602. Fundamentals of Patient Care
(H M 602) Fall, Winter, Spring, Summer. 15 credits. Approval of department. Interdepartmental with and administered by the Department of Family Practice.
A full-time introduction to clinical medicine with emphasis on data gathering, and formulation and presentation of plans for patients and families in the hospital and outpatient setting.

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 of various industrial accidents. Review of safety and preventive medicine programs.

607. Ambulatory Care Clerkship
Fall, Winter, 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 ambulatory care program in an industrial setting. Exposure to delivery of medical care to workers of various industrial accidents. 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 hospital, clinic, patient assessment, development, use of management and care plan and use of community resources for the long term care of the aged.

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. 6 to 12 credits. May reenroll for a maximum of 24 credits. Approval of department.
Individual projects on special problems related to community medicine.

630. Alcoholism Clerkship
Fall, Winter, Spring, Summer. 6 to 12 credits. May reenroll for a maximum of 12 credits. COM students: Satisfactory completion of terms 1 through 8. CHM students: Satisfactory completion of Phase II. Diagnosis, inpatient and outpatient management of alcoholics.

COMPUTER SCIENCE - Descriptions of Courses

115. Introduction to Computing
Fall, Winter, Spring. 3(3-0) Not open to students with credit in CPS 120, LBS 124, or CPS 235.
Applications of computers in business, education, government and industry. Introduction to computing systems and programming in BASIC.

120. Computer Programming for Engineers and Scientists
Fall, Winter, Spring. 3(3-0) MTH 111 or concurrently. Students may not receive credit in both CPS 110 and CPS 120.
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) LBS 112 or concurrently. Interdepartmental with and administered by Lafayette 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.

130. Computers in Society
Fall. 3(3-0)
A non-technical introduction to computers, programming applications and to the computer revolution. Topics: automation, data banks, privacy, the engineered society.

231. Algorithms and Computing I
Fall, Winter, Spring. 3(2-3) 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. 3(2-3) CPS 251.
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 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
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. 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.

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, Winter, Spring. 2(3-0) 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 360 or CPS 301 or approval of department.
Development and implementation of computer programs in stgig 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 315 or CPS 120 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) CPS 252, CPS 301 or CPS 300, CPS 304, MTH 214 or LBS 216.

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, deck, tree and list data structures. Interpreters, recursive routines.

313. Introduction to System Programming
Fall, Winter. 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 or LBS 215.
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 LBS 217.
Finite-state machines, stack automata. Turing machines. Effective procedures and computability. Introduction to recursive functions, Symbol manipulation systems.
340. Computer Aided Manufacturing  
Spring, Fall, 3(3-2) CPS 115 or CPS 120 or CPS 251 or LBS 124. Interdepartmental with and administered by the Department of Metallurgy, Mechanics and Materials Science. APT and COMPACT numerical control languages. Group technology and computer-aided process planning. Introduction to manufacturing robotics.

412. Computer Communications  
Winter, 3(3-0) CPS 300 or CPS 301, STT 351 or STT 441. Computer networks; analysis by queueing languages. Group technology and computer-aided process planning. Introduction to manufacturing robotics.

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 or E E 430 or approval of department. Computer arithmetic algorithms, memory systems, computer design, output system design, digital system simulation.

447. Digital Filtering  
Spring, 3(3-0) CPS 300 or CPS 301, 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  

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. 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 394, 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 estimation 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 multiplexed addition/subtraction, re-coded and cellular array multipliers; high-performance dividers; floating-point arithmetic; error control; pipelining.

813. Logic Design Methodologies  
Spring, 3(3-0) CPS 422 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. 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.

827. Switching Theory  
Spring, 3(3-0) CPS 526. 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, 4(4-0) CPS 301 or CPS 304, STT 441. Foundations of heuristic methods; syntactic means-end analysis; semantic means-end analysis; adaptive systems.

842. Artificial Intelligence and Adaptive Systems II  
Spring, 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.

876. Performance Measurement Techniques  
Fall, 3(3-0) CPS 313, CPS 392, 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, 2(2-0) 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 of even-numbered years, 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, sub-schemas and access methods. Analytic and theoretical treatments.

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.
Counseling, Educational Psychology and Special Education - Descriptions of Courses

Counseling, Educational Psychology and Special Education - CEP

College of Education

400. Testing and Grading  
(ED 465.) Fall, Winter, Spring. Variable credit. Approval of department.

401. Standardized Tests and Testing Programs  
(ED 484.) Fall, Winter, 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 wide scale testing programs.

410. Instructional Design and Technology  
(ED 410.) Fall. Spring. 2 to 4 credits. May be repeated for a maximum of 6 credits. TE 200 or TE 200A or TE 200B or TE 200C. 
Students design plans for implementing instruction via systems approach and application of learning principles.

411. School Learning I  
(ED 411.) Fall, Winter, Spring. Summer. 3(3-0) TE 200 or TE 200A or TE 200B or TE 200C. 
Verbal learning, concept formation, problem solving and transfer with implications for teaching in schools.

412. Human Growth and Development  
(ED 412.) Fall, Winter, Spring. Summer. 3(3-0) TE 200 or TE 200A or TE 200B or TE 200C. 
Patterns in human growth and mental and emotional development of children through 12 and adolescents through 18; observation and participation in schools is an integral part of the course.

413. Mental Health of School Children  
(ED 413.) Fall, Winter, Spring. Summer. 3(3-0) TE 200 or TE 200A or TE 200B or TE 200C. 
Social and emotional adjustments of children. Emphasis on balancing factors favoring prevention and resolution of behavior difficulties and evaluation of school programs on basis of their contribution to mental health.

425A. Psycho-Educational Characteristics of the Mentally Retarded  
(ED 425A.) Fall, Summer. 3(3-0) CEP 460A or approval of department. 
Cognitive, affective and social characteristics of the mentally retarded. Implications for school learning and life adjustment. Differentiation of mental retardation from related conditions.

425B. Curriculum for the Mentally Retarded  
(ED 425B.) Fall, Summer. 3(3-0) CEP 460A or approval of department. 
The development of curriculum for mentally retarded children and youth emphasizing current practice in pre-school through secondary school programs for educable and trainable mentally retarded.

425C. Educational Procedures for the Mentally Retarded  
(ED 425C.) Fall, Summer. 3(3-0) CEP 460A or approval of department. 
Methods of instruction for mentally retarded children and youth, including the development of objectives, assessment of individual abilities, the development of learning skills, and the teaching of non-academic and academic skills.

425D. Education of the Severely Retarded  
(ED 425D.) Fall, Winter, Spring. 3(3-0) CEP 460A. 
Procedures in teaching severely mentally retarded children and youth.

431A. Educational Media in Instruction  
(ED 431A.) Fall, Winter, Spring. 3(3-0)TE 200 or approval of department. 
A course for teachers and prospective teachers in the local production of visual instructional materials.

434. Computers in the Classroom  
Fall, Winter, Spring. Summer. 3(3-0) 
How to use computer literacy and programming in public schools. Computer aided instruction in the classroom. Applying instructional design principles to the selection, evaluation, modification, and development of computer courseware.

442. Use of Paraprofessionals in Counseling  
(ED 442.) Fall, Spring. 3(3-0) 
History and current status of the paraprofessional movement. Review of the selection, training, and evaluation processes; identification of issues and problems in the use of support personnel.

450. Interpersonal Process Recall  
(ED 450.) Fall, Winter, Spring. Summer. 3(3-0) Approval of instructor. 
Interpersonal communication focusing on one's own interpersonal style through self study of video-recorded interviews.

459A. Education of Exceptional Children  
(ED 459A.) Fall, Winter, Spring. Summer. 3(3-0) 
Emphasis on the nature of handicapping conditions and educational needs and approaches. Includes mental retardation, emotional disturbance; visual, auditory and physical handicaps.

459B. Educational Provisions for the Physically Handicapped  
(ED 459B.) Fall. 3(3-0) CEP 460A, TE 470. 
Facilities, programs, trends, methods, materials and terminology in education of the physically handicapped. Field trips to special classes and hospital school programs.

461. Core Seminar in Special Education  
(ED 461.) Fall, Winter, Spring. 3(3-0) CEP 460A, T E 461. 
Core seminar in special education, core students only. 
Consideration of affective interactions with children, parents, other professionals, and self. Attention to sharing field experiences, examining belief-behavior consistency, teaching in the affective domain, and the parent-teacher partnership.