

## Computer Science

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The Computer Science program offers education in the field for those who wish to pursue careers as software engineers, software developers, programmers, database designers and in other related areas.

It is highly recommended that entering students have four years of high school mathematics and two years of high school science.

### **Ancillary Requirements for the Computer Science Major:**

MA 200 & MA 201	Calculus I and II
MA 220 & MA 321	Discrete Mathematics I and II
PY 271 & PY 272	Analog and Digital Electronics I and II <b>or</b>
PY 221 & PY222	General Physics I and II

### **Requirements for a Major in Computer Science: 46 Credits**

#### **Required Courses: 37 Credits**

CS 140	Computer Science I
CS 145	Computer Science II
CS 201	Designing User Friendly Interfaces
CS 241	Assembly Language Programming
CS 245	Programming in C Under UNIX
CS 252	Digital Logic Circuits
CS 340	Data Structures & Algorithm Analysis
CS 352	Digital Computer Architecture
CS 371	Computability Theory
CS 373	Operating Systems

CS 400	Database Design
CS 401	Object Oriented Analysis and Design

Elective Courses: 9 Credits in Computer Science courses at the 200 level or above excluding CS 261 and CS 265. Up to 3 credits of internship (CS 498) and up to 3 credits of Independent Study (CS 499) may be used to satisfy the major elective requirements.

**Requirements for a Minor in Computer Science: (18 credits)**

- CS 140 Computer Science I
- CS 145 Computer Science II
- CS 241 Assembly Language Programming
- CS 245 Programming in C under UNIX
- CS 372 Principles of Programming Languages
- Plus one more Computer Science course above 200 level

**Requirements for a Minor in Web Development: (18 Credits)**

- CS 140 Computer Science I
- CS 161 Web Design using HTML
- CS 201 Designing User Friendly Interfaces
- CS 261 Advanced Web Design Using Scripting Languages
- CS 265 Database Applications
- CS 365 Client Server Computing Using the Internet

**Note:** All computer science courses must be taken in sequence, i.e., CS 100 level courses must be completed before CS 200 level courses are begun. In turn, all lower division course requirements must be completed before upper division courses are begun. **Due to the changing nature of the program, students are strongly advised to meet with their advisor before registering for classes.**

**Computer Science Courses**

**CS 120 Microcomputer Applications in Business I**

Learning state-of-the-art application packages including but not limited to word processing, spreadsheets and presentation software.

*Category 1. 3 credits.*

**CS 121 Microcomputer Applications in Business II**

*Prerequisite: CS 120*

Advanced features of application packages including but not limited to spreadsheets, database management systems, word processing, graphics and integration.

*Category 1. 3 credits.*

### **CS 140 Computer Science I**

*Prerequisite: Familiarity with basic computer operations or CS 120*

CS structures and concepts. Execution, compilation, datatypes, classes, objects, methods, selection, loops, arrays, strings. Problem solving and implementation in a programming language.

*Category 1. 3 credits.*

### **CS 145 Computer Science II**

*Prerequisites: CS 140*

This course builds on the concepts covered in CS 140; advanced programming constructs and concepts; data structures lists and queues.

*Category 1. 3 credits.*

### **CS 161 Web Design Using HTML**

*Prerequisites: CS 140*

Introduces web page design tools; covers how to create web pages using the latest version of HTML by using HTML tags.

*Category 1. 3 credits.*

### **CS 201 Designing User Friendly Interfaces**

*Prerequisites: CS 140 or CS161*

Introduction to techniques for designing “user friendly” interfaces. Examines innovative technologies including touchscreens, speech recognition, multimedia and virtual reality.

*Category 1. 3 credits.*

### **CS 240 Application Development using Visual BASIC**

*Prerequisites: CS 140*

Using the Visual Programming System to create robust and useful applications that make use of the graphical user interface.

*Category 2. 3 credits.*

### **CS 241 Assembly Language Programming**

*Prerequisites: CS 145*

This course introduces the fundamental operations of the computer system at the assembly language level.

*Category 1. 3 credits.*

### **CS 245 Programming in C under UNIX**

*Prerequisites: CS 241*

Covers concepts in procedural abstraction and problem solving/software design using C. Students also gain exposure to the UNIX operating system.

*Category 1. 3 credits.*

**CS 252 Digital Logic Circuits**

*Prerequisites: CS 241, MA 220*

Topics include application of Boolean algebra to an analysis of combinatorial and sequential switching circuits. Characteristics of logic elements, memory devices, and logic circuits to accomplish code conversion.

*Category 1. 4 credits.*

**CS 261 Advanced Web Design Using Scripting Languages**

*Prerequisites: CS 161*

This course covers scripting languages and teaches how to make the web pages interactive by embedding executable scripts into them.

*Category 1. 3 credits.*

**CS 265 Database Applications**

*Prerequisites: CS 140*

This course introduces basic database concepts and teaches how to create a database; use SQL; and create database applications.

*Category 1. 3 credits.*

**CS 340 Data Structures and Algorithm Analysis**

*Prerequisites: CS 245*

Introduces computational complexity; various graph algorithms; binary search trees, dictionaries, priority queues, B-trees, and inverted files; dynamic programming and backtracking.

*Category 1. 3 credits.*

**CS 341 Advanced Assembly Language Programming**

*Prerequisites: CS 241*

This course is a continuation of CS 241. Assembler Language topics covered are MACROS, subprograms, operating systems, debugging, and special purpose instructions.

*Category 2. 3 credits.*

**CS 345 Object Oriented Programming with C++**

*Prerequisites: CS 245*

Introduction to the fundamentals of C++; Topics include objects/classes, single/multiple inheritance, friend functions, operator overloading, polymorphism and streams.

*Category 2. 3 credits.*

**CS 352 Digital Computer Architecture**

*Prerequisites: CS 252*

A study of the internal structure of a typical digital computer from both a logical and a hardware viewpoint; memory devices, arithmetic, and control circuits including LSI and MSI components.

*Category 1. 3 credits.*

### **CS 365 Client Server Computing Using the Internet**

*Prerequisites: CS 265, CS 261*

This course covers what client/server is and covers various client/server models and explores the Internet from a client/server perspective.

*Category 1. 3 credits.*

### **CS 371 Computability Theory**

*Prerequisites: CS 245, MA 321*

This course provides an introduction to theoretical computer science. Covers the fundamentals of automata theory, formal languages, and computability theory.

*Category 1. 3 credits.*

### **CS 372 Principles of Programming Languages**

*Prerequisites: CS 245*

Topics include comparison of syntax and semantic descriptions, data types and control, operations and sequencing, ease of use, applicability, generality, non-proceduralism, and efficiency.

*Category 2. 3 credits.*

### **CS 373 Operating Systems**

*Prerequisites: CS 245, CS 352*

Hardware and software as an integrated system; development of system software for process management, resource allocation, memory management and I/O processing.

*Category 1. 3 credits.*

### **CS 375 Software Analysis and Design**

*Prerequisites: CS 340*

This course deals with software as an engineered product that requires planning, analysis, design, implementation, testing and maintenance.

*Category 2. 3 credits.*

### **CS 380 System Programming**

*Prerequisites: CS 245*

The design and implementation of assemblers, linkers, loaders, editors, and high-level translation software. Algorithms solving specific problems of a system program are investigated.

*Category 3. 3 credits.*

**CS 400 Database Design**

*Prerequisites: CS 340*

The history and requirements of database development and maintenance; includes comparisons of commercially available models.

*Category 1. 3 credits.*

**CS 401 Object Oriented Design and Analysis**

*Prerequisites: CS 340*

This course introduces object-oriented analysis and design concepts as a new way of thinking about problems using models organized around real-world concepts.

*Category 1. 3 credits.*

**CS 403 Compiler Design**

*Prerequisites: CS 371*

This course covers basic concepts involved in the design of compilers such as language definition, lexical, syntactic and semantic analysis, and code generation.

*Category 3. 3 credits.*

**CS 405 Data Communications and Networking**

*Prerequisite: CS 373*

Data transmission, encoding, interfacing, synchronization, data-link control, multiplexing, networking, circuit switching, packet switching, radio and satellite, local area networks, network access protocols.

*Category 1. 3 credits.*

**CS 471 Artificial Intelligence**

*Prerequisites: CS 371, MA 321*

Introduction to central issues of constructing intelligence systems. Examines historical and future trends of AI research.

*Category 2. 3 credits.*

**CS 497 Selected Topics in Computer Science**

*Prerequisites: CS 245*

Selection of topics of mutual interest to students and faculty.

*Category 2. 3 credits.*

**CS 498 Internship**

*Prerequisites: Approval by vote of Computer Science faculty; 21 credit hours in Computer Science courses including CS 340.*

Working in and for an organization where skills can be tested in real situations in order to gain experience, increase knowledge in various functional areas, and establish important contacts with an organization.

*Category 3. 3 credits.*

**CS 499 Independent Study**

*Prerequisite: 18 credit hours in Computer Science including CS 340 and approval by vote of Computer Science faculty.*

An opportunity for advanced students to examine topics not normally taught in other computer science courses. Geared to interests of both the student and the instructor.  
*Category 1. 1-6 credits.*