Computer Science (NR) Course Descriptions

CSC 171 Introduction to Computer Science I 3 credits

Co-requisite: MTH 141 or permission of instructor.

Overview of Computer Organization, Algorithm Design, Introduction to Programming in C++. Input/Output Statements, Control Statements, Functions and Function Calls, Math Library, I/O Library, Character Library, Introduction to Arrays and Pointers, Program Testing and Debugging.

CSC 172 Introduction to Computer Science II 3 credits

Prerequisite: CSC 171.

Built-In and User-Defined Data Types, Arrays, Lists, Strings, Records, Classes and Data Abstraction, C++ Object-Oriented Software Developments, Inheritance, Composition, Dynamic Binding and Virtual Functions, Pointers, Dynamic Data, Reference Data Types, Recursion.

CSC 271 Assembly Language 3 credits

Prerequisite: CSC 172 or CSC 171 with permission of instructor.

Basic PC Architecture, Computer Number Systems and Codes, Basic Components of Assembly Language, Assemblers, Directives, Linking and Executing Programs, Addressing Techniques, Symbolic Instructions, Writing .COM Programs, Logic and Control, Processing String Data, Processing Binary Data, Processing ASCII and BCD Data, Defining and Processing Tables, Macros.

CSC 345 Object-Oriented Software Construction 3 credits

Prerequisite: CSC 172

Object-oriented programming techniques, encapsulation, constructors, destructors, overloading, single and multiple inheritance, polymorphism, composition, templates, iterators, member function access, data hiding, abstract classes, exception handling, projects.

CSC 354 Database, Systems and Programming 3 credits

Prerequisites: CSC 172 or CSC 345

Database management, database system architecture, relational databases, SQL, domains, relations, relational algebra, relational calculus, integrity, views, normalization, database security, database connectivity, database programming, projects.

CSC 413 Java 3 credits

Prerequisite: CSC 172, CSC 345 or CSC 441.

Java applications, Java Applets, control structures, methods, arrays, strings and characters, object-oriented programming, graphics and Java 2D, basic graphical user interface components, exception handling, files and streams, and Java utilities.

CSC 417 Unix Systems Programming 3 credits

Prerequisite: CSC 172, CSC 345 or CSC 441, and CSC 449.

UNIX organization, UNIX commands, the Bourne Shell, the Korn Shell, the C Shell, pattern matching, the Emacs Editor, the Vi Editor, the Ex Editor, the AWK Scripting Language, text formatting, macros, preprocessors, the Source Code Control System (SCCS), Revision Control System (RCS), UNIX networking.

CSC 441 Object-Oriented Programming 3 credits

Prerequisite: A year of computer programming in any programming language.

This course is designed to introduce object-oriented programming to students who have had a background in traditional, procedural programming. Topics include: Object-oriented Programming Techniques, Encapsulation, Constructors, Destructors, Overloading, Single and Multiple Inheritance, Polymorphism, Composition, Templates, Iterators, Member Function Access, Data Hiding. The implementation language will be C++. The course begins with a description of that part of C++ this is simply part of C (called the kernel language) and then present objects and their implementation in C++.

CSC 443 Data Structures 3 credits

Prerequisite: CSC 172, CSC 345 or CSC 441.

Review of Object Oriented Principles, Standard Data Structures, Big-O Notation, NP Completeness, Stacks, Queues, Generic Data Types, Dynamic Memory, Recursion, Linked Lists, Circular Lists, Doubly Linked Lists, Trees, Binary Search Tree Heaps, Graphs, Sorting Algorithms, Searching Algorithms, Object-Oriented Language Implementation of Data Structures and Algorithms.

CSC 445 Numerical Analysis 3 credits

Prerequisite: CSC 172, CSC 345 or CSC 441. Recommend: MTH 372 and 402.

Iterative methods; equations in one variable; polynomial approximations; numerical integration and differentiation; polynomial approximation of functions; numerical methods in matrix algebra; least squares method; numerical methods in differential equations, including initial value problems; computer projects.

CSC 449 Operating Systems 3 credits

Prerequisite: CSC 172, CSC 345 or CSC 441.

Review of operating systems strategies such as batch, timesharing, and process control and real-time systems; resource abstraction and sharing; defining and studying processes and threads; factors on OS design; basic functions and implementation considerations for interrupts; Device management using direct I/O with polling and interrupt-driven I/O; Buffering; Device Drivers; Process Management and process address space; scheduling mechanisms considering preemptive and non-preemptive strategies; synchronization using semaphores and monitors; Deadlock prevention, avoidance, detection and recovery; Memory management. Computer simulation projects.

CSC 452 Advanced Java 3 credits

Prerequisite: CSC 413

Advanced graphical user interfaces, multithreading, Java Beans, java networking, Java Database Connectivity (JDBC), Java Servlets, Java Security, Remote Method Invocation (RMI), Java Native Interface (JNI), Java 2 Micro Edition, Java programming with COBRA.

CSC 457 Software Project Management 3 credits

Prerequisites: CSC 172 or CSC 345 and CSC 443

Project management concepts, project metrics, project planning, risk analysis and management, project scheduling, project tracking, software quality assurance, software configuration management, communicating project information, critical paths, case studies, and term project.

CSC 464 Parallel Programming 3 credits

Prerequisites: CSC 172, CSC 345 or CSC 445

Overview of parallel hardware and software, parallel programming tools, parallel numerical integration example, collective communication, grouping data for communication, dealing with I/O, debugging, parallel programs, design and coding of parallel programs, performance, advanced point-to-point communication, parallel algorithms.

CSC 467 Distributed Computation 3 credits

Prerequisite: CSC 172 and CSC 443

Theory of Distributed Computing, basic algorithms for message passing systems, leader election in rings, mutual exclusion in shared memory, fault-tolerant consensus, causality and time, formal models for simulations, broadcast and multicast, distributed shared memory, fault-tolerant clock synchronization.

CSC 469 Seminar in Computer Science 3 credits

Students prepare and present paper(s) related to their primary area of interest, with approval of the instructor. This course should be taken by computer science majors in their final year of study.

CSC 490 Special Topics 3 credits

Covers some topic of current interest in Computer Science. Topics vary from semester to semester.

EE 364 **Digital Logic Circuits I** **3 credits**

Sophomore Standing

Binary numbers and arithmetic. Fundamentals of Boolean algebra. Basic logic, circuit concepts. Karnaugh maps. Multiplexers, decoders, flip-flops, counters, PLDs and FPGAs. Design of sequential circuits, computer modeling and simulation of digital systems.

EE 468 **Computer Networking** **3 credits**

Study of local area networks (LAN) and wide area networks (WAN). Survey of the state-of-the-art computer network. Topics include networking theory, design approaches, standards, topologies, OSI and TCP/IP, protocols, applications and distributed processing.

EE 480 **Computer Organization and Architecture** **3 credits**

Prerequisite: EE 364

Basic and advanced concepts of CPU design, memory systems, and I/O interfacing. Alternative design and evaluation of the control unit, the arithmetic and logic unit, and memory hierarchy.

MTH 141 **Analytic Geometry and Calculus I** **4 credits**

Prerequisite: MTH 140 or equivalent

Functions; limits and continuity; derivatives and integrals of polynomial, rational and trigonometric functions. Computer laboratory included.