COMMUNICATION ARTS AND SCIENCES (COLLEGE OF)   CAS

492. Special Topics
Fall, Winter, Spring, Summer. 1 to 8 credits. May reenroll for a maximum of 24 credits. Approval of department.
Varied topics pertaining to the study of communication processes.

892. Special Topics
Fall, Winter, Spring, Summer. 1 to 8 credits. May reenroll for a maximum of 24 credits. Approval of department.
Varied topics pertaining to advanced study of communication processes.

990. Research Internship
Fall, Winter, Spring, Summer. 1 credit. May reenroll for a maximum of 6 credits.
Research practice in association with a designated faculty member.

999. Doctoral Dissertation Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.
Dissertation research for the doctoral program in Mass Media.

COMMUNITY HEALTH SCIENCE   CMS

College of Human Medicine
College of Osteopathic Medicine

512. Epidemiology and Biostatistics
Fall. 2 to 5 credits. Admission to a college of medicine or approval of department.
Epidemiology and biostatistics 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
Fall. 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
Fall. 2 to 5 credits. Admission to a college of medicine or approval of department.
Medical economics, health care financing and organization, personnel utilization, resource allocation, health services administration, patterns of medical practice, politics of health care. Continuing field experiences and seminars in community medicine.

518. Aging: Clinical and Community Perspectives
Spring. 4(3-3) Medical student or approval of instructor.
Multi-dimensional aspects of aging and their application to long-term, continuing care of the chronically ill older adult.

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
Fall. 4(4-0) 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 College of Nursing.
Use of experimental and quasi-experimental designs. Cost benefit and efficiency models. Assessment of health services delivery.

522. Principles of Gerontology for Medical Practice
Spring. 3(3-0) Admission to a college of medicine or approval of department.
An introductory course relating the biological, psychological and social implications of aging to health care of elderly.

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.

543. Health and Adaptation of the Elderly
Fall. 3(3-0) Baccalaureate degree in health science; approval of instructor. Interdepartmental with and administered by the College of Nursing.
Health and adaptation of the aged individual experiencing the normative biophysiologic and psychodevelopmental changes related to the aging process.

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.

605. Occupational Health Clerkship
Fall, Winter, Spring, Summer. 6 to 12 credits. May reenroll for a maximum of 12 credits. Grade P in all courses offered in terms 1 through 8.
The occupational health program in an industrial setting. Exposure to delivery of medical care to workers, treatment of industrial accident injuries. Review of safety and preventive medicine programs.

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.

618. Topics in International Health
Fall. 2(2-0) Admission to a college of medicine, or approval of department.
Selected topics such as African AIDS, malaria, onchocerciasis, tuberculosis, schistosomiasis. Pathophysiology, treatments, epidemiology, current research and controversies.

619. Clinical Health Education Clerkship
Fall, Winter, Spring, Summer. 6 to 12 credits. May reenroll for a maximum of 12 credits. Grade P in all courses offered in terms 1 through 8.
Clinical experiences for developing and applying skills in patient and family health education. Identification of behavioral components of health care. Assessment of educational needs of patient and family.

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

100. About Computers
Fall, Winter, Spring, Summer. 4(3-2) Not open to students with credit in CPS 130.
Computer impact on the individual and society. How computers work. Computer applications. Laboratory experience in accessing data bases, directing a screen simulated robot, use of a spreadsheet, and word processing.

112. Computing for Engineers and Scientists I
Fall, Winter, Spring, Summer. 3(2-2) MTH 112 or concurrently. Student may not receive credit in both CPS 112 and CPS 120.
Algorithms; data representation, structures, type; decision structures. Design and implementation of algorithms. Applications from engineering, mathematics, and science. Computer arithmetic; microcomputers, mainframes, editors, files.

113. Computing for Engineers and Scientists II

Fall, Winter, Spring, Summer. 3(2-2) CPS 112, MTH 112. Student may not receive credit in both CPS 113 and CPS 300.

Continuation of CPS 112 with emphasis upon more complex problem solving tasks. Development of self-sufficiency. Use of reference manuals and documentation. Networks, operating systems, software systems.

115. Introduction to Computing

Fall, Winter, Spring, Summer. 3(3-0)

Applications of computers in business, education, government and industry. Introduction to computing systems and programming in BASIC.

124. APL-Computer Programming for Scientists

Fall, Winter, Spring. 3(3-0) LBS 112 or concurrently. Interdepartmental with and administered by Lyman Briggs School.

APL programming; interactive programming techniques; arithmetic, logical, and extended APL operators; functions, applications to concurrent topics in mathematics; principles of operation of time-shared computers.

214. Computing for Engineers and Scientists III

Fall, Winter, Spring, Summer. 3(2-2) CPS 113; MTH 113.

Continuation of CPS 113. Data and instruction structures from both the high-level and implementation perspectives. Emphasis upon problem solving tasks requiring complex data and instructional structures.

251. Algorithms and Computing I

Fall, Winter, Spring. 3(2-4) 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(2-4) 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 4 credits. May reenroll for a maximum of 8 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.

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 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 CPS 301.

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 112 or CPS 115 or CPS 251.

The mechanics of COBOL, a business data processing language; presented with illustrative problems.

311. Assembly Language and Machine Organization

Fall, Winter. 4(3-2) MTH 214 and one of the following pairs: CPS 252, CPS 301 or CPS 300, CPS 304, or CPS 113, CPS 304.

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(3-2) 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(3-2) 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.

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.

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

412. Computer Communications

Winter. 3(3-0) CPS 300 or CPS 301; 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.

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, Winter, Summer. 2(1-3) CPS 416 or concurrently.

Designing, constructing and testing computer related circuits using discrete logic, MSI, LSI and microprocessors.

423. Computer Architecture

Fall, Winter, Spring. 3(3-0) CPS 416.

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

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.

471. Algorithms and Data Structures

Fall. 4(4-0) MTH 215, one programming course in a high level language. Not open to students with credit in CPS 311.

Algorithms, data structures, control structures, data types, analysis of algorithms, lists, trees, graphs, sets, sorting and searching.

472. Machine Organization and System Programming

Winter. 4(4-0) CPS 322, CPS 471.

Machine organization, addressing formats, assembly language, assemblers, compilers, linkers, loaders, interrupt and I/O programming, paging and segmentation.

484. Database Management Systems

Fall, Spring. 4(3-3) CPS 312, CPS 321.

File systems, access methods. Data models, design and manipulation languages. Design methods and implementation.

490. Selected Topics

Fall, Winter, Spring, Summer. 2 to 4 credits. May reenroll for a maximum of 9 credits when different topics are 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.   Independent Study
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 301 or CPS 304, 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 301 or CPS 304, 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.

809.   Computer Arithmetic Algorithm Design
Fall. 4(4-0) E E 431 or CPS 423. Interdepartmental with and administered by Electrical Engineering.
Number systems; fast two-operand and multioperand addition/subtraction; standard, recoded and cellular array multipliers; high-performance dividers; floating-point arithmetic; error control; pipelining.

812.   Computer Networks
Spring. 3(3-0) CPS 412. Interdepartmental with Electrical Engineering.
Network architecture model, routing and congestion control, satellite and radio networks, local computer networks, virtual terminal and file transfer protocols, network security, transport and session protocols, distributed processing.

813.   Logic Design Methodologies
Spring. 3(3-0) CPS 423 or E E 431. Interdepartmental with and administered by Electrical Engineering.
Modeling and simulation of logic circuits; hardware description languages; design methodologies for logic arrays and bit-slice processors; fault tolerance, testability, computer aided design of logic circuits; automated routing algorithms.

815.   Architecture of Computational Systems
Winter. 3(3-0) CPS 423. Interdepartmental with Electrical Engineering.
Overview of computer system organization; theoretical constructs of computer systems; processors; control units; memory; interconnection networks.

818.   Introduction to Robotics
Spring. 3(3-0) E E 415 or M E 458 or approval of department. Interdepartmental with and administered by Electrical Engineering.
Robot configuration and geometry. Robot drive systems, kinematics, controller design, sensors, sensor-based robots. Economic, political and social implications. Industrial application.

822.   Computer Vision
Winter. 4(4-0) MTH 334, CPS 252, STT 441.
Imaging geometry, sampling, coding. Picture transformations, enhancement. Edge detection, segmentation. Object and scene description and recognition applications.

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.

835.   Analysis of Graph Algorithms
Fall. 3(3-0) MTH 334, CPS 322.
Basic concepts in graphs, fundamental graph algorithms: shortest paths, minimum spanning trees, network flow, connectivities, matching, their limitations and complexities, other graph algorithms, NP-complete graph problems.

841.   Artificial Intelligence I
Winter. 4(4-0) CPS 252, STT 441.
Foundations of heuristic methods; syntactic means-end analysis; semantic means-end analysis; adaptive systems.

842.   Artificial Intelligence II
Spring. 3(3-0) CPS 312, CPS 841.
Computer representation of information from natural languages; representation of two and three dimensional environments; theory of design of robots; future trends.

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.

881.   Operating Systems Theory I
Winter. 3(3-0) CPS 313, STT 441.
Control of concurrent processes. Deterministic and probabilistic models of processor scheduling. Introduction to auxiliary and buffer storage models.

882.   Operating Systems Theory II
Spring. 3(3-0) CPS 881.
Auxiliary and buffer storage models. Storage allocation in paging systems. Multiprogrammed memory management.

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.

890.   Special Topics
Fall, Winter, Spring, Summer. 2 to 4 credits. May reenroll for a maximum of 10 credits. Approval of department.
Special topics in computer science of current interest and importance.

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, CPS 822.
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.

921.   Advanced Computer Systems I
Fall. 3(3-0) Two graduate level courses in computer system design (hardware or software). Interdepartmental with Electrical Engineering.
Models of single and multiple processors, their computational power, and measures of performance. Interconnection networks, data driven machines, and pipelines.

922.   Advanced Computer Systems II
Winter. 3(3-0) CPS 921. Interdepartmental with Electrical Engineering.
Design and characterization of parallel algorithms. Matching of algorithms with appropriate hardware configurations. Programming languages which support parallel computation.

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

COUNSELING, EDUCATIONAL PSYCHOLOGY AND SPECIAL EDUCATION   CEP

College of Education

400.   Classroom Testing and Grading
Winter, Summer. 3(3-0) T E 200 or T E 200A or T E 200B or T E 200C or approval of department.
Construction, use, and evaluation of teacher-made classroom tests, objective and essay, in elementary schools, secondary schools, and colleges. Statistical analysis of test scores and item responses. Grading problems.

401.   Standardized Tests and Testing Programs
Fall, Spring, Summer. 3(3-0) Approval of department.
An overview of standardized tests and sources of information about them. Selection and uses of standardized tests. Interpretation of standardized test scores. Local and widescale testing programs.

410.   Instructional Design and Technology
Winter, Spring, Summer. 2 to 4 credits. May reenroll for a maximum of 6 credits. T E 200 or T E 200A or T E 200B or T E 200C.
Students design plans for implementing instruction via systems approach and application of learning principles.