COMPUTER SCIENCE

Head of the Department:
Professors: Higginbotham, J. Hu
Associate Professors: Beaubouef, Curran, G. Hu
Assistant Professor: Alkadi, Mason, Yang
Instructors: Pierce, Tahaoglu

COMPUTER SCIENCE (CMPS)

101. Introduction to Computer Science. Credit 3 hours. Prerequisite: Registration in or prior credit for Mathematics 160 or 161. Introduction to the major areas of computer science including operating systems, machine architecture, programming languages, data representation and storage, and algorithm development. Includes major emphasis in problem solving and simple programming concepts.

105. Computers in Society. Credit 3 hours. Topics include historical, modern, and future developments, as well as an overview of a computer system's hardware, software and people. Issues concerning security, privacy, and ethics will be discussed. Includes practical application of using communication software networks, including the Internet and the World Wide Web. This course does not satisfy the general requirement for computer literacy.

110[151]. Computer Literacy. Credit 3 hours. An introduction to microcomputer hardware and software. Software includes an operating system, a user interface, networking, word processing, and electronic spreadsheets. Credit toward the degree will not be granted for both CMPS 110 and GBBT 210.

120[267]. Microcomputers and BASIC Programming. Credit 3 hours. Prerequisite: Registration in or prior credit for Mathematics 161 or 165. Introduces microcomputers using the BASIC language. Includes a study of applications and characteristics of microcomputers. Credit toward the degree will not be granted for the Computer Science major.

159. Structured Programming I. Credit 3 hours. Prerequisite: Mathematics 161 or 165 or permission of the Department Head. Basic concepts of computer programming, problem solving, algorithm development, and coding using a high-level, block-structured language.

161. Algorithm Design and Implementation I. Credit 3 hours. Prerequisite: Mathematics 161 or 165 or permission of the Department Head. Basic concepts of computer programming, problem solving, algorithm development, and program coding using a high-level, block-structured language. Credit may be given for both Computer Science 110 and 161.

173. Software for Management of Data. Credit 3 hours. Prerequisite: Mathematics 161 or permission of the Department Head. Concepts of acquisition, organization, exchange and storage of quantitative data through the use of visual languages and packages.

169. Structured Programming II. Credit 3 hours. Prerequisite: Computer Science 158 or 159. A continuation of the basic concept of computer programming, problem solving, algorithm development, and coding using a high-level structured programming language. Credit may be given for only one of Computer Science 161 or 169 or 258.

225. Software Applications. Credit 3 hours. Prerequisite: Mathematics 241 or equivalent and Computer Science 110 or 151. Use of various software packages for data analysis including SAS, SPSS and BMDP. Credit toward the degree will not be granted for the Computer Science major.

233[253]. Desk Top Publishing. Credit 3 hours. Prerequisite: Computer Science 110 or 151, or with permission of the Department Head. Topics include assembling, and design of document, fonts, art layout, photos, black and white images, shading, colors, graphics, using microcomputers, scanners, and other peripheral devices. Credit toward the degree will not be granted for the Computer Science majors or minors.

234[254]. An Introduction to Applications of Database Management Systems. Credit 3 hours. Prerequisite: Computer Science 110 or 151, or with permission of the Department Head. A course for non-majors covering relational database basic structure, method of design, implementation, and manipulation. Student will design and implement a major database project using a production version database management system. Credit toward the degree will not be granted for the Computer Science majors or minors.

235. World Wide Web Publishing and Web Servers. Credit 3 hours. Prerequisite: Computer Science 110 or permission of the Department Head. Topics include Hyper-Text-Markup-Language, ISO SGML, Linux/Unix server setup on the Internet with operation, and security issues.

257. Discrete Structures. Credit 3 hours. Prerequisite: Computer Science 161 or 169, or 258 and Mathematics 161 or 165. Introduction to discrete structures of computing. Topics include sets, relations, functions, digraphs, matrices, recursion, partially ordered sets, Boolean Algebra, artificial languages, and finite state machines.

262. COBOL Programming. Credit 3 hours. Prerequisite: Registration in or prior credit for Mathematics 161 or 165. A study of the business oriented programming language COBOL, including a study of its more powerful capabilities such as the search, sort, and access techniques.

273. Software for Storing and Analyzing Data. Credit 3 hours. Prerequisites: Mathematics 165 or 241 and Computer Science 173 or permission of the Department Head. Topics include methods for designing database schema and spreadsheet programs based on quantitative data analysis requirements; implementation of spreadsheet programs and database schema using integrated methodologies with visual languages and software packages.

280[270]. Algorithm Design and Implementation II. Credit 3 hours. Prerequisite: Computer Science 161 or 169, or 258. An intensive capstone of the material covered in Computer Science 161 or 169 and an introduction to elementary data structures, searches, simple and complex sorts, and objects. Credit may not be given for both Computer Science 270 and 280.

285. Software Development and Professional Practice. Credit 3 hours. Prerequisite: Computer Science 280 or permission of the department head. Introduction of the methods used for specifying, designing, implementing, and testing medium and large scale software systems; methods for organizing and managing software development projects; professionalism and ethical responsibilities in software development.

293[263]. Introduction to Assembly Language. Credit 3 hours. Prerequisite: Computer Science 280. Fundamentals of assembly language programming. Topics include machine representation of data, fixed point, floating point, and decimal arithmetic, macros, address modification, bit manipulation, and subroutine linkage.

295. Special Problems. Credit 1-3 hours. Prerequisite: Computer Science 110 or equivalent. Independent investigation and application of computing software that is not covered in existing courses. May be repeated for up to 3 hours credit. Credit toward the degree will not be granted for Computer Science majors or minors.

297. Digital Logic. Credit 3 hours. Prerequisite: Computer Science 257. Principles of digital logic, to include gates, combinational circuits, flip-flops, registers, counters, timers, memory, buses, input/output interfaces and microprocessors.

309. Computer Networking. Credit 3 hours. Prerequisite: Computer Science 161 or 169, and Computer Science 293, and Mathematics 165. Fundamentals of computer networking and protocols used in local area and wide area networks. Topics include network selection, installation, customization, and administration.

319. Principles of Information Assurance. Credit 3 hours. Prerequisites: CMPS 110 and successful completion of any 200-level computer course; or permission of the Department Head. Conceptual and technical aspects of computing security and of the Information Assurance (IA) discipline; addresses knowledge areas specified in IA certification programs with emphasis on applying IA concepts to case studies from business, industry and government.

320. Applied Graphical User Interface (GUI) Concepts. Credit 3 hours. Prerequisite: Computer Science 280 or permission of the instructor. Topics include GUI design styles and strategies for visual applications, development life cycle, flow diagrams, and application documentation.

335. Advanced Web Publishing. Credit 3 hours. Prerequisite: Computer Science 235 and one introductory programming course or permission of the Department Head. Topics include using a variety of markup languages and scripting techniques for both server and client WWW applications.

355. Object-Oriented Programming. Credit 3 hours. Prerequisite: Computer Science 270 or 280. Introduction to the Object-Oriented Paradigm, including data abstraction, encapsulation, polymorphism, inheritance, and garbage collection. Implementation of these concepts using an Object-Oriented language.

375. Computer Architecture. Credit 3 hours. Prerequisite: Computer Science 293. Hardware organization and implementation of computer architecture. Instruction set considerations and addressing modes. System control concepts. CPU control, microprogramming, I/O interface and memory organization. Parallel and data flow architecture.

383. Information Systems. Credit 3 hours. Prerequisite: Computer Science 280. A study of file organization and management, analysis of the concept of information systems, approaches and techniques for evaluating information systems. Fourth generation languages will be explored.

387. Statistical Computing. Credit 3 hours. Prerequisites: Mathematics 200, 241, and Computer Science 270 or 280. Computer techniques in statistical analyses using standard statistical packages. Topics include frequency distributions, variances, confidence intervals, chi-square, linear regression and correlation analysis.

389. Computer Graphics. Credit 3 hours. Prerequisites: Mathematics 200 and Computer Science 270 or 280. Introduction and techniques of computer graphics. Topics include interactive versus passive graphics, input-output devices, and programming techniques suitable for the visual representation of data and images.

390. Data Structures. Credit 3 hours. Prerequisite: Computer Science 257 and (270 or 280) and 285. Further study of trees, including: balanced trees, B-trees, 2-3 trees, and tries; external sorting, symbol tables, and file structures.

391. Numerical Methods. Credit 3 hours. Prerequisites: Computer Science 270 or 280 and Mathematics 201 or equivalent. Computer-oriented numerical methods for scientific problems. Topics include error analysis, Taylor series, solutions of equations, linear simultaneous equations, and interpolation.

393. Fundamental Algorithms. Credit 3 hours. Prerequisites: Computer Science 257, 390 and Mathematics 201. The design, implementation, and complexity of algorithms analysis.

400. Internship. Credit 1-6 hours. Prerequisite: CMPS 390 and permission of the department head. Student must be an integral part of a software project team in industry during the semester. Graded as Pass/Fail only. Can be counted as a general elective only, not as a Computer Science Elective (300-400).

401. Survey of Programming Languages. Credit 3 hours. Prerequisite: Computer Science 390. Involves the formal study of programming languages, specification, and analysis in terms of data types and structures.

409. Advanced Computer Networking. Credit 3 hours. Prerequisite: Computer Science 309. Advanced computer networking. Topics include security, optimization, custom modules, protocols, information flow management, disaster recovery, wireless applications, and legal and ethical issues.

411. Software Engineering. Credit 3 hours. Prerequisite: Computer Science 390, must be taken in the academic year in which the student intends to graduate. Presents a formal approach to the top-down design, development, and maintenance of software systems. Includes organization and management of software projects, security, programmer teams, validation and verification.

420. Human Computer Interaction. Credit 3 hours. Prerequisite: Computer Science 320. Designing, implementing, and evaluating computer systems. Task analysis, prototyping, usability evaluation, dialogue specification, interaction styles and techniques, human factors, virtual reality, multimedia, and hypermedia systems.

421/521 [421UG]. Computers in Education. Credit 3 hours. Prerequisite: Permission of Department Head. Designed for the prospective graduate student and other students who are interested in the preparation and processing of data in research.

431. Operating Systems. Credit 3 hours. Prerequisite: Computer Science 375 and 390. Design and implementation of operating systems. Topics include process management, processor management, memory management, device management, file management, process synchronization and interprocess communication, and user interface. Other issues such as distributed computing and system performance may be discussed.

432. Compiler Construction. Credit 3 hours. Prerequisite: Computer Science 375 and 390. The design and construction of compilers including compile-time symbol tables, lexical scan, syntax scan and object code generation.

435. Real Time Software Systems. Credit 3 hours. Prerequisites: Computer Science 431 and Mathematics 200. Design of real time software systems including communications, interrupts and device control.

439. Database Systems. Credit 3 hours. Prerequisite: Computer Science 390. Design and implementation of database systems. Topics include hierarchical, relational, and network models, normalization of relations, data integrity and security, and database administration. A programming project using a relational DBMS is required.

441. Artificial Intelligence. Credit 3 hours. Prerequisites: Computer Science 387 or Mathematics 380, and Computer Science 390. Introduction to intelligent processes and their performance by a computer. Topics include computer representation of knowledge, problem solving, game playing, theorem proving, natural language understanding, computer vision, and robotics.

443/543. Simulation and Modeling. Credit 3 hours. Prerequisite: Computer Science 390 and Mathematics 380 or Computer Science 387. Construction and use of computer and mathematical models, parameter estimation, simulation techniques, applications of simulation, examples, and cases and studies taken from physical, social and life sciences, engineering, business and information sciences.

447. Robotic Software. Credit 3 hours. Prerequisites: Computer Science 161, 169, or 258, and 375 or equivalent and Physics 191, 193. An introduction to the study of robotic software with emphasis on basic concepts including motion, vision and speech.

449. Communications in Computing. Credit 3 hours. Prerequisite: Computer Science 390. Principles of computer communications and networks. Topics include communication codes, communication modes, communication media, networks, and communication applications.

458. Expert Systems. Credit 3 hours. Prerequisite: Computer Science 441. Introduction to Expert Systems. Topics include artificial intelligence techniques for Expert Systems, knowledge bases, knowledge representation, inference engines, system shells, natural language processing, heuristic techniques, rule-based systems, and meta level languages.

460. Design and Implementation of Neural Networks. Credit 3 hours. Prerequisite: Computer Science 441 and Mathematics 360. Introduction to Neural Networks. Topics include connections, processing elements, n-dimensional geometry, self-adaptive equations, data transformation structures, mapping networks, and neurocomputing applications.

479. Automata and Formal Languages. Credit 3 hours. Prerequisites: Computer Science 257 or Mathematics 223 and senior standing. Introduction to computing device capabilities through study of abstract machines and corresponding formal languages. Topics include Turing machines, recursion, Chomsky grammars, context-free languages, regular languages, and finite automata.

481. Seminar. Credit 1 hour. Prerequisite: Senior Classification. Discussion of social, ethical, and professional issues. Students present reports on topics of current interest in Computer Science.

487/587. Introduction to Operations Research. Credit 3 hours. Prerequisites: Math 200 and CMPS 280 or equivalent. An application-oriented survey of operations research topics including linear and integer programming, network analysis, dynamic programming, nonlinear programming, and decision analysis.

491/591. Selected Topics in Computer Science. Credit 3 hours. Prerequisite: Permission of Department Head. Selected topics in Computer Science that are new or unique and are not covered in existing courses. May be taken more than once for credit.

495/595. Special Problems. Credit 1-3 hours. Prerequisite: Permission of Department Head. Permits work by students on special projects in Computer Science. May be taken more than once for credit.