420. **Message Design**
Winter. 4(4-0) COM 101.
Principles and practice in message-media construction and selection.

499. **Special Projects**
Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 15 credits. Approval of project proposal by department.
Independent research, group research, student-directed group projects.

805. **Communication Research**
Fall. 5(4-2) Majors.
Communication research strategy and methodology. Scientific process, bases for derivation and verification of hypotheses, and basic methods of designing research in communication.

806. **Communication Research**
Winter. 4(5-0) COM 805.
Continuation of COM 805.

815. **Organizational Communication**
Winter, Spring. 4(4-0)
Structure and function of communication in organizations, with emphasis on concepts and principles needed for effective management of organizational communication processes.

820. **Communication Theory and Process**
Fall, Summer. 3(3-0)
Theoretic models of communication, with emphasis on the applications of communication theory to various professional communication areas.

821. **Mass Communication Theory and Research**
Fall, Spring. 4(4-0)
Current behavioral science theories and research, e.g., media institutions, decision-making, mass media exposure patterns, diffusion of news and influence, effective message strategies, political communication, and mass media in socialization.

822. **Interpersonal Communication**
Winter, Summer. 4(3-0)
Current theories and research in interpersonal communication with emphasis on persuasion. The role of interpersonal communication in such processes as conflict resolution and information exchange will be considered.

828. **Cross-Cultural Communication**
Winter, Spring, Summer. 4(4-0)
Role of communication in the economic, social and political development of less developed countries. Problems in communicating across cultural boundaries.

830. **Nonverbal Communication**
Fall. 4(4-0)
A review of theory and empirical research on nonverbal communication with implications for application.

850. **Seminar in Research Utilization**
Winter, Summer. 4(3-0) May reenroll for a maximum of 8 credits. Approval of department.
Applications of communication research to professional practice in such areas as teaching, change agencies, information system management, etc.

870. **Communication and Change: The Diffusion of Ideas and Information**
Fall, Spring. 4(4-0)
Research traditions underlying the diffusion of ideas and information, and acceptance of innovation and change. Strategic principles for introduction of change through the use of communication.

890. **Special Problems**
Fall, Winter, Spring, Summer. 1 to 6 credits. Approval of department.
Special problems as arranged with instructor.

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

905. **Communication Research Design**
Fall, Winter, Spring. 5(4-2) May reenroll for a maximum of 15 credits. COM 806.
Methods of data collection and analysis in communication research. Designing exploratory studies of the communication process. Interviewer training and bias. Content analysis of the mass media. Writing and critiquing reserch reports.

940. **Seminar in Communication Theory and Research**
Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 45 credits. Approval of department.
Theoretic and research issues in communication.

990. **Special Problems**
Fall, Winter, Spring, Summer. 1 to 6 credits. Approval of department.

COMMUNICATION ARTS AND SCIENCES   CAS

(College of)

492. **Special Topics**
Fall, Winter, Spring, Summer. 3 to 5 credits. Approval of department.
Varied topics pertaining to the study of communication processes.

892. **Special Topics**
Fall, Winter, Spring, Summer. 3 to 5 credits. Approval of department.
Varied topics pertaining to advanced study of communication processes.

999. **Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.
Dissertation research for the doctoral programs in Communication and in Mass Media.

COMMUNITY HEALTH SCIENCE   CMS

College of Human Medicine
College of Osteopathic Medicine

510. **Health, Medical Care and Society**
Summer. 2 to 5 credits. Admission to a college of medicine or approval of department.
The role of social, cultural and psychological variables in health and illness and in health care delivery. Special attention to patient/physician behavior and health maintenance, health education and patient compliance.

511. **Interpersonal Relationships in Health Care**
Fall. 2 to 5 credits. Admission to a college of medicine or approval of department.
Developing the communication and interpersonal skills needed in health care delivery. Emphasis on the doctor-patient relationship. Use of video-taped interactions among students, and between students and simulated patients.

512. **Epidemiology and Biostatistics**
Winter. 2 to 5 credits. Admission to a college of medicine or approval of department.
Epidemiology and biostatics in clinical medicine and health care delivery. Evaluation of medical investigations. Applicability to preventive medicine and health maintenance. Field experiences and seminars in community medicine.

513. **Medical Jurisprudence**
Spring. 2 to 5 credits. Admission to a college of medicine or approval of department.
Basic concepts of the legal process and the health care system. Law suits, malpractice, statutory and case law. Insurance and tax consideration. Continuing field experiences and seminars in community medicine.

514. **Topics and Issues in Health Care Delivery I**
Summer. 2 to 5 credits. Admission to a college of medicine or approval of department.
Medical economics, health care financing and organization, manpower utilization, resource allocation, health services administration, patterns of medical practice, politics of health care. Continuing field experiences and seminars in community medicine.

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.

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.

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.

255. Computer Models in Science and Enginering

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 110, or CPS 120; MTH 108 or 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.

411. Information Theory

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

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

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.

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.