452. *Mechanical Language II*

Winter. 3(3-0) 451.

Floyd-Evans productions. Assignment of a two-term project on compiler writing. Lexical analysis. semantics. register allocation, code of optimization. Hashing and other searching techniques. Dynamic storage techniques.

453. *Mechanical Language III*

Spring. 3(3-0) 452.

Finite state automata; pushdown automata. Extended precedence grammars. Precedence functions. LR(K) grammars; LL(K) grammars. Bounded context techniques.

490. *Special Problems*

Fall, Winter, Spring, Summer. 1 to 5 credits. May re-enroll for a maximum of 9 credits. Advanced standing and approval of instructor.

Independent undergraduate research in computer science.

801. *Special Problems*

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

810. *Introduction to Linear System Theory*

(812.) 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 system variables, 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) 810, 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(1-6) 811. 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. *Parametric Pattern Recognition*

Winter. 3(3-0) STT 441, computer programming.

The decision-theoretic approach to pattern recognition using decision rules, parameter estimation, sub-optimum strategies, optimum strategy without learning, learning, and sequential recognition.

818. *Nonparametric Pattern Recognition*

Spring. 3(3-0) 817.

The non-statistical approach to pattern recognition. Discriminant functions, clustering, nonparametric learning, and algorithms for 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 multiple-output 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 contex-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.

833. *Mathematical Theory of Formal Languages III*

Spring. 3(3-0) 832.

Current literature and advanced topics in formal language theory.

835. *Data Structures in Information Processing*

Fall. 3(3-0) 453.

Memory hierarchy and allocation algorithms; information collection; management, processing, retrieval and display; implications for machine, language and problem organization.

836. *Simulation of Stochastic Systems*

Winter. 3(3-0) 835.

Computational aspects of the development, verification, and utilizations of algorithms for simulating models of discrete, stochastic systems; processing using Random Walks and Markov Chains.

837. *Computer-Aided Design of Deterministic Systems*

Spring. 3(3-0) 835.

Formal language specification of time-dependent, deterministic systems; automatic production, management, and solution of system-associated equations.

841. *Artificial Intelligence and Adaptive Systems I*

Winter of odd-numbered years. 4(4-0) 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) 841.

Computer representation of information from natural languages; representation of two and three dimensional environments; theory of design of robots; future trends.

899. *Research*

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

911. *General Automata Theory I*

(E E 981.) Fall of odd-numbered years. 3(3-0) 453 or 825 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 982.) Winter of even-numbered years. 3(3-0) 911. Interdepartmental with Electrical Engineering.

Reliability and redundancy of finite automata. Probabilistic sequential machines. Languages definable by probabilistic and deterministic automata. Axioms for equivalance of regular expressions.

913. *General Automata Theory III*

(E E 983.) Spring of even-numbered years. 3(3-0) 912. Interdepartmental with Electrical Engineering.

Degrees of difficulty of computation. Models of parallel computation. Iterative automata.

999. *Research*

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

CRIMINAL JUSTICE* C J

College of Social Science

110. *Introduction to Criminal Justice*

Fall, Winter, Spring. 4(4-0)

Agencies and processes involved in the administration of criminal justice—the legislature, the police, the prosecutor, the courts and corrections. Problems of law enforcement in a democratic society.

225. *Police Science Laboratory I*

Fall, Winter, Spring. 4(0-8) 110.

General course in laboratory techniques. Photography, recording of a crime scene, collection and preservation of evidence, and fingerprinting.

230. *Administrative Theory in Criminal Justice*

(130.) Winter, Spring. 5(3-4) 110.

Exposition of theories and research relating to organization and management, and their applicability to criminal justice agencies.

245. *Highway Traffic Administration I*

Fall. 5(5-0) 110.

Examination of United States transportation system, emphasizing efficient, safe operation. Activities and agencies concerned with increasing efficiency. System's development; components; social, economic and political impacts. Survey of present and future needs.

246. *Highway Traffic Administration II*

Winter. 5(4-0) 110.

Organization for traffic control, accident investigation, traffic flow regulation, and accident analysis and interpretation. Survey of traffic law, as related to administration. Violation bureau and traffic court administration.

247. *Highway Traffic Administration III*

Spring. 5(4-0) 110.

Highway traffic education at the elementary, secondary and adult levels of instruction. Communication aspects of highway traffic administration. Public support organizations. Motor vehicle fleet safety programs. Traffic safety research.

318. *The Police and Community Relations*

Fall, Winter, Spring. 4(4-0) 110.

Interdisciplinary survey of the field of police and community relations, emphasizing police administrative responsibility, with special attention to police role in community relations tension and conflict.

*Name changed July 1, 1970. Formerly Police Administration and Public Safety.

327. Police Science Laboratory II

Winter. 3(0-6) 225 or approval of school.

Continuation of 225, including the studies of firearms, hair, microscopy and chemistry.

328. Police Science Laboratory III

Spring. 3(0-6) 327 or approval of school.

Continuation of 327, including serological examination of minute pieces of evidence, documents, and instrumental analysis.

335. Police Administration I

(235.) Fall. 5(4-1) 230.

Principles of police administration and organization; administration of staff units; function and activities of police agencies.

336. Police Administration II

(236.) Winter. 5(4-1) 335.

Administration of police line operations; including patrol as the basic police function, investigation, juvenile, traffic and special operational units. Liaison between units, enforcement policy, manpower distribution, and analysis of operations.

355. Delinquency Prevention and Control

Fall, Spring. 5(4-1) 230.

Problem of juvenile deliquency, theories of causation and prevention programs. Police prevention programs, juvenile courts, institutional treatment, community resources for prevention, federal and state programs.

356. Organization and Administration of Delinquency Prevention Programs

Winter. 5(4-1) 355.

Prevention programs in general. Police prevention programs—historical development, present status, organization and administration areas of operation, personnel, training, relationship to other agencies. Application of organizational scheme to other agencies.

368. Correctional Philosophy, Theory and Practice

Fall, Winter. 5(4-1) 110.

Introductory survey of philosophy, theory and practice involved in the treatment of convicted law violators of all ages. Appraisal of the impact of correctional treatment upon post-correctional behavior.

369. Probation and Parole

Spring. 5(4-1) 110, 355, 368; or approval of school.

Treatment of convicted law violators by the correctional field services before and after prison. The role of probation and parole counselors. Appraisal of effectiveness. Prediction of behavior during and after probation and parole.

375. Criminal Law

(275.) Fall, Winter, Spring. 4(4-0) 110.

Survey of substantive criminal law as a means of attaining certain socially desirable ends like the preservation and protection of life and property; emphasis on historical and philosophical concepts.

380. Industrial Security Administration

Fall. 5(4-1) 230.

The organization and management of industrial security units including government security. The protection of commercial and industrial manpower, facilities, and installations. Security and police operations. Administrative, legal and technical problems. Specialized programs for factories, railroads, retail stores, insurance companies, credit bureaus, etc.

381. Industrial Fire Protection, Disaster Control, and Defense Programs

Spring. 4(3-0) 230.

The administration of fire and accident prevention programs. Development of policy, rules and regulations. Operations for fire and accident control. Equipment facilities, inspections, investigations, and records. Special problems and hazards.

395. Criminal Investigation

(325.) Fall, Winter. 4(4-0) 110, 375.

Introduction to criminal investigation procedures including theory of an investigation, conduct at crime scenes, collection and preservation of physical evidence; methods used in police science laboratory; fingerprints, ballistics, documents, serology, photography, and related forensic sciences.

400H. Honors Work

Fall, Winter, Spring, Summer. Variable credit. 110, 230, and 10 additional criminal justice credits.

Open only to qualified students. Individually selected program of supervised group or individual study dealing with some phase of police administration and public safety.

401. Case Studies in Criminal Justice

Fall, Winter, Spring, Summer. 1 to 6 credits. May re-enroll for credit. 110, 230, and 10 additional criminal justice credits.

Surveys and applied research as approved by students' major professor.

409. Special Issues in Criminal Justice

Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 4 credits. Majors: 110, others: approval of school.

Forum for special course offerings focusing on special issues in criminal justice by visiting instructors or regular faculty.

429K. Fundamentals of Traffic Law

Fall, Summer. 3(3-0) Interdepartmental with and administered by the College of Education.

Nature, function and application of traffic law as it applies to the safe and efficient movement of people and goods in a broadly conceived traffic accident prevention program.

453. Case Analysis in Prevention Programs

Spring. 5(4-1) 356.

Factors to be considered in determination of referral action for delinquent youth. Estimating significance of behavior and home situation. The referral process, selection of agency, preparation for referral, follow-up.

465. Administration of Correctional Institutions

Fall. 5(4-1) 110, 355, 368; or approval of school.

Treatment, security, custody and discipline of the convicted law violator in correctional institutions. Social structure of the prison community; inmate social systems and interaction. Correctional clinic records. Correctional research and decision making.

471. Criminal Procedure

Fall, Spring. 4(4-0) 375.

Study of the constitutional right of the people to be secure from unreasonable searches and seizures; how rules of evidence safeguard individual rights in the administration of criminal justice.

475. Evidence

Winter. 3(3-0) 375.

Concepts, policies and procedures relating to the admission of evidence before judicial tribunals.

480. Internal Security in a Democracy

Winter. 4(4-0)

Approaches to the control of "subversive activities" and their effectiveness from the standpoint of security and freedoms essential in a democracy.

481. Theft Control in Business, Industry and Institutions

Spring. 3(2-0)

Causation, prevention, and control of robbery, burglary, shop-lifting, pilferage, embezzlement, and employee dishonesty in private and public institutions. Social science theory and research methods.

490. Criminal Justice Practicum

Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 12 credits. Approval of school.

Planned program of research, observation, study, and work in selected criminal justice agencies. Designed to supplement classroom study with constructive participation in the criminal justice system of communities of the United States and foreign nations.

492. Methods of Criminal Justice Research

Fall, Spring. 4(3-2) 110.

Elements of scientific perspective; interaction of research and theory. Introduction to research design, data collection, analytic and statistical techniques, use of data processing resources, and preparation of research reports.

493. Problems and Techniques of Criminal Justice Research

Winter. 4(3-2) 492 or approval of school.

Continuation of 492 to provide depth in the various elements of research; extension to more sophisticated research models, and the relevance of findings for criminal justice program innovation and evaluation.

499. Seminar in Criminal Justice

Fall, Winter, Spring, Summer. 5(3-0) 230, 355, 368, 375, 492.

Discussion and evaluation of criminal justice policies and practices. Preparation of undergraduate senior research paper.

801. Directed Studies

Fall, Winter, Spring, Summer. 1(0-2) to 6(0-12) Approval of school.

Individual research and study in student's field of interest as approved and directed by major professor.

812. Advanced Law Enforcement and Public Safety Administration

Fall. 3(3-0) or 5(3-0) Approval of school.

Framework through which the objectives of the process of social control (criminal justice) are obtained. The administrative, political and social milieu in which this machinery operates.

815. Seminar in Criminal Investigation

Spring. 3(3-0) Approval of school.

Seminar in investigative techniques; criminalistics; case studies: including discussion on quantum of proof in criminal investigations and probative value of physical evidence.

820. Advanced Police Administration

Winter. 3(3-0) or 5(3-0) Approval of school.

Depth analysis of the line and staff functions within a law enforcement agency. Problems of program development, execution, and evaluation.

822. Comparative Law Enforcement Administration

Spring. 3(3-0) Approval of school.

Comparative study of police organization and adminstration in various governmental and social systems. Evaluation of government's role, its limitations, the selection and training of leaders.

823. Community Relations in the Administration of Justice

Fall. 5(5-0) Approval of school.

Seminar in the field of community relations, encompassing the spectrum of the administration of justice and community responsibility, utilizing the interdisciplinary approval in case and situational analysis.

840. Seminar in Highway Traffic Administration

Winter. 3(3-0) or 5(3-0) Approval of school.

Traffic problems in their broad social setting. Inventory and critical review of the traffic safety movement and role of various professions therein. Future problems and developments.

868. Review and Evaluation of Correctional Research

Winter. 3(3-0) or 5(3-0) Approval of school.

Correctional research systems review, analysis and critical evaluation of correctional research findings and conclusions pertaining to correctional decision making in the treatment process.

870. Administration of Criminal Law

Winter. 3(3-0) or 5(3-0) Approval of school.

Major provisions of the Constitution of the United States that safeguard personal liberties. Judicial processes are examined in the light of historical experience, and social change.

875. Seminar in Deviant Behavior

Spring. 3(3-0) or 5(3-0) Approval of school.

Evaluation of current major hypotheses, review of recent developments, contributions by agencies and academic institutions and review of current literature in the field of deviant behavior.

890. Field Training

Fall, Winter, Spring, Summer. 1(0-4) to 6(0-24) Approval of school.

Field service training provided with federal, state, and local enforcement agencies; crime laboratories; commercial, industrial, and financial organizations with security programs; agencies working in crime and deliquency prevention; correctional agencies; and organizations engaged in highway safety.

899. Research

Fall, Winter, Spring, Summer. Variable credit. Approval of school.

CROP SCIENCE CSC

College of Agriculture and Natural Resources

101. Crop Science

Fall. 3(3-0)

Principles of identification, adaptation, management, and utilization of field crops for food and fiber. Fundamentals of crop management, breeding, weed control, crop quality, and tropical crops in world agriculture.

250. Plant and Animal Genetics

Spring. 4(4-0) B S 211.

Fundamental genetic principles with particular reference to problems in plant and animal biology.

251. Plant and Animal Genetics Laboratory

Spring. 1(0-2) 250 concurrently.

301. Forage Crops

(201.) Fall. 3(2-2) Sophomores.

Distribution, morphology, identification, physiology, management and utilization of forage crops for hay silage, and pasture for livestock and for soil improvement and conservation.

380. Ecology and Physiology of Agricultural Plants

Spring. 3(3-0) FOR 220 or BOT 301.

Interrelationships of physiological processes and environmental manipulation for higher yield of agricultural plants.

402. Principles of Weed Control

Fall. 3(2-2) Juniors. Interdepartmental and administered jointly with the Horticulture Department.

Comprehensive study of principles underlying weed control practices, and factors involved in both mechanical and chemical control.

406. Crop Improvement and Seed Production

Winter. 4(3-2)

Practical methods of crop improvement, seed production, storing, cleaning, packing, and distribution, seed certification of small grains, legumes, corn, beans, potatoes, visits to seed agencies and seed farms.

407. Special Crop Problems

Fall, Winter, Spring, Summer. 1 to 3 credits. May re-enroll for a maximum of 6 credits. Approval of department.

Independent comprehensive study of some area of crop science.

408. Principles of Plant Breeding

Spring. 4(3-2) 250. Interdepartmental and administered jointly with the Horticulture Department

Application of genetics and other sciences to breeding and improvement of agronomic and horticultural crops.

415. Turfgrass Management

Spring. 3(2-2)

Adaptation characteristics and utilization of turf grasses, management principles and physiological bases for the establishment and maintenance of turf for lawns, athletic fields, golf courses, cemeteries, parks, highways and airfields.

420. Seminar

Winter. 1(1-0) May re-enroll for a maximum of 4 credits. Interdepartmental and administered jointly with Soil Science.

485. Seed Science

(912.) Spring. 3(3-2) Approval of department.

Morphological and physiological changes during seed formation, development, maturation and germination. Practical and biological aspects of seed drying, storage, deterioration, dormancy and quality. Current problems and research in seed science.

488. The Impact of Animal Resource Management Upon the World's Developing Nations

Winter. 3(4-0)

For course description, see Interdisciplinary Courses.

801. Crop Ecology

Fall. 3(3-0) Approval of department.

Environment within the crop community and the environmental stresses limiting crop survival. Temperature, light, water and atmospheric stresses and variations in the crop canopy will be discussed.

803. Crop Physiology

Spring. 3(3-0) Approval of department.

Role of physiological factors determining maximum crop yields and quality.

805. Herbicidal Action and Metabolism

Spring. 3(3-0) 402; BOT 415 or concurrently.

A study of the properties and characteristics of herbicides, the fundamental processes involved in the physiological action, behavior, and metabolism of herbicides.

814. Advanced Field Crop Studies

(914.) Fall, Winter, Spring, Summer. 1 to 3 credits. Approval of department.

Opportunity for students to prepare graduate level reports on specific fields.

830. Physiological Genetics

Winter. 3(3-0) Approval of department. Interdepartmental with and administered by the Forestry Department.

Physiological bases for genetic variation in higher plants including adaptive physiology, quantitative genetics, growth correlations, biochemical genetics, hybrid physiology, and genecology.

831. World Crop Adaptation

Spring. 3(3-0)

Distribution, adaptation, and importance of crops in world agriculture and their production as influenced by climate, soil, people and markets.

851. Quantitative Genetics in Plant Breeding

Fall of odd-numbered years. 4(3-1) One course in genetics or breeding, and one course in biometry, or approval of department.

Genetic systems and quantitative inheritance in relation to the establishment of superior populations.

899. Research

Fall, Winter, Spring, Summer. Variable credit.

904. Seminar

Fall, Winter, Spring. 1(1-0) Required of majors; others: approval of department.

Studies and presentation of research in crop science.

920. Design and Analysis of Agronomic Experiments

Spring. 3(3-0) STT 423 or approval of department.

Constructing and analyzing designs for experimental investigations in the biological sciences.

951. Cytogenetics in Plant Breeding

Winter of odd-numbered years. 3(3-0) BOT 427, 919, or approval of department. Interdepartmental with the Horticulture Department.

Application of cytogenetic principles to plant breeding. Significance of recombination, role of induced mutations, polyploid, chromosome substitution, and aneuploid analyses as they apply to the field of plant breeding.

952. Plant Breeding Biometrics

Winter of even-numbered years. 4(3-2) Approval of department.

Biometrical genetics as it applies to plant breeding. Includes studies of path coefficients, partitioning of variance, and the principles of selection in a changing environment.