

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

Code	Title	Hours
Summary of Requirements		
Required Outside the College of Engineering		55
Required in the College of Engineering		58
Technical Electives		6
Required Mathematics Courses		6
Free Electives		3
Total Hours		128

Required Outside the College of Engineering

Code	Title	Hours
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: ^a		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.) ^b		12
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	Information Aesthetics I	
COMM 316	Writing for the Electronic Media	
COMM 430	Media, Information and Society	

COMM 460	Visual Communication	
MATH 180	Calculus I ^c	4
MATH 181	Calculus II ^c	4
MATH 210	Calculus III ^c	3
MATH 220	Introduction to Differential Equations	3
PHYS 141	General Physics I (Mechanics) ^c	4
PHYS 142	General Physics II (Electricity and Magnetism) ^c	4
Total Hours		55

- a *Students should consult the [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.*

Required in the College of Engineering

Code	Title	Hours
Required Courses		
ENGR 100	Engineering Success Seminar ^a	1
Select one of the following:		3
CS 111	Program Design I	
CS 112	Program Design I in the Context of Biological Problems	
CS 113	Program Design I in the Context of Law and Public Policy	
CS 141	Program Design II	3
CS 151	Mathematical Foundations of Computing	3
CS 211	Programming Practicum	3
CS 251	Data Structures	4
CS 261	Machine Organization	4
CS 277	Technical and Professional Communication in Computer Science	3
CS 301	Languages and Automata	3
CS 341	Programming Language Design and Implementation	3
CS 342	Software Design	3
CS 361	Systems Programming	4
CS 362	Computer Design	4
CS 377	Ethical Issues in Computing	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	
Total Hours		58

a ENGR 100 carries one equivalent semester hour, but awards no credit toward graduation.

Technical Electives

Code	Title	Hours
Courses		
Select two of the following, only one of which may be outside of the CS rubric:		6
CS 351	Advanced Data Structure Practicum	
CS 378	Framework-based Software Development for Hand-held Devices	
CS 398	Undergraduate Design/Research	
CS 402	Algorithms in Practice	
CS 407	Economics and Computation	
CS 411	Artificial Intelligence I ^a	
CS 412	Introduction to Machine Learning	
CS 415	Computer Vision I ^a	
or ECE 415	Image Analysis and Computer Vision I	
CS 418	Introduction to Data Science	
CS 421	Natural Language Processing ^a	
CS 422	User Interface Design and Programming	
CS 424	Visualization and Visual Analytics ^a	
CS 425	Computer Graphics I ^a	
CS 426	Video Game Design and Development ^a	
CS 427	Creative Coding	
CS 428	Virtual, Augmented and Mixed Reality	
CS 440	Software Engineering I	
CS 441	Engineering Distributed Objects For Cloud Computing	
CS 442	Software Engineering II	
CS 450	Introduction to Networking	
CS 453	Introduction to Parallel and Distributed Processing	
CS 454	Principles of Concurrent Programming	
CS 455	Design and Implementation of Network Protocols	
CS 461	Operating Systems Design and Implementation	
CS 463	Systems Performance and Concurrent Computing	
CS 466	Computer Architecture	
CS 468	Network Security	
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 479	Wearables and Nearables Technology Laboratory	
CS 480	Database Systems	
CS 483	Big Data Mining	
CS 484	Secure Web Application Development	
CS 485	Networked Operating Systems Programming	
CS 487	Building Secure Computer Systems	
CS 488	Introduction to Cryptography	
CS 489	Human Augmentics	
ECE 452	Robotics: Algorithms and Control	
ECE 469	Hardware Description Language Based Digital and Computer System Design	
IT 301	Networks and Distributed Computing Technology	
IT 302	Database Administration and Installation	
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	
Total Hours		6

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

Required Mathematics Courses

Code	Title	Hours
Required Courses		
IE 342	Probability and Statistics for Engineers ^a	3
or STAT 381	Applied Statistical Methods I	
MATH 310	Applied Linear Algebra	3
or MATH 320	Linear Algebra I	
Total Hours		6

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

Free Electives

Code	Title	Hours
Electives		
Select 3 hours of Free Electives		3
Total Hours		3

Sample Course Schedule

Course	Title	Hours
Freshman Year		
First Semester		
MATH 180	Calculus I	4

CS 111 or CS 112 or CS 113	Program Design I or Program Design I in the Context of Biological Problems or Program Design I in the Context of Law and Public Policy	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 Success Seminar ^a	1
Hours		16

Second Semester

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
Hours		16

Sophomore Year

First Semester

MATH 210	Calculus III	3
PHYS 141	General Physics I (Mechanics)	4
CS 211	Programming Practicum	3
CS 251	Data Structures	4
General Education Core course		3
Hours		17

Second Semester

CS 261	Machine Organization	4
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
Hours		17

Junior Year

First Semester

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

Second Semester

CS 341	Programming Language Design and Implementation	3
CS 422	User Interface Design and Programming	3
CS 461	Operating Systems Design and Implementation	3
MATH 310 or MATH 320	Applied Linear Algebra or Linear Algebra I	3
Humanities/Social Science/Art Elective ^b		3-4
Hours		15-16

Senior Year

First Semester

CS 377	Ethical Issues in Computing	3
CS 401	Computer Algorithms I	3
CS 424	Visualization and Visual Analytics	3
CS 425	Computer Graphics I	3
General Education Core course		3
Hours		15

Second Semester

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

Humanities/Social Science/Art Elective ^b	3-4
Free Elective	3
Hours	15-16
Total Hours	128

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.