

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.

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.

FORTTRAN 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.

FORTTRAN 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.

255. Computer Models in Science and Engineering

Spring. 3(3-0) CPS 110 or CPS 120 or equivalent FORTRAN. Interdepartmental with and administered by the Department of Mechanical Engineering.

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.

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

(290.) 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.

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 300. MTH 113 or concurrently, or approval of department.

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. MTH 214 or concurrently or approval of department. 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 300, MTH 113.

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 MTH 334.

Finite-state machines, stack automata. Turing machines. Effective procedures and computability. Introduction to recursive functions. Symbol manipulation systems.

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 queueing 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.

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.

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.

Descriptions – Computer Science

of Courses

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.

861. Structured Programming

Fall. 3(3-0) CPS 322; CPS 313 or concurrently.

Block structured languages, control structures and mathematical foundations of structured programming; program development by stepwise refinement; proving program correctness; extensive readings from the current literature.

862. Advanced Data Structures

Winter. 3(3-0) CPS 313; CPS 322 or concurrently.

Structured data types; recursive and structured data structures and semantics; hierarchical program structures; models for programming languages; extensive readings from the current literature.

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.

Theoretical foundations of pattern recognition; classical and contemporary research themes including structural approaches, sequential methods, and evaluation of alternative strategies.

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.