Summary of Requirements

Required Outside the College of Engineering	57
Required in the College of Engineering	54
Technical Electives	3
Required Mathematics Courses	6
Free Electives	8
<b>Total Hours</b>	<b>128</b>

## Required Outside College of Engineering

### Required Courses

ENGL 160	Academic Writing I: Writing in Academic and Public Contexts	3
ENGL 161	Academic Writing II: Writing for Inquiry and Research	3

### General Education Core

Select one course from each of the following categories: <sup>a</sup>	15
Exploring World Cultures	
Understanding the Creative Arts	
Understanding the Past	
Understanding the Individual and Society	
Understanding US Society	

### Humanities/Social Sciences/Art Electives

At least three of the selected courses must be from the following: (Please note: In order to enroll in some of these courses, students will have to go to the respective departments to get an override on prerequisites and/or enrollment restrictions.) <sup>b</sup>	12
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PSCH 100	Introduction to Psychology	
PSCH 242	Introduction to Research in Psychology (prerequisite PSCH 100)	
ART 150	Introduction to New Media Arts	
ART 454	3D Space I: Modeling	
ART 456	Embedded Media: Physical Computing	
DES 452	Informational Aesthetics I	
COMM 316	Writing for the Electronic Media	
COMM 430	Media, Information and Society	
COMM 460	Visual Communication	
MATH 180	Calculus I <sup>c</sup>	4

MATH 181	Calculus II <sup>c</sup>	4
MATH 210	Calculus III <sup>c</sup>	3
MATH 220	Introduction to Differential Equations	3
PHYS 141	General Physics I (Mechanics) <sup>c</sup>	4
PHYS 142	General Physics II (Electricity and Magnetism) <sup>c</sup>	4

Science Elective (see below) <sup>d</sup>	2
<b>Total Hours</b>	<b>57</b>

- a *Students should consult the General Education (<http://catalog.uic.edu/ucat/degree-programs/general-education>) section of the catalog for a list of approved courses in this category.*
- b *These electives must be selected from a list of approved courses provided by the CS department.*
- c *This course is approved for the Analyzing the Natural World General Education category.*
- d *All courses on the science elective list below are approved for the Analyzing the Natural World General Education category.*

## Required in the College of Engineering

### Required Courses

ENGR 100	Engineering Orientation <sup>a</sup>	1
CS 111	Program Design I	3
CS 141	Program Design II	3
CS 151	Mathematical Foundations of Computing	3
CS 211	Programming Practicum	2
CS 251	Data Structures	4
CS 261	Machine Organization	3
CS 301	Languages and Automata	3
CS 341	Programming Language Design and Implementation	3
CS 342	Software Design	3
CS 361	Systems Programming	3
CS 362	Computer Design	3
CS 377	Communication and Ethical Issues in Computing	3
CS 385	Operating Systems Concepts and Design	3
CS 401	Computer Algorithms I	3
CS 422	User Interface Design and Programming	3
CS 499	Professional Development Seminar	0
Select at least three of the following:	9	
CS 415	Computer Vision I	
or ECE 415	Image Analysis and Computer Vision I	
CS 411	Artificial Intelligence I	
CS 421	Natural Language Processing	
CS 424	Visualization and Visual Analytics	
CS 425	Computer Graphics I	
CS 426	Video Game Design and Development	

<b>Total Hours</b>	<b>54</b>
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- a *ENGR 100 carries one equivalent semester hour, but awards no credit toward graduation.*

## Technical Electives

### Courses

Select one of the following:	3
CS 398 Undergraduate Design/Research	
CS 411 Artificial Intelligence I <sup>a</sup>	
CS 412 Introduction to Machine Learning	
CS 415 Computer Vision I <sup>a</sup> or ECE 415 Image Analysis and Computer Vision I	
CS 421 Natural Language Processing <sup>a</sup>	
CS 424 Visualization and Visual Analytics <sup>a</sup>	
CS 425 Computer Graphics I <sup>a</sup>	
CS 426 Video Game Design and Development <sup>a</sup>	
CS 440 Software Engineering I	
CS 441 Engineering Distributed Objects For Cloud Computing	
CS 450 Introduction to Networking	
CS 455 Design and Implementation of Network Protocols	
CS 466 Advanced Computer Architecture	
CS 469 Computer Systems Design	
CS 473 Compiler Design	
CS 474 Object-Oriented Languages and Environments	
CS 476 Programming Language Design	
CS 477 Public Policy, Legal, and Ethical Issues in Computing, Privacy, and Security	
CS 478 Software Development for Mobile Platforms	
CS 480 Database Systems	
CS 485 Networked Operating Systems Programming	
CS 486 Secure Operating System Design and Implementation	
CS 487 Building Secure Computer Systems	
ECE 452 Robotics: Algorithms and Control	
CS 489 Human Augmentics	
MCS 320 Introduction to Symbolic Computation	
MCS 471 Numerical Analysis	
MCS 481 Computational Geometry	
STAT 471 Linear and Non-Linear Programming	
MATH 419 Models in Applied Mathematics	
<b>Total Hours</b>	<b>3</b>

<sup>a</sup> May be used as either a selective course (above) or a technical elective but not both.

## Required Mathematics Courses

### Required Courses

IE 342 Probability and Statistics for Engineers <sup>a</sup>	3
or STAT 381 Applied Statistical Methods I	
MATH 310 Applied Linear Algebra	3
or MATH 320 Linear Algebra I	
<b>Total Hours</b>	<b>6</b>

<sup>a</sup> Students who take IE 342 will not receive credit for either STAT 381 or STAT 401.

## Lab Science Sequence and Science Electives

Every student must take a total of at least 2 additional credit hours in the science area to make up a total of 10 credits. Additional courses may be other courses on this list, courses that have PHYS 141, PHYS 142, or any of these courses as prerequisites, or other courses from a list maintained by the Department of Computer Science of certain additional courses in Engineering and quantitative social sciences.

### Required Courses

Select two hours from the following: <sup>a</sup>	2
BIOS 100 Biology of Cells and Organisms	
BIOS 101 Biology of Populations and Communities	
CHEM 122 General Chemistry I Lecture & CHEM 122and General Chemistry Laboratory I <sup>b</sup>	
CHEM 124 General Chemistry II Lecture & CHEM 124and General Chemistry Laboratory II <sup>b</sup>	
CHEM 116 Honors and Majors General and Analytical Chemistry I	
CHEM 118 Honors and Majors General and Analytical Chemistry II	
EAES 101 Global Environmental Change	
EAES 111 Earth, Energy, and the Environment	

**Total Hours** 2

- <sup>a</sup> These courses are approved for the Analyzing the Natural World General Education category.
- <sup>b</sup> General Education credit is only given for successful completion of both CHEM 122 and CHEM 123 or both CHEM 124 and CHEM 125.

## Free Electives

### Electives

Select 8 hours of Free Electives	8
<b>Total Hours</b>	<b>8</b>

## Sample Course Schedule

Course	Title	Hours
<b>Freshman Year</b>		
<b>First Semester</b>		
MATH 180	Calculus I	4
CS 111	Program Design I	3
ENGL 160	Academic Writing I: Writing in Academic and Public Contexts	3
	General Education Core course	3
	General Education Core course	3
ENGR 100	Engineering Orientation <sup>a</sup>	1
		<b>Hours</b>
		<b>16</b>
<b>Second Semester</b>		
MATH 181	Calculus II	4
ENGL 161	Academic Writing II: Writing for Inquiry and Research	3
CS 141	Program Design II	3
CS 151	Mathematical Foundations of Computing	3
	General Education Core course	3
		<b>Hours</b>
		<b>16</b>

**Sophomore Year**

**First Semester**

MATH 210	Calculus III	3
PHYS 141	General Physics I (Mechanics)	4
CS 211	Programming Practicum	2
CS 251	Data Structures	4
General Education Core course		3
<b>Hours</b>		<b>16</b>

**Second Semester**

CS 261	Machine Organization	3
CS 301	Languages and Automata	3
MATH 220	Introduction to Differential Equations	3
PHYS 142	General Physics II (Electricity and Magnetism)	4
Humanities/Social Sciences/Art Elective		3
<b>Hours</b>		<b>16</b>

**Junior Year**

**First Semester**

CS 361	Systems Programming	3
CS 362	Computer Design	3
CS 342	Software Design	3
IE 342 or STAT 381	Probability and Statistics for Engineers or Applied Statistical Methods I	3
Science Elective		2
Humanities/Social Science/Art Elective <sup>b</sup>		3-4
<b>Hours</b>		<b>17-18</b>

**Second Semester**

CS 341	Programming Language Design and Implementation	3
CS 385	Operating Systems Concepts and Design	3
CS 422	User Interface Design and Programming	3
MATH 310 or MATH 320	Applied Linear Algebra or Linear Algebra I	3
Humanities/Social Science/Art Elective <sup>b</sup>		3-4
<b>Hours</b>		<b>15-16</b>

**Senior Year**

**First Semester**

CS 377	Communication and Ethical Issues in Computing	3
CS 401	Computer Algorithms I	3
CS 424	Visualization and Visual Analytics	3
CS 425	Computer Graphics I	3
Free Elective		2
General Education Core course		3
<b>Hours</b>		<b>17</b>

**Second Semester**

CS 426	Video Game Design and Development	3
CS 499	Professional Development Seminar	0

Technical Elective	3
Humanities/Social Science/Art Elective <sup>b</sup>	3-4
Free Elective	3
Free Elective	3

<b>Hours</b>	<b>15-16</b>
<b>Total Hours</b>	<b>128</b>

- a *ENGR 100 carries one equivalent hour but awards no credit towards graduation.*
- b *One of the following electives: PSCH 100, PSCH 242; ART 150, ART 454, ART 456; DES 452; COMM 430, COMM 316, COMM 460.*