Computer Science (CMPS)

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Head of the Department: Professor Owens
Professors:              Higginbotham, J. Hu
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Instructors:             G. Alkadi, I. Alkadi, Carter, Lucas,
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COMPUTER SCIENCE (CMPS)

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. Degree credit is not available for the Computer Science major or minors.

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. Degree credit is not available for the Computer Science major.

125. LOGO Programming. Credit 3 hours. Prerequisite: Registration in or prior credit for Mathematics 161 or 165. LOGO is a simple, enjoyable, yet powerful programming language. Topics include some of the more powerful features of LOGO, such as its use of procedures, variables, predicates, recursive programming, and graphics.

159. Structured Programming I. Credit 3 hours. Prerequisite: Registration in or prior credit for Mathematics 161 or 165. Basic concepts of computer programming, problem solving, algorithm development, and coding using a high-level, block-structured language. Credit is not available for Computer Science majors. Credit may not be given for both Computer Science 158 and 159, or 161.

161. Introduction to Computing. Credit 3 hours. Prerequisite: Registration in or prior credit for Mathematics 161 or 165. 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. Credit may not be given for both Computer Science 161 and

158, 159, 169, or 258.

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, 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. Degree credit is not available for the Computer Science major.

232[252]. Expert Systems Applications. Credit 3 hours. Prerequisite: Computer Science 110 or 151, or with permission of the Department Head. An introduction to the conceptual basis and specialized tools designed for expert system building. Students will develop an expert system using an expert system shell tool. Degree credit is not available for the Computer Science majors or minors.

233[253]. Desk Top ublishing. 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. Degree credit is not available 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. Degree credit is not available for the Computer Science majors or minors.

235. World Wide Web Publishing and Web Servers. Credit 3 hours. Prerequisite: Computer Science 233 or permission of instructor. Topics include Hyper-Text-Markup-Language, ISO SGML, Linux/Unix server setup on the Internet with operation, and security issues.

250. Neural Network Applications. Credit 3 hours. Prerequisite: Computer Science 110 or 151, or with permission of the Department Head. An introduction to the conceptual basis and specialized tools designed for neural network building. Students will develop a neural network using a neural network tool. Degree credit is not available for the Computer Science majors or minors.

257. Discrete Structures. Credit 3 hours. Prerequisite: Computer Science 161, 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.

261. FORTRAN Programming. Credit 3 hours. Prerequisite: Registration in or prior credit for

Mathematics 161 or 165. The scientific computer language FORTRAN is used to teach problem solving methods and algorithm development.

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.

280[270]. Intermediate Programming. Credit 3 hours. Prerequisite: Computer Science 161, 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.

293[263]. Introduction to Assembly Language. Credit 3 hours. Prerequisite: Computer Science 161, 169, 258, 261, or 262. 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. Degree credit is not available 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.

345. Logic and Metalogic. Credit 3 hours. Prerequisites: Computer Science 257 or Mathematics 223. Topics include models and derivations for sentential (propositional) logic and first-order logic. Completeness and soundness results and Gödel's Incompleteness Theorems.

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 297. 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.

378. Microprocessors. Credit 3 hours. Prerequisite: Computer Science 375. Introduction to Microprocessors. Topics include addressing modes, registers, BIOS, RAM, ROM, buses, I/O, interrupts, caching, assembly languages, machine languages, channels, and basic communication.

382. Advanced Programming Methodologies in C. Credit 3 hours. Prerequisite: Computer Science 270 or 280. Algorithms, recursion, screen techniques, macros, strings, arrays, pointers, preprocessors, bit manipulation, I/O, memory management.

383. Information Systems. Credit 3 hours. Prerequisite: Computer Science 262. 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.

384. Assemblers. Credit 3 hours. Prerequisite: Computer Science 375. An introduction to assembler construction, addressing, relocatability, macro assemblers, symbol tables, address spaces, and the design of assembly languages.

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. 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: Senior classification and permission of Department Head. Involves the successful completion of a project in industry during one semester. Grade assigned on a Pass/Fail basis only.

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.

403. Logic for Computer Science. Credit 3 hours. Prerequisites: Computer Science 257, Mathematics 201, and Mathematics 241. Includes Propositional Calculus, First-Order Predicate Calculus with Identity, Number Theory, and program verification techniques (primarily of Floyd and Hoare). Programs will be written to test running time of other programs, to check the syntax of expressions, and to determine satisfiability.

411. Software Engineering. Credit 3 hours. Prerequisite: Computer Science 390 and senior standing or permission of instructor. 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.

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. 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 241, 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. Simulation and Modeling. Credit 3 hours. Prerequisite: Computer Science 387 or Mathematics 241. 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 409. Introduction to Neural Networks. Topics include connections, processing elements, n-dimensional geometry, self-adaptive equations, data transformation structures, mapping networks, and neurocomputing applications.

471. System Project. Credit 3 hours. Prerequisite: Computer Science 411. Completion of a system development project allowing students to acquire practical experience.

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.

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.

492. Laboratories Experiences in Computer Program Analysis and Maintenance. Credit 1-3 hours. Prerequisite: 9 hours in Computer Science and permission of Department Head. Supervised, progressive experience in developing techniques and procedures in reading, analyzing, and maintaining the computer programs of others. May be repeated more than one time for credit. Two hours laboratory per week per credit hour.

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.

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