## Computer Science (4360)

**3460:101 Essentials of Computer Science (3 Credits)**
Explore major topics in Computer Science - computing systems, data representation, hardware, programming topics, and important applications such as networks, robotics, databases, and gaming.

**3460:125 Descriptive Computer Science (2 Credits)**
Computer literacy: terminology; methods, media for data representation, storage; elements of a computing system; data organization.

**3460:126 Introduction to Visual Basic Programming (3 Credits)**
Windows GUI and Microsoft's Visual BASIC programming environment. Design of user interfaces, event-driven programming, basic control structures, simple variables, arrays, and sequential files.

**3460:209 Computer Science I (4 Credits)**
Prerequisite: Completion of 3450:145 or 3450:149 with a grade of C- or better. Introduction to problem-solving methods and algorithms. Programming in a high-level language including how to design, code, debug and document programs with good programming style.

**3460:210 Computer Science II (4 Credits)**
Prerequisites: 3460:209 and 3460:208 with a grade of C- or better. Dynamic memory allocation methods, elementary data structures, internal representations, and associated algorithms. Topics include lists, stacks, queues, trees, and sorting methods.

**3460:289 Selected Topics in Computer Science (1-3 Credits)**
Prerequisite: Permission. Selected topics of interest in computer science.

**3460:306 Assembly and System Programming (4 Credits)**
Prerequisite: Completion of 3460:210 or equivalent with a grade of C- or better. Basic computer organization, digital logic, and data representation. Programming in assembly and C languages on a typical digital computer.

**3460:316 Data Structures (3 Credits)**
Prerequisites: 3460:210 and [3450:221 or 3450:210] with grades of C- or better. Overview of current programming languages, tool and scripting technologies for the Internet and World Wide Web.

**3460:395 Internship in Computer Science (1-12 Credits)**
Prerequisites: Completion of 3460:209 and 3460:210 with grades of C- or better, and permission of a faculty supervisor. Placement in industry for experience related to computer science. (May be repeated to a maximum of 12 credit hours. No more than three credits may be applied towards a computer science major.)

**3460:406 Introduction to C & UNIX (3 Credits)**
Prerequisite: Completion of 3460:208 or 3460:210 or 3460:406 with a grade of C- or better or permission. Windows operating systems, integrated development environment, event-driven programming, graphical user interface design, object libraries, component object model, object linking, embedding, client-server objects.

**3460:408 Windows Programming (3 Credits)**
Prerequisites: Completion of 3460:208 or 3460:210 or 3460:406 with a grade of C- or better or permission. Introduction to a number of structures in algebra of particular use to student in computer science. Topics include algorithms and flow chart language, graphs and digraphs, trees, lattices codes.

**3460:412 Object-Oriented Programming (3 Credits)**
Prerequisite: Completion of 3460:210 with a grade of C- or better. Object-oriented design, analysis, and programming using different development models. Comparison with other programming paradigms.

**3460:418 Introduction to Discrete Structures (3 Credits)**
Prerequisite: Completion of 3460:210 with a grade of C- or better or permission. Introduction to a number of structures in algebra of particular use to student in computer science. Topics include algorithms and flow chart language, graphs and digraphs, trees, lattices codes.

**3460:421 Object-Oriented Programming (3 Credits)**
Prerequisite: Completion of 3460:210 with a grade of C- or better. Object-oriented design, analysis, and programming using different development models. Comparison with other programming paradigms.

**3460:426 Operating Systems (3 Credits)**
Prerequisites: Completion of 3460:316 and 4450:320 or equivalents with grades of C- or better. Introduction to aspects of all modern operating systems: types; storage management; process and resource control; interacting process synchronization.

**3460:428 UNIX System Programming (3 Credits)**
Prerequisite: Completion of 3460:210 with a grade of C- or better and knowledge of C. An overview of the UNIX operating system. Shell programming. Process management, processor management, storage management, scheduling algorithms, resource protection, and system programming.

**3460:430 Theory of Programming Languages (3 Credits)**
Prerequisite: Completion of 3460:210 with a grade of C- or better. Advanced concepts underlying programming languages and their applications, formal definitions of programming languages, Backus Normal Form, semantics. Alternative programming paradigms including functional programming.
3460:435 Algorithms (3 Credits)
Prerequisite: Completion of 3460:316 with a grade of C- or better. Design and analysis of efficient algorithms for random access machines; derivation of pattern classification algorithms.

3460:440 Compiler Design (3 Credits)
Prerequisites: Completion of 3460:210 and (4450:320 or 3460:306), with a grade of C- or better. Techniques used in constructing compilers, including lexical and syntactic analysis, parsing techniques, object code generation and optimization. Course requires a compiler implementation project.

3460:445 Introduction to Bioinformatics (3 Credits)
Prerequisite: Completion of 3460:210 with a grade of C- or better or permission. Introduce major themes in bioinformatics. Topics include concepts of molecular genetics, biological databases, database searching, sequence alignments, phylogenetic trees, structure prediction, and microarray data analysis.

3460:453 Computer Security (3 Credits)
Prerequisite: Completion of 3460:210 with a grade of C- or better. Principles of computer security – cryptography, authentications, secure network protocols, intrusion detection and countermeasures.

3460:455 Data Communication & Computer Networks (3 Credits)
Prerequisites: Completion of 3460:210 with a grade of C- or better. ISO-OSI, TCP/IP, SNA data switching, protocols, flow and error control, routing, topology. Network trends, network taxonomies, and socket-based programming.

3460:457 Computer Graphics (3 Credits)
Prerequisite: Completion of 3460:210 with a grade of C- or better. Topics in vector and raster graphics, interactive graphics languages, scan conversion, clipping, geometric transformation, projection, shading, animation and virtual reality.

3460:460 Artificial Intelligence & Heuristic Programming (3 Credits)
Prerequisite: Completion of 3460:210 with a grade of C- or better. Study of various programs which have displayed some intelligent behavior. Exploration of level at which computers can display intelligence.

3460:463 Pervasive Computing (3 Credits)
Prerequisites: Completion of 3460:210 with a grade of C- or better. Computing from a wireless perspective. Topics include protocols, algorithms, security and sensor networks.

3460:465 Computer Architecture (3 Credits)
Prerequisite: Completion of 3460:210 and (4450:320 or 3460:306), with a grade of C- or better. An introduction to the hardware organization of the computer at the register, processor and systems level. In-depth study of the architecture of a particular computer system family.

3460:468 Mobile Robotics (3 Credits)
Prerequisites: Completion of 3460:210 with a grade of C- or better. Introduction to history, hardware and software components, and design of autonomous mobile robots. Multiple projects involving both physical robots and software emulation.

3460:475 Database Management (3 Credits)
Prerequisite: Completion of 3460:210 with a grade of C- or better. Fundamentals of database organization, data manipulations and representation, data integrity, privacy.

3460:477 Introduction to Parallel Processing (3 Credits)
Prerequisites: Completion of 3460:316 with a grade of C- or better and knowledge of C. Commercial processors: past and present. Parallel languages, models of parallel computation, parallel algorithm design and performance evaluation. Parallel paradigms with relation to real world applications.

3460:480 Software Engineering (3 Credits)
Prerequisite: Completion of 3460:210 with a grade of C- or better. Introduction to formal software specification and validation. Introduction of methodologies and tools of design, development and validation, and maintenance.

3460:489 Topics in Computer Science (1-3 Credits)
Prerequisite: Permission of instructor. Selected topics in computer science at an advanced level.

3460:490 Senior Seminar in Computer Science (3 Credits)
Prerequisites: Must have completed at least 30 hours of 3460 (computer science) courses. Corequisites: 3460:435 and [3460:426 or 4450:325]. Professional software development, surviving "Mission Impossible" projects, computer ethics, intellectual property rights (patents and copyrights), and other current topics.

3460:497 Individual Study in Computer Science (1-3 Credits)
(May be repeated. Can apply to degree, minor or certificate only with department approval.) Prerequisite: Permission. Directed studies designed as introduction to research problems under guidance of designated faculty member.

3460:498 Senior Honors Project: Computer Science (1-3 Credits)
Prerequisites: 3460:497 and Senior student in Honors Program. Directed study for senior student in the Honors Program who has completed 3460:497. An introduction to research problems in the computer science under the guidance of selected faculty.