

517. Health, Medical Care, and Society IV
 Summer. 2(1-3)
 Community-based studies of health care delivery systems.

620. Directed Studies in Community Medicine
 Fall, Winter, Spring, Summer. 1 to 6 credits. May re-enroll 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 110 and 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 110 and 120.
 FORTRAN programming, number systems and basic computer structure. Applications from engineering, mathematics and physical science.

255. Computer Models in Science and Engineering
 Spring. 3(3-0) 110 or 120 or equivalent FORTRAN. Interdepartmental with and administered by the Mechanical Engineering Department.
 Problem-solving; development of student's ability to formulate computable models based on finite physical elements, examples from statics, dynamics, electrical resistance, and conduction heat transfer.

290. Special Problems
 Fall, Winter, Spring, Summer. 1 to 4 credits. May re-enroll for a maximum of 9 credits. Approval of department.
 Independent undergraduate research in computer science.

300. Computer Programming
 Fall, Winter, Spring, Summer. 3(2-1) 110 or 120; MTH 108 or 111.
 Development and implementation of numeric and non-numeric algorithms using FORTRAN. Number systems and representations of data. Concepts of storage, processors and compilers.

305. List Processing Languages
 Winter. 3(3-0) 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) 110 or 120.
 The mechanics of COBOL, a business data processing language; presented with illustrative problems.

311. Assembly Language and Machine Organization
 (301.) Fall, Winter. 4(3-1) 300.

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
 (302.) Winter, Spring. 4(3-1) 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
 (303.) Fall, Spring, Summer. 4(3-1) 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) 300, MTH 113.

Set operations, relations and functions. Deductive and mathematical proofs. Algebraic systems. Applications to computer science.

322. Introduction to Theory of Computing
 Winter, Spring. 3(3-0) 321.

Finite-state machines, Turing machines. Effective procedures and algorithms. Symbol manipulation systems.

411. Information Theory
 Winter. 3(3-0) 110 or 120; 322 recommended; STT 351 or 441.

Measures of information content and flow. Channel capacity and theoretical limits on information transmission. Applications to coding and computer related studies.

421. Combinational Circuits
 Fall. 3(3-0) 300, 321; 322 desirable; MTH 215.

Combinational circuits. Minimization, multiple output, NAND-NOR implementation and iterative circuits.

422. Sequential Circuits
 Winter. 3(3-0) 311, 421.

Synchronous and asynchronous machines. State minimization, flip-flops, Boolean equations, races and hazards.

423. Computer Architecture
 Spring. 3(3-0) 422.

Computer arithmetic algorithms, memory systems, computer design, input-output system design, digital system simulation.

451. Mechanical Language I
 Fall. 3(3-0) 311; MTH 215; 321 or PHL 337 and MTH 324; 322 recommended.

Classification of grammars and their properties. BNF, trees, relations, top-down parsing. Simple precedence grammars using matrix techniques.

452. Mechanical Language II
 Winter. 3(3-0) 451.

Floyd-Evans productions. Assignment of a two-term project on compiler writing. Lexical analysis, semantics, register allocation, code of optimization. Hashing and other searching techniques. Dynamic storage techniques.

453. Mechanical Language III
 Spring. 3(3-0) 452.

Finite state automata; pushdown automata. Extended precedence grammars. Precedence functions. LR(K) grammars; LL(K) grammars. Bounded context techniques.

490. Special Problems
 Fall, Winter, Spring, Summer. 1 to 5 credits. May re-enroll for a maximum of 9 credits. Advanced standing and approval of instructor.

Independent undergraduate research in computer science.

801. Special Problems
 Fall, Winter, Spring, Summer. 1 to 4 credits. May re-enroll for a maximum of 8 credits. Approval of department.

810. Introduction to Linear System Theory
 (812.) Fall. 3(3-0) MTH 214. Interdepartmental with Systems Science and Social Science (College of) and administered by Systems Science.

A first course in system theory for students from a range of disciplines. Mathematical representation of system variables, transform and state space method of analysis, introduction to control theory, applications to physical, economic and social systems.

811. System Methodology and Simulation
 Winter. 3(3-0) 810, STT 441. Interdepartmental with Systems Science and Social Science (College of) and administered by Systems Science.

Problem definition, design of abstract models for system design and control, simulation of systems described by differential and difference equations, generation of random variables, simulation of discrete object stochastic systems, simulation languages, applications to physical, economic and social systems.

813. System Project
 Spring. 3(1-6) 811. Interdepartmental with Systems Science and Social Science (College of) and administered by Systems Science.

Individual or team application of simulation methods to system design and/or management.

817. Parametric Pattern Recognition
 Winter. 3(3-0) STT 441, computer programming.

The decision-theoretic approach to pattern recognition using decision rules, parameter estimation, sub-optimum strategies, optimum strategy without learning, learning, and sequential recognition.

818. Nonparametric Pattern Recognition
 Spring. 3(3-0) 817.

The non-statistical approach to pattern recognition. Discriminant functions, clustering, non-parametric learning, and algorithms for recognition.

825. Theory of Combinational Circuits
 Fall. 3(3-0) 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) 825.

Sequential machines; machine specification in terms of states and transitions; decomposition; state minimization and assignment.

827. Switching Theory
Spring. 3(3-0) 826.
Asynchronous and speed independent circuits; static and dynamic hazards; use of race conditions.

831. Mathematical Theory of Formal Languages I
Fall. 3(3-0) 453 or approval of department.

Definition of grammars; recursive and recursively enumerable sets; decidability and undecidability; regular sets; linear languages and context-free languages.

832. Mathematical Theory of Formal Languages II
Winter. 3(3-0) 831.

Context-sensitive grammars; scattered context grammars; closure properties of languages; abstract families of languages; derivation restricted grammars.

833. Mathematical Theory of Formal Languages III
Spring. 3(3-0) 832.

Current literature and advanced topics in formal language theory.

835. Data Structures in Information Processing
Fall. 3(3-0) 453.

Memory hierarchy and allocation algorithms; information collection; management, processing, retrieval and display; implications for machine, language and problem organization.

836. Simulation of Stochastic Systems
Winter. 3(3-0) 835.

Computational aspects of the development, verification, and utilizations of algorithms for simulating models of discrete, stochastic systems; processing using Random Walks and Markov Chains.

837. Computer-Aided Design of Deterministic Systems
Spring. 3(3-0) 835.

Formal language specification of time-dependent, deterministic systems; automatic production, management, and solution of system-associated equations.

841. Artificial Intelligence and Adaptive Systems I
Winter of odd-numbered years. 4(4-0) 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) 841.

Computer representation of information from natural languages; representation of two and three dimensional environments; theory of design of robots; future trends.

899. Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

911. General Automata Theory I
(E E 981.) Fall of odd-numbered years. 3(3-0) 453 or 825 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
(E E 982.) Winter of even-numbered years. 3(3-0) 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
(E E 983.) Spring of even-numbered years. 3(3-0) 912. Interdepartmental with Electrical Engineering.

Degrees of difficulty of computation. Models of parallel computation. Iterative automata.

999. 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. 4(4-0)

Agencies and processes involved in the administration of criminal justice—the legislature, the police, the prosecutor, the courts and corrections. Problems of law enforcement in a democratic society.

225. Police Science Laboratory I
Fall, Winter, Spring. 4(0-8) 110.

General course in laboratory techniques. Photography, recording of a crime scene, collection and preservation of evidence, and fingerprinting.

230. Administrative Theory in Criminal Justice
(130.) Winter, Spring. 5(3-4) 110.

Exposition of theories and research relating to organization and management, and their applicability to criminal justice agencies.

245. Highway Traffic Administration I
Fall. 5(5-0) 110.

Examination of United States transportation system, emphasizing efficient, safe operation. Activities and agencies concerned with increasing efficiency. System's development; components; social, economic and political impacts. Survey of present and future needs.

246. Highway Traffic Administration II
Winter. 5(4-0) 110.

Organization for traffic control, accident investigation, traffic flow regulation, and accident analysis and interpretation. Survey of traffic law, as related to administration. Violation bureau and traffic court administration.

247. Highway Traffic Administration III
Spring. 5(4-0) 110.

Highway traffic education at the elementary, secondary and adult levels of instruction. Communication aspects of highway traffic administration. Public support organizations. Motor vehicle fleet safety programs. Traffic safety research.

318. The Police and Community Relations
Fall, Winter, Spring. 4(4-0) 110.

Interdisciplinary survey of the field of police and community relations, emphasizing police administrative responsibility, with special attention to police role in community relations tension and conflict.

*Name changed July 1, 1970. Formerly Police Administration and Public Safety.

327. Police Science Laboratory II
Winter. 3(0-6) 225 or approval of school.

Continuation of 225, including the studies of firearms, hair, microscopy and chemistry.

328. Police Science Laboratory III
Spring. 3(0-6) 327 or approval of school.

Continuation of 327, including serological examination of minute pieces of evidence, documents, and instrumental analysis.

335. Police Administration I
(235.) Fall. 5(4-1) 230.

Principles of police administration and organization; administration of staff units; function and activities of police agencies.

336. Police Administration II
(236.) Winter. 5(4-1) 335.

Administration of police line operations; including patrol as the basic police function, investigation, juvenile, traffic and special operational units. Liaison between units, enforcement policy, manpower distribution, and analysis of operations.

355. Delinquency Prevention and Control
Fall, Spring. 5(4-1) 230.

Problem of juvenile delinquency, theories of causation and prevention programs. Police prevention programs, juvenile courts, institutional treatment, community resources for prevention, federal and state programs.

356. Organization and Administration of Delinquency Prevention Programs
Winter. 5(4-1) 355.

Prevention programs in general. Police prevention programs—historical development, present status, organization and administration areas of operation, personnel, training, relationship to other agencies. Application of organizational scheme to other agencies.

368. Correctional Philosophy, Theory and Practice
Fall, Winter. 5(4-1) 110.

Introductory survey of philosophy, theory and practice involved in the treatment of convicted law violators of all ages. Appraisal of the impact of correctional treatment upon post-correctional behavior.

369. Probation and Parole
Spring. 5(4-1) 110, 355, 368; or approval of school.

Treatment of convicted law violators by the correctional field services before and after prison. The role of probation and parole counselors. Appraisal of effectiveness. Prediction of behavior during and after probation and parole.

375. Criminal Law
(275.) Fall, Winter, Spring. 4(4-0) 110.

Survey of substantive criminal law as a means of attaining certain socially desirable ends like the preservation and protection of life and property; emphasis on historical and philosophical concepts.

380. Industrial Security Administration
Fall. 5(4-1) 230.

The organization and management of industrial security units including government security. The protection of commercial and industrial manpower, facilities, and installations. Security and police operations. Administrative, legal and technical problems. Specialized programs for factories, railroads, retail stores, insurance companies, credit bureaus, etc.