512. Health Behavioral Science III
Spring. 2 to 3 credits. 511 or approval of department.
The diagnosis and treatment of various forms of
deviant behavior, i.e. alcoholism, neurones, character
disorders, sexual deviations, schizophrenia, affective
psychoses, organic and psychosomatic conditions,
and mental subnormality. Preceptivity in community mental health.

513. Health Behavioral Science IV
Summer. 2 to 5 credits. 512 or approval of department.
Community-based health surveys. Continuation of
preceptorship in community mental health.

514. Health, Medical Care, and Society I
Fall. 2 to 5 credits. 513 or approval of department.
A historical review of medical care programs in the United States. Introduction to health care organization and delivery; health care facilities and financing of medical care; comparative health care systems. Manpower development and utilization; politics of health care; elements of community health planning. Practice on health care agencies and programs.

515. Health, Medical Care, and Society II
Winter. 2 to 5 credits. 514 or approval of department.
Continuation of 514. Medical economics and finance for the general practitioner. Principles of medical management. Field placements with health care agencies and programs.

516. Health, Medical Care, and Society III
Spring. 2 to 5 credits. 515 or approval of department.
Clerkship in community medicine. Consideration is also given to patient care issues. Practical problems of health care delivery are analyzed and occur in clerkship. Some issues are explored directly with the principal parties involved.

517. Health, Medical Care, and Society IV
Summer. 2 to 5 credits. 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.

129. 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 129.
FORTRAN programming, numerical 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(3-1)
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) 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.

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

300. Computer Programming
Fall, Winter, Spring, Summer. 3(3-0)
110 or 120; MTH 109 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
Fall, Winter. 4(3-1) 300. MTH 113
or concurrently, or approval of department.
Machine structure, registers and operations. Pro-
gramming in assembly language. Discrimination of assembler, loader and execution tasks. Co-
operation with interpretive processing. Introduction to program and data structures. Subprogram
linkage.

110. Introduction to Computer Programming
Fall, Winter, Spring, Summer. 3(3-0)
Students may not receive credit in both 110 and 129.
FORTRAN programming, numerical systems and
basic computer structure. Applications from
various areas including business and social science.

112. Generative Coding and
Information Structures
Winter, Spring. 4(3-1) 311. MTH
114 or concurrently or approval of department.
Macro facilities, conditional assembly, interaction
with monitor, assembly language II/0. 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) 312.
Loaders and operating systems. Study of
existing batch and time-sharing systems. Design
and implementation of parts 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, 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) 321. MTH
215 or 334.
Finite state machines, stack automata, Turing
machines. Effective procedures and computa-
bility. Introduction to recursive functions. Sym-
bol manipulation systems.

341. Computer Aided Manufacturing
Spring. 4(3-2) 110 or 120. Interdepa-
rtmental with and administered by the De-
partment 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 ma-
chinists.

411. Information Theory
Winter. 3(3-0) 110 or 120; 322 recom-
mended; STT 251 or 441.
Measures of information content and flow.
Channel capacity and theoretical limits on in-
formation transmission. Applications to coding
and computer related studies.

421. Combinational Circuits
Fall. 3(3-0) 311 and 321 or approval of department.
Combinational circuits. Minimization, multiple
output, NAND-NOR implementation and itera-
tive circuits.

422. Sequential Circuits
Winter. 3(3-0) 322 or approval of department.
Synchronous and asynchronous machines. Bool-
ean equations, state minimization, races and
hazards. Regular expressions, Moore and Mealy
models.

423. Computer Architecture
Spring. 3(3-0) 422.
Computer arithmetic algorithms, memory sys-
tems, computer design, input-output system
design, digital system simulation.

447. Digital Filtering
Spring. 3(3-0) 300, MTH 215.
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) 313 or concurrently, 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) 451.

453. Design of Language Processors III
Spring, 3(3-0) 452.
Continuation of 452. Readings from the current literature. Completion of compiler project.

490. Selected Topics
Fall, Winter, Spring, Summer, 3(3-0)
May re-enroll for a maximum of 9 credits if different topic is taken. Approval of department.

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

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

805. Clustering and Scaling Algorithms
Fall, 3(3-0) 300, STT 441 or approval of department.
Algorithms that organize large amounts of data. Includes metric clustering, hierarchical clustering and multi-dimensional scaling.

810. Introduction to Linear System Theory
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 systems, 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) 610, 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(3-0) 611. 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. Nonparametric Pattern Recognition
Winter, 3(2-0) 300, STT 441, MTH 334.

818. Parametric Pattern Recognition
Spring, 3(3-0) STT 442, MTH 334.
Decision-theoretic approach to pattern recognition using decision rules, parameter estimation, suboptimum strategies, optimum strategy without learning, learning and sequential 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 multioutput 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.

841. Artificial Intelligence and Adaptive Systems I
Winter of odd-numbered years, 4(4-0) 306, 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.

861. Structured Programming
Fall, 3(3-0) 322, 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.

882. Advanced Data Structures
Winter, 3(3-0) 313, 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.

883. Structured Multiprogramming Systems
Spring, 3(3-0) 313, 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.

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

911. General Automata Theory I
(E E 881.) Fall of odd-numbered years. 3(3-0) 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
(E E 892.) Winter of even-numbered years. 3(3-0) 911. Interdepartmental with Electrical Engineering.

913. General Automata Theory III
(E E 893.) Spring of even-numbered years. 3(3-0) 912. Interdepartmental with Electrical Engineering.

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

CRIMINAL JUSTICE

College of Social Science

110. Introduction to Criminal Justice
Fall, Winter, Spring, 3(3-0)
Survey of agencies that compose the system: primarily the police, courts and corrections. Also, the processes of these components and their relationships, as well as related agencies involved are examined.

235. Criminology
Winter, Spring, 4(4-0) SOC 241 or C J 110 or approval of school. Interdepartmental and jointly administered with the Department of Sociology.
Crime analyzed 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.