COURSE DESCRIPTIONS FOR COMPUTER SCIENCE

The Department of Mathematics and Computer Science requires that, prior to enrolling in any departmental course, students should earn a grade of "C" or better in all course prerequisites.

CSDP 100 Computer Science Orientation Credit 1
This course is a survey of Computer Science with special emphasis on topics of importance to computer scientists. It also provides an exploration of skills required and resources available to students majoring Computer Science. Topics include nature of problems, hardware, human factors, security, social, ethical and legal issues, familiarization of various aspects of computing and networks. This course must be taken by all Computer Science major and minor students.

CSDP 120 Introduction to Computing Credit 3
This course is for students new to Computer Science. The goal is to introduce students to different general computing aspects of the computer systems. Course topics include overview of the history of computing machines, computing codes and ethics, computing algorithms, programming languages, and mathematical software packages. Prerequisite: High school mathematics. CSDP 120 does not satisfy the General Education Area III Requirement.

CSDP 121 Microcomputer Applications Credit 3
This course is designed for non-technical majors in different applications of modern computing systems. The course surveys computing hardware and software systems and introduces students to the present state-of-the-art word processing, spreadsheet, and database software. Applications to other disciplines, such as medicine, administration, accounting, social sciences and humanities, will be considered. Prerequisite: High School Mathematics. CSDP 121 does not satisfy the General Education Area III Requirement.

CSDP 150 Office Automation Workshop Credit 1
This course is an introduction to current progress in word processing and/or office automation. The course involves considerable hands-on work with current equipment. This course may be repeated (with different topics) for a maximum of six credits. Prerequisite: Variable, depending on topic selected. CSDP 150 does NOT satisfy the General Education Area III Requirement.

CSDP 151 Special Software Workshop Credit 1
This course is an intensive introduction to various commercially available software packages, such as spreadsheet and database packages. The course involves considerable hands-on work with current software tools. The course may be repeated for a maximum of six credits. Prerequisite: Variable, depending on the topic selected. CSDP 151 does NOT satisfy the General Education Area III Requirement.

CSDP 152 Programming Techniques Workshop Credit 1
This course is an intensive introduction to special programming techniques, e.g., handling disk files on computers and writing computer-assisted instruction materials. This course involves considerable hands-on experience in the area chosen. The course may he repeated (with different topics) for a maximum of six credits. Prerequisite: Variable, depending on the topic selected. CSDP 152 does NOT satisfy the General Education Area III Requirement.

CSDP 153 Programming Language Workshop Credit 1
This course is an intensive introduction to special implementations of programming languages, e.g., hypertext and operating systems languages. The course involves considerable hands-on experience in the area chosen. This course may be repeated (with different topics) for a maximum of six credits. Prerequisite: Variable, depending on the topic selected. CSDP 153 does NOT satisfy the General Education Area III Requirement.

CSDP 154 Computer Hardware Workshop Credit 1
This course is an intensive introduction to new hardware and hardware methodology in special areas, e.g., microcomputer interaction with analogue devices, small-system data communications, etc. The course involves considerable hands-on experience in the area chosen. The course may be repeated for a maximum of six credits. Prerequisite: Variable, depending on the topic selected. CSDP 154 does NOT satisfy the General Education Area III Requirement.

CSDP 155 Computer Utilities Workshop Credit 1
This course is an intensive introduction to special computer utilities and operating systems such as OS/2, and UNIX look-alikes.

The course involves considerable hands-on experience with the utilities or systems chosen. The course may be repeated (with different topics) for a total of six credits. Prerequisite: Variable, depending on topic selected. CSDP 155 does not satisfy the General Education Requirement in Area III Requirement.

CSDP 199 Introduction to MatLab Programming Credit 3

This course introduces basic computing and programming techniques using MatLab development environment and language. This course is suitable to all STEM majors especially to students who need scientific computing. Topics covered includes: MatLab interface and environment, variables, matrices, structures and cellarrays, symbolic math ID and 2D signals, plotting, scripting and programming, standard I/O and file I/O, basic GUI. Further, the course is extended to include training on Geographical Information System-GIS. The students are trained on basic GIS skills and expected to work on read world projects. Co-requisites: Currently enrolled in or the completion of MATH 109.

CSDP 220 Introduction to Computer Programming Credit 4

This course is designed to introduce the student to computers and to programming in a high level language. Course topics include but are not limited to computer hardware, software algorithms, programming methodology, social and ethical implications of computing. The programming language Visual BASIC is used to learn input/output, arithmetic computation, and debugging of programs in the computer laboratory. Prerequisites: MATH 102 or MATH 109 or MATH 110. Students planning on continued study in Computer Science might well consider CSDP 221 instead.

CSDP 221 Introduction to Computer Programming Credit 4

The course, primarily for departmental majors, is designed to introduce the student to computers and to programming in a high level language. Course topics include but are not limited to computer hardware, software, algorithms, programming methodology, and social and ethical implications of computing. The programming language C++ is used to learn input/output, arithmetic computation, control structures, subroutines and functions, string manipulation, arrays, and pointers. Significant emphasis is placed on coding and debugging of programs in the computer laboratory. Prerequisites: MATH 109 or MATH 110.

CSDP 222 Advanced Programming Credit 4

This course covers advanced programming language features, including structured programming, top-down, and object-oriented techniques. Emphasis is placed on team projects and structured walk-throughs. Much of the work in this course involves the construction and debugging of programs that accomplish realistic applications. Prerequisite: CSDP 221.

CSDP 240 Principles of Data Programming Credit 3

This course is an introduction to the COBOL language and its business data processing environment. Topics include the six divisions: arithmetic, input/output, control statements, control-break logic, tables, and searching logic. The course is a computer lab-based course involving extensive coding and debugging of small to large programs. Prerequisite: CSDP 221.

CSDP 241 File Structures Credit 3

This course is an introduction to the theory of file structures and its applications. Topics include sequential direct, indexed sequential access methods, entry and updating techniques, and reports. The relationship between file structures and program structures is discussed with extensive program development and production. Prerequisites: CSDP 222 and CSDP 240.

CSDP 250 Data Structures Credit 3

This course covers the properties, implementation and analysis of data structures and object-oriented programming styles. Topics covered include linked lists, queues, stacks, binary trees, B-trees, graphs and heaps. Prerequisite: CSDP 222.

CSDP 301 Computer Organization and Assembly Language Programming Credit 3

This course covers the basics of computer organization with emphasis on the lower-level abstraction of a computer system, including digital logic, instruction set and assembly language programming. Topics include data representation; logic gates; simplification of logical expressions; design and analysis of simple combinational circuit, such as decoders and multiplexers, flip-flops and registers; design and analysis of simple synchronous sequential circuit, random-access and read-only memories; instruction set architecture; and programming in assembly language. Prerequisite: CSDP 222

CSDP 305 Software Engineering I Credit 3

This course introduces methodologies and tools that are useful in software engineering, including structured programming, software charts, sequence selection, and iteration structure charts. The course covers ethical and social implications of computing,

concepts of software design, software module structures, data flow diagrams, system dynamics, engineering system analysis, real-time data flow, and introduction to object-orientation and requires written and oral presentations. Computer Aided Software Engineering (CASE) will be introduced. Prerequisite: CSDP 250.

CSDP 332 Internet Programming **Credit 3**

This course introduces students to various aspects of internet programming and scripting languages. Topics include object-oriented programming, general information on Internet and World Wide Web, active server pages, HTML, DHTML, XML, JavaScript, VBScript, CSS, and databases. Prerequisite: CSDP 222.

CSDP 341 Numerical Analysis **Credit 3**

This course is designed to introduce fundamental aspects of numerical analysis including the basic concepts, representation of numbers, error analysis, and iterative methods. Additional topics include solution techniques for non-linear equations, interpolation and approximation, numerical differentiation and integration, and their computer applications. Prerequisites: CSDP 222 and MATH 211.

CSDP 345 Introduction to Mobile Robotics Programming **Credit 3**

This course provides an introduction to the basic concepts of mobile robotic systems in a hands-on oriented environment using iRobot Create platform and MatLab software development environment. Topics covered in this class include: robotic system architecture, control schemes of robotics systems, robotic communication and tele-operation, robotic sensor and robotic mobility. The course will train the students on programming mobile robots in real world and simulated virtual environments. Students will be trained and exposed to advanced GUI programming and machine learning methods. Prerequisite: CSDP 222.

CSDP 351 Computer Architecture **Credit 3**

This course covers how computer hardware works, logical aspects of system implementation as seen by the programmer and what considerations go into the design of a computer and components. Topics include processor design, instruction set design and addressing; control structures and microprogramming; memory management, caches, and memory hierarchies; interrupts and I/O structures; and advanced topics. Prerequisite: CSDP 301.

CSDP 390 Social, Ethical and legal issues in Computer Science **Credit 3**

The growth in computer usage and the number of networks in the information age of 21st century have placed responsibilities on computer scientists to properly use both computers and networks. Issues such as professional, social, ethical and legal responsibilities, intellectual property, piracy, hacking, Internet crimes, viruses, privacy, crime and civil liberties are addressed. Prerequisite: Students must have a junior status and have a basic understanding and awareness of computer programming.

CSDP 395 Internship **Credit 3**

This course is designed to encourage a student to engage in a professional discipline oriented, and supervised work place learning experience in a work setting to be approved by development chair and a faculty advisor. In all cases, approval to register for this course must be granted by the department chair and a departmental faculty advisor prior to the commencement of the work experience for which the student desires this credit. A student is eligible to enroll in this course upon attaining junior level classification. The work place supervisor must submit a confidential performance evaluation of the work done by the student to the faculty advisor. This course may be repeated for maximum of 6 credits. Prerequisites: Junior level classification, approval by faculty advisor and department chair

CSDP 398 Computer and Language Topics A **Credit 3**

This is a reading/research course recommended for all computer science majors. The course allows the student to gain experience in new or otherwise unavailable programming languages (e.g., JAVA, C, LISP, ADA, PROLOG). At least one section in JAVA, to satisfy major requirements will be given each year. This course may be repeated (with different topics) for a maximum of 12 credits. Prerequisite: CSDP 222

CSDP 399 Computer and Language Topics B **Credit 3**

This is a reading/research course recommended for all computer science majors. This course allows the student gain experience in new or otherwise unavailable programming languages (e.g., UNIX, PROLOG, XML, C#). At least one section in UNIX to satisfy major requirements will be given each year. This course may be repeated (with different topics) for a maximum of 12 credits. Prerequisite: CSDP 222.

CSDP 401 Operating Systems **Credit 3**

This course is an introduction to the fundamentals of operating systems. Topics may include interrupts and recovery, inter-process communication and synchronization, process scheduling, deadlock, memory management, virtual memory file systems, scheduling, and distributed systems. Formal principles are illustrated with the examples and case studies of one or more contemporary operating systems. Prerequisite: CSDP 250 and CSDP 301.

CSDP 402 Computer Networks **Credit 3**

This course is designed to introduce students to the basic concepts of computer network communication. Topics may include OSI model and computer network protocols (with emphasis on the TCP/IP suite of protocols), data signals and data encoding, transmission media and multiplexing, network architectures (with emphasis on the Ethernet and its various IEEE models), internetworking devices, IP addressing, and sub-netting. Prerequisite: CSDP 250.

CSDP 403 Computer Language Theory **Credit 3**

This course examines the principles of programming languages. Topics include criteria, formal specifications of syntax, lexical analysis, declarations binding, allocation data and control structures, imperative programming, and functional programming. Prerequisite: CSDP 301 and MATH 323.

CSDP 404 Database Management Systems **Credit 3**

This course covers database management and the different data models currently used to structure the logical view of databases. It provides an introduction to concepts and design principles used in database management systems, including entity-relationship data models, physical and logical database design, relational databases, query language, transaction management, reliability, and security, and considers the social and ethical implications of computing. This course has a significant writing component. Prerequisite: CSDP 250.

CSDP 405 Software Engineering II **Credit 3**

This course is designed to expand software engineering skills using structured programming methodologies with object-oriented design. State of the art technique in software design and development of laboratory experience in applying the techniques are covered. Topics may include structured design, structured programming, top-down design and development, segmentation and modularization techniques, iterative enhancement, design and code inspection techniques, correctness, and chief-programmer teams. Software engineering metrics, including measures of size, reuse, functionality, complexity, and quality, will be taught. Critical human factor issues involving software design, reliability, team productivity, and project management are addressed for a clearer understanding of software engineering. Prerequisite: CSDP 305.

CSDP 406 Introduction to Artificial Intelligence **Credit 3**

This course is designed to provide an introduction to the different topics of Artificial Intelligence as well as the basic principles that Artificial Intelligence application areas are based on. Topics covered include automated reasoning, knowledge representation, automated interpretation systems and automated behavior. Prerequisite: CSDP 250

CSDP 407 Advanced Database **Credit 3**

This course is intended for computer science students and professionals who have already acquired a basic background on databases. The objective of the course is to introduce the students to the most advanced concepts and recent issues in several areas of database technology, including the following: advanced database design and implementation, transaction management and concurrency control, distributed database management systems, object-oriented databases, and client/server systems. The course includes lab work and individual database application projects. Prerequisites: CSDP404

CSDP 425 Computer and Network Forensics **Credit 3**

This course provides an introduction to the basic knowledge of network forensics process, incident response and response after detection, data collection, handling and analysis in different operating system environments. It also provides competence in using established forensic methods to investigate electronic evidence and offers a rigorous audit/logging and data archival practices. It further provides hands-on experiencers throughout the semester with a number of laboratories using a variety of forensics tools like FTK, Encase and others. Prerequisites: Reasonable experience with programming and operating systems and permission of the instructor.

CSDP 431 Data Warehousing and Data Mining Credit 3

This course introduces students to concepts and techniques of data mining and data warehousing. Concepts, principles, architecture, design, implementation, application of data warehousing and data mining are taught. The course also introduces several systems for data warehousing and/or data mining. Prerequisite: CSDP 222, MATH 232, and MATH 210.

CSDP 442 Numerical Analysis II Credit 3

This course extracts numerical solutions of systems of equations by direct and iterative methods, ordinary differential equations, optimization, evaluation of determinants, matrix inversion, and calculation of eigenvalues and eigenvectors, and partial differential equations. This course makes use of the powerful MATLAB software utilizing a more practical approach to link every method to real engineering and/or science problems without deriving theoretical concepts. Prerequisite: CSDP 341 and MATH 212.

CSDP 450 Algorithms and Data Structures Credit 3

This course will focus on the design and analysis of algorithms. Topics include: review of data structures, analysis of algorithms, brute force algorithms, searching techniques, divide-and-conquer, sorting and selection, dynamic programming, graph algorithms, greedy algorithms, P and NP, and coping with NP-completeness. Prerequisites: CSDP250 and MATH 323.

CSDP 490-I Senior Design Project Business Track Credit 3

This course deals with formal software development techniques applied to the definition, design, coding, testing and documentation of a computer programming project. Each student completes an individual project. Prerequisite: CSDP 305, CSDP 390, CSDP 402, CSDP 404 as either prerequisites or corequisites.

CSDP 490-S Senior Design Project Science Track Credit 3

This course deals with formal software development techniques applied to the definition, design, coding, testing and documentation of a computer programming project. Each student completes an individual project. CSDP 305, CSDP 390, CSDP 399, CSDP 401, CSDP 402, CSDP 404, CSDP 450 as either prerequisites or corequisites.

CSDP 498 Selected Topics in Computer Science A Credit 3

This is a reading/research course recommended for all computer science majors. The grade for this course will be based primarily on a research project in an area of computer science chosen together by the student and the instructor. This course may be repeated (with different topics) for a maximum of 12 credits. Advanced undergraduate students may also enroll in graduate-level computer science courses below CSDP 610 with permission of the Department.

CSDP 499 Undergraduate Research Credit 3

This course is designed to provide a student an active experience in research methodology while working closely with a faculty research advisor. It will generally require literature search and review, problem selection, and the student's approach to addressing the problem. A written final report of the student's work is required and an oral presentation is encouraged. The credit hours for this course are arranged with a research faculty advisor whose approval is needed prior to registration for the course. Prerequisites: permission of a departmental faculty advisor and the department chair.