

**Descriptions – Community Health Science
of
Courses**

515. Topics and Issues in Health Care Delivery II
Fall. 2 to 5 credits. Admission to a college of medicine or approval of department. Continuation of CMS 514.

516. Field Experience in Community Medicine I
Winter. 1 to 5 credits. Admission to a college of medicine or approval of department. Continuation of CMS 515 field experiences and seminars.

517. Field Experience in Community Medicine II
Spring. 1 to 5 credits. Admission to a college of medicine or approval of department. Continuation of CMS 516 field experiences and seminars.

518. Aging: Clinical and Community Perspectives
(H M 534.) Spring. 4(3-3) Medical student or approval of instructor. Multi-dimensional aspects of aging and their application to long-term, continuing care of the chronically ill older adult.

519. Health Education in Clinical Settings
Spring. 3(2-3) Approval of instructor. Application of concepts from social and behavioral sciences to clinical health education through laboratory and classroom experiences including development of a model educational plan for a specific health problem.

520. Biostatistical and Epidemiological Reasoning
Fall. 4(4-0) Approval of instructor. Interdepartmental with the Department of Statistics and Probability. Concepts and principles from biostatistics and epidemiology to facilitate critical reading literature relevant to clinical medicine and community health. Emphasis on design and interpretation.

521. Evaluation of Health Services
Spring. 2 to 4 credits. Approval of instructor. Interdepartmental with the College of Nursing. Use of experimental and quasi-experimental designs. Cost benefit and efficiency models. Assessment of health services delivery.

530. Care of the Elderly
Fall, Spring. 3(2-2) Student in H M, OST or other clinical program or approval of instructor. Interdepartmental with and administered by the Department of Family Practice. Case studies of the care of the elderly based on the physician patient-interaction with elderly persons and their families. Family systems applications to health care. Associated clinical experience.

543. Health and Adaptation of the Elderly
Fall. 3(3-0) Baccalaureate degree in health science; approval of instructor. Interdepartmental with and administered by the College of Nursing. Health and adaptation of the aged individual experiencing the normative biophysiological and psychodevelopmental changes related to the aging process.

590. Special Problems in Community Medicine
Fall, Winter, Spring, Summer. 1 to 8 credits. May reenroll for a maximum of 32 credits. Approval of department. Each student will work under direction of a faculty member on an experimental, theoretical or applied problem.

600. Preventive Medicine and Public Health Clerkship
Fall, Winter, Spring, Summer. 2 to 12 credits. Successful completion of first two years of medical school. Clinical and community experiences in personal and community health services, environmental health, and other health and medical programs which meet health needs of various population groups.

605. Occupational Health Clerkship
Fall, Winter, Spring, Summer. 6 to 12 credits. Grade P in all courses offered in terms 1 through 8. The occupational health program in an industrial setting. Exposure to delivery of medical care to workers, treatment of industrial accident injuries. Review of safety and preventive medicine programs.

607. Ambulatory Care Clerkship
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 9 credits. H M 602. Interdepartmental with the departments of Family Practice, Medicine, and Pediatrics and Human Development. Administered by the Department of Family Practice. Outpatient experience, lasting an equivalent of 48 half days over a period of six months or more, emphasizing continuous and comprehensive patient care under the supervision of appropriate physicians.

610. Geriatric Clerkship
Fall, Winter, Spring, Summer. 2 to 12 credits. Successful completion of first two years of medical school. Clinical and community experiences including history taking, patient assessment, development and use of management and care plan and use of community resources for the long term care of the aged.

619. Clinical Health Education Clerkship
Fall, Winter, Spring, Summer. 6 to 12 credits. May reenroll for a maximum of 12 credits. Grade P in all courses offered in terms 1 through 8. Clinical experiences for developing and applying skills in patient and family health education. Identification of behavioral components of health care. Assessment of educational needs of patient and family.

620. Directed Studies in Community Medicine
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 24 credits. Approval of department. Individual projects on special problems related to community medicine.

COMPUTER SCIENCE CPS

College of Engineering

110. Introduction to Computer Programming
Fall, Winter, Spring, Summer. 3(3-0) Students may not receive credit in both CPS 110 and CPS 120.

FORTRAN programming, number systems and basic computer structure. Applications from various areas including business and social science.

120. Computer Programming for Engineers and Scientists
Fall, Winter, Spring, Summer. 3(3-0) MTH 111 concurrently. Students may not receive credit in both CPS 110 and CPS 120.

FORTRAN programming, number systems and basic computer structure. Applications from engineering, mathematics and physical science.

124. APL-Computer Programming for Scientists
Fall, Winter, Spring. 3(3-0) LBC 112 or concurrently. Interdepartmental with and administered by Lyman Briggs School.

APL programming; interactive programming techniques; arithmetic, logical, and extended APL operators; functions, applications to concurrent topics in mathematics; principles of operators of time-shared computers.

130. Computers in Society
Fall. 3(2-1)

A non-technical introduction to computers, programming, applications and to the computer revolution. Topics: automation, data banks, privacy, the engineered society.

251. Algorithms and Computing I
Fall, Winter, Spring. 3(2-3) MTH 112. Algorithms, numeric and character data, data types, variables, expressions, decision structures, arrays, and procedures. Design and implementation of algorithms in PASCAL.

252. Algorithms and Computing II
Winter, Spring, Summer. 3(2-3) CPS 251, MTH 113. Problem solving methods, numeric computation, string processing, number and character representation, data structures, and programming style. Design and implementation of algorithms in PASCAL.

292. Selected Topics
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 6 credits when different topics are taken. Topics selected will in general supplement and enrich existing courses, and lead to the development of new courses.

295. Independent Study
Fall, Winter, Spring, Summer. 1 credit. May reenroll for a maximum of 4 credits in CPS 295 and CPS 495 combined. Approval of department. Independent undergraduate research in computer science.

300. Computer Programming
Fall, Winter, Spring, Summer. 3(3-0) CPS 120 or approval of department; MTH 111. Development and implementation of numeric and non-numeric algorithms using FORTRAN. Number systems and representations of data. Concepts of storage, processors and compilers.

- 301. FORTRAN Laboratory**
Fall, Winter, Spring, Summer. 1(0-3)
CPS 252 or concurrently. Students may not receive credit in CPS 301 and in CPS 110 or CPS 120.
Programming laboratory using FORTRAN.
- 304. PASCAL Programming**
Fall, Summer. 2(1-3) CPS 300, MTH 113. Students with credit in CPS 251 may not receive credit in CPS 304.
Programming style, problem solving methods, linear data structure, trees. Design and implementation of algorithms in PASCAL.
- 305. List Processing Languages**
Winter. 3(3-0) CPS 300 or approval of department.
Development and implementation of computer programs in string and list processing languages. Emphasis upon non-numeric applications. Structure of a simple list processing language. Comparison of list processing languages.
- 306. COBOL Programming**
Spring. 3(3-0) CPS 110 or CPS 120.
The mechanics of COBOL, a business data processing language; presented with illustrative problems.
- 311. Assembly Language and Machine Organization**
Fall, Winter. 4(3-1) CPS 252, CPS 301 or CPS 300, CPS 304, MTH 214 or LBC 216.
Machine structure, registers and operations. Programming in assembly language. Discrimination of assembler, loader and execution tasks. Comparison with interpretive processing. Introduction to program and data structures. Sub-program linkage.
- 312. Generative Coding and Information Structures**
Winter, Spring. 4(3-1) CPS 311.
Macro facilities, conditional assembly, interaction with monitor, assembly language I/O. Use of buffer, stack, queue, deque, tree and list data structures. Interpreters, recursive routines.
- 313. Introduction to System Programming**
Fall, Spring, Summer. 4(3-1) CPS 312.
Loaders and operating systems. Study of existing batch and time-sharing systems. Design and implementation of part of an operating system. Segments, overlays, multi-processing and multi-programming.
- 321. Introduction to Discrete Structures**
Fall, Winter. 3(3-0) CPS 252 or CPS 300, MTH 214 or LBC 216.
Set operations, relations, functions and mappings. Boolean algebra, Boolean matrices, truth tables, minimization. Propositional and predicate calculus, well formed formulas, precedence relations, quantifiers. Applications to computer science.
- 322. Introduction to Theory of Computing**
Winter, Spring. 3(3-0) CPS 321, MTH 215 or LBC 217.
Finite-state machines, stack automata. Turing machines. Effective procedures and computability. Introduction to recursive functions. Symbol manipulation systems.
- 341. Computer Aided Manufacturing**
Fall. 4(3-2) CPS 110 or CPS 120. Inter-departmental with and administered by the Department of Mechanical Engineering.
Numerical control. Computer-Aided Numerical Control, Direct Numerical Control, and adaptive control applied in present day manufacturing. Use of the APT language to control NC machines.
- 412. Computer Communications**
Winter. 3(3-0) CPS 300, STT 351 or STT 441.
Computer networks; analysis by queuing theory; network design algorithms, routing and flow.
- 414. Interactive Computer Graphics**
Summer. 3(3-0) CPS 312, matrix algebra.
Design of interactive graphics systems including display devices, processors, data structures, interrupt processing and graphical techniques. Two and three dimensional transformations, perspectives, hidden surface removal, shading. Graphics languages.
- 416. Digital Design**
Fall, Spring, Summer. 3(3-0) CPS 311, CPS 322.
Combinational logic with MSI, LSI (medium-scale and large-scale integrated circuits) and microprocessors. Synchronous and asynchronous machines. Processor and control logic design.
- 417. Digital Design Laboratory**
Fall, Winter, Summer. 2(1-3) CPS 416 or concurrently.
Designing, constructing and testing computer related circuits using discrete logic, MSI, LSI and microprocessors.
- 423. Computer Architecture**
Spring. 3(3-0) CPS 416.
Computer arithmetic algorithms, memory systems, computer design, input-output system design, digital system simulation.
- 447. Digital Filtering**
Spring. 3(3-0) CPS 300, MTH 310.
Background. Sampling theorems. Discrete linear systems. The digital filter. Digital filter design. Discrete Fourier transforms. Applications and generalizations.
- 451. Design of Language Processors I**
Fall. 3(3-0) CPS 313 or concurrently, CPS 322.
Relation between languages and automata. Properties of grammars. Lexical analysis and symbol-table management. Syntactic analysis using top-down parsing, precedence, LR(k) and LL(k). Preliminary design of a compiler.
- 452. Design of Language Processors II**
Winter. 3(3-0) CPS 451.
Continuation of CPS 451. Semantics and generation of intermediate code. Pragmatics of code optimization, register allocation and machine code generation. Macro facilities, compiler generators and interpreters. Implementation of designed compiler.
- 453. Design of Language Processors III**
Spring. 3(3-0) CPS 452.
Continuation of CPS 452. Readings from the current literature. Completion of compiler project.
- 490. Selected Topics**
Fall, Winter, Spring, Summer. 3(3-0)
May reenroll for a maximum of 9 credits if a different topic is taken. Approval of department.
A new developing area of computer science selected by the department.
- 495. Independent Study**
Fall, Winter, Spring, Summer. 1 credit.
May reenroll for a maximum of 4 credits in CPS 295 and CPS 495 combined. Approval of department.
Independent undergraduate research in computer science.
- 801. Special Problems**
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 8 credits. Approval of department.
- 805. Clustering and Scaling Algorithms**
Fall. 3(3-0) CPS 300, STT 441 or approval of department.
Algorithms that organize large amounts of data. Includes metric clustering, hierarchical clustering and multi-dimensional scaling.
- 806. Fundamentals of Pattern Recognition**
Spring. 4(4-0) CPS 300, MTH 334, STT 442.
Decision-theoretic and nonstatistical approaches; discriminant functions; parameter and density estimation; feature extraction; supervised and unsupervised learning; sample size effects; error estimation; design of pattern recognition systems; computational considerations.
- 809. Computer Arithmetic Algorithm Design**
Fall. 4(4-0) E E 431 or CPS 423. Inter-departmental with and administered by Electrical Engineering.
Number systems; fast two-operand and multi-operand addition/subtraction; standard, recoded and cellular array multipliers; high-performance dividers; floating-point arithmetic; error control; pipelining.
- 822. Digital Image Processing**
Winter. 3(3-0) MTH 334, CPS 447 or SYS 311 or approval of instructor.
Image digitization, sampling, and coding. Discrete picture transforms. Image restoration and enhancement. Image segmentation and description.
- 825. Theory of Combinational Circuits**
Fall. 3(3-0) CPS 423 or approval of department.
Switching algebra and related group and lattice theory; decomposition; the synthesis of multiple-output switching functions using multi-level combinational circuits.
- 826. Theory of Digital Machines**
Winter. 3(3-0) CPS 825.
Sequential machines; machine specification in terms of states and transitions; decomposition; state minimization and assignment.
- 827. Switching Theory**
Spring. 3(3-0) CPS 826.
Asynchronous and speed independent circuits; static and dynamic hazards; use of race conditions.

Descriptions – Computer Science

of

Courses

- 831. Theory of Formal Languages I**
Fall. 3(3-0) CPS 322 or approval of department.
Definition of formal languages; acceptors and grammars; regular, linear and context free languages; closure properties.
- 832. Theory of Formal Languages II**
Winter. 3(3-0) CPS 831.
Context sensitive languages; derivation restricted grammars; semantics of formal languages.
- 841. Artificial Intelligence and Adaptive Systems I**
Winter. 4(4-0) CPS 300, STT 441.
Foundations of heuristic methods; syntactic means-end analysis; semantic means-end analysis; adaptive systems.
- 842. Artificial Intelligence and Adaptive Systems II**
Spring. 4(4-0) CPS 841.
Computer representation of information from natural languages; representation of two and three dimensional environments; theory of design of robots; future trends.
- 863. Structured Multiprogramming Systems**
Spring. 3(3-0) CPS 313; CPS 322 or concurrently.
Advanced software techniques for computer operating systems. Term project to design, implement and analyze an operating system using quality structured program construction.
- 876. Performance Measurement Techniques**
Fall. 3(3-0) CPS 313, CPS 322, STT 441.
Performance evaluations on computer systems, evaluation of the central processor. Systems analysis, simulation, programmed measurement, and instrumental measurement techniques. Case studies.
- 884. Large Data Base Theory**
Summer. 3(3-0) CPS 313, CPS 452, or approval of department.
Data base management constituent parts; data definition, data manipulation, data retrieval and report generation. Hierarchical, network and relational data base models. Schemas, subschemas and access methods. Analytic and theoretical treatment.
- 899. Master's Thesis Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.
- 906. Advances in Pattern Recognition**
Fall. 3(3-0) CPS 805, CPS 806.
Current research topics in pattern recognition, exploratory data analysis, syntactic pattern recognition and digital image processing; practical applications of pattern recognition methodology.
- 911. General Automata Theory I**
Fall of odd-numbered years. 3(3-0) CPS 423 or SYS 827 or approval of department. Interdepartmental with Electrical Engineering.
Characterization of machines and programs as automata; mathematical decomposition of finite automata.
- 912. General Automata Theory II**
Winter of even-numbered years. 3(3-0) CPS 911. Interdepartmental with Electrical Engineering.
Reliability and redundancy of finite automata. Probabilistic sequential machines. Languages definable by probabilistic and deterministic automata. Axioms for equivalence of regular expressions.
- 913. General Automata Theory III**
Spring of even-numbered years. 3(3-0) CPS 912. Interdepartmental with Electrical Engineering.
Degrees of difficulty of computation. Models of parallel computation. Iterative automata.
- 921. Advanced Computer Systems I**
Fall of odd-numbered years. 3(2-3) CPS 827; graduate course in operating systems. Interdepartmental with Electrical Engineering.
Models of single and multiple processors, their computational power, and measures of performance. Interconnection networks, data driven machines, and pipelines.
- 922. Advanced Computer Systems II**
Winter of even-numbered years. 3(2-3) CPS 921. Interdepartmental with Electrical Engineering.
Design and characterization of parallel algorithms. Matching of algorithms with appropriate hardware configurations. Programming languages which support parallel computation.
- 944. Theory of Algorithms**
Summer. 3(3-0) CPS 832 or CPS 912.
Formulation of computation concept and algorithm verification. Topics included are finite and infinite acceptors, recursive functions, program verification, decision problems, flowchart schemas, and fixpoint theory of programs.
- 999. Doctoral Dissertation Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.
- 314. Criminalistics III**
Spring. 3(0-6) C J 313, approval of school.
Criminalistics techniques. Serology. Comparative micrography. Document examination. Forensic chemistry.
- 315. Criminal Investigation**
Fall, Winter. 4(4-0) C J 375.
Theory of investigation, crime scene conduct, collection and preservation of physical evidence and methods used in scientific interpretation of evidence.
- 318. Crime and the Community**
Fall, Spring. 4(4-0) C J 320.
Interdisciplinary survey of police-criminal justice and community relations. Stresses the community role and responsibility for crime, crime-coping programs, and the need for the improvement of criminal justice processes.
- 320. Criminology**
(235.) Fall, Winter, Spring, Summer. 4(4-0) SOC 241 or C J 110 or approval of school. Interdepartmental and jointly administered with the Department of Sociology.
Crime analysed from sociological perspective: meaning of 'crime,' crime statistics, and measurement, theories of crime causation, crime typologies, e.g., professional organized, violent, sex, white-collar crimes, juvenile delinquency.
- 330. Organizational Theory and the Politics of Criminal Justice**
Fall, Spring. 4(4-0) C J 320 or approval of school.
An historic and a comparative overview of the principles of organization used by criminal justice agencies. Current theories and research on organization, with special attention to the impact of politics on system objectives and policy development.
- 335. Police Process**
Fall, Winter, Spring, Summer. 4(4-0) C J 110, C J 320.
Functions of law enforcement and the roles of the police in modern society. Study of the police from several perspectives; historical, sociological, psychological, organizational and political.
- 355. Juvenile Justice Process**
Fall, Winter, Spring, Summer. 4(4-0) C J 320.
Variables related to the duties and responsibilities of criminal justice practitioners working with delinquents. Prevalent interdisciplinary issues, ideas, principles and assumptions pertaining to delinquency.
- 365. Corrections Process**
Fall, Winter, Spring, Summer. 4(4-0) C J 320.
An historical view of the development of methods of offender treatment. Operation of a correctional system. The effect of institutionalization upon individuals. Alternatives to incarceration.
- 375. Criminal Law Process**
Fall, Winter, Spring, Summer. 4(4-0) C J 320.
Administration of criminal justice: investigation, detection, arrest, search, seizure, charging, adjudication, sentencing, probation, corrections, parole. Constitutional safeguards and legal controls on official action emphasized.