

- 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**
Winter. 3(3-0) 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 School 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.
- 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.
- 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.
- 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 College.
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. Subprogram 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.

Descriptions - COMPUTER SCIENCE

of

Courses

341. Computer Aided Manufacturing

Spring. 4(3-2) CPS 110 or CPS 120. Interdepartmental 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, Spring, Summer. 2(1-3) CPS 416 or concurrently. Designing, constructing and testing computer related circuits using discrete logic, MSI, LSI and microprocessors.

421. Combinational Circuits

Fall. 3(3-0) CPS 311 and CPS 321 or approval of department. Combinational circuits. Minimization, multiple output, NAND-NOR implementation and iterative circuits. Approved through Winter 1981.

422. Sequential Circuits

Winter. 3(3-0) CPS 322 or approval of department, CPS 421. Synchronous and asynchronous machines. Boolean equations, state minimization, races and hazards. Regular expressions, Moore and Mealy models. Approved through Spring 1981.

423. Computer Architecture

Spring. 3(3-0) CPS 422. 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.

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.

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 of odd-numbered years. 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 of odd-numbered years. 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.

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.

CRIMINAL JUSTICE C J

College of Social Science

110. Introduction to Criminal Justice
Fall, Winter, Spring, Summer. 3(3-0)
 Agencies and processes of criminal justice, emphasizing historical, constitutional (legal), and political considerations. Criminal Justice is also analyzed as a system, with the problems and prospects for change.

312. Criminalistics I
Fall, Spring. 3(0-6) Criminalistics majors or approval of school.
 Criminalistics laboratory techniques. Photography, crime scene recording, reproduction of evidence, latent fingerprints.

313. Criminalistics II
Winter. 3(0-6) C J 312, approval of school.
 Criminalistics laboratory techniques. Firearms. Hair and fiber identification. Comparative microscopy.

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.

400H. Honors Study
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 6 credits. Seniors or approval of instructor.
 Individually selected programs of supervised group or individual study dealing with some phase of the criminal justice system.

401. Independent Study
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 6 credits. C J 335, C J 355, C J 365, C J 375 or approval of school.
 Individual study of the various fields of emphasis in criminal justice, under direct supervision of appropriate faculty member.

409. Issues in Criminal Justice
Fall, Winter, Spring, Summer. 3 or 4 credits. May reenroll for a maximum of 15 credits when different topics are taken. C J 335, C J 355, C J 365, C J 375 or approval of school.
 Forum for course offerings on special issues in criminal justice, by visiting instructors or regular faculty.

429K. Fundamentals of Traffic Law
Spring. Summer of odd-numbered years. 3(3-0) Interdepartmental with and administered by the College of Education.
 Nature, function and application of traffic law as it applies to the safe and efficient movement of people and goods in a broadly conceived traffic accident prevention program.

433. Alcohol: A Social Dilemma
Winter. 3(3-0) Juniors or approval of school. Interdepartmental with the College of Education.
 Substance abuse with emphasis on beverage alcohol. Sociological, psychological and medical aspects. Prevention, treatment, rehabilitation.

434. Police Administration and Management
Fall, Winter. 4(4-0) C J 335, C J 375.
 Principles of organization and management of a police agency. Line and non-line functions, personnel administration, planning, budgeting, goals and control.

435. Analysis of Police Operations
Spring. 3(3-0) C J 434 or approval of school.
 Analysis of police operations including patrol, criminal investigation, staff services, and traffic enforcement. Measurements of police productivity as related to goals. Principles of management evaluation of police agency organization and administration.

440. Introduction to Highway Traffic Administration
Fall. 4(4-0)
 Systems approach to highway traffic administration emphasizing the interrelationships among agencies having management responsibilities and their accident prevention and loss reduction countermeasures to combat system failures. Future needs and alternatives.

441. Police and Court Traffic Administration
Spring. 4(4-0)
 Police and court traffic functions relative to other police and court functions in the criminal justice system. Systems approach to managing traffic accident prevention programs. Weaknesses, future needs and alternatives.

455. Analysis of Delinquency Programs
Fall, Winter. 4(4-0) C J 355 or approval of school.
 Social organization and administration of delinquency prevention programs, juvenile courts and treatment agencies.