489. 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.

490. Independent Study
Fall, Winter, Spring, Summer. 1 credit.
May reenroll for a maximum of 4 credits in CPS 293 and CPS 495 combined. Approval of department.
Independent undergraduate research in computer science.

801. Special Problems
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 300, 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 300, 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.

825. Theory of Combinational Circuits
Fall, 3(3-0) CPS 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) CPS 425.
Sequencing machines; machine specification in terms of states and transitions; decomposition; state minimization and assignment.

827. Switching Theory
Spring. 3(3-0) CPS 426.
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 531.
Context sensitive languages; derivation restricted grammars; semantics of formal languages.

841. Artificial Intelligence and Adaptive Systems I
Winter of odd-numbered years. 4(4-0)
CPS 360, 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)
CPS 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) CPS 322; CPS 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.

862. Advanced Data Structures
Winter. 3(3-0) CPS 313; CPS 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.

863. Structured Multiprogramming Systems
Spring. 3(3-0) CPS 313; CPS 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.

865. 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.

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

Criminal Justice – Descriptions of Courses

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

944. Theory of Algorithms
Spring. 3(3-0) CPS 532 or CPS 542.
Formulation of computation concept and algorithm verification. Topics include finite and infinite acceptors, recursive functions, program verification, decision problems, flowchart schemas, and fixed point theory of programs.

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

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 CJ 110 or approval of school. Interdepartmental and jointly administered with the Department of Sociology.
Crime analysed 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.

315. Criminal Investigation
(305) Winter, Spring. 4(4-0) CJ 375.
Theory of investigation, crime scene conduct, collection and preservation of physical evidence and methods used in scientific interpretation of evidence.

315. Community Relations in Criminal Justice
Fall, Winter, Spring. 4(4-0) CJ 235.
Interdisciplinary survey of community relations in police and other criminal justice processes; theory and case studies. Emphasizes problem solving, conflict management, and community action in the prevention of civic disorder.

330. Organisational Theory in Criminal Justice
Fall, Winter. 4(4-0) CJ 110, CJ 335.
A historic and a comparative overview of the principles of organization used by criminal justice agencies. Current theories and research on organization, with focus on the needs of the criminal justice process.

335. Police Process
Fall, Winter, Spring. 4(4-0) CJ 235.
Functional role of law enforcement within the criminal justice system. Law enforcement organizations and the function of operational units. Role of law enforcement in a democracy, service, crime deterrence, discretion, enforcement policies and evaluation of effectiveness.
435. Alcohol and Drugs: A Social Dilemma
Fall, Winter, Spring, 3(3-0) Majors or approval of school. Interdepartmental with the College of Education.

An overview investigation of the substance abuse phenomena with an emphasis on alcohol. Sociological, psychological and medical aspects are discussed with implications for prevention, treatment and rehabilitation.

440. Analysis of Police Operations
Winter, Spring, 4(4-0) C J 318, C J 335, C J 355, C J 365, C J 375, C J 392 or approval of school.

Organization and administration of line and staff functions of police units, interrelationships of components. Analysis of total operations of the police, including personnel, budgeting, manpower allocation, enforcement policies and specialization.

441. Police and Court Traffic Administration
Spring, 4(4-0) C J 318, C J 335, C J 355, C J 365, C J 375, C J 392 or approval of school.

Police and court traffic functions relative to other police and court functions in the criminal justice system. Systems approach to managing traffic accident prevention programs. Weaknesses, future needs and alternatives.

445. Analysis of Delinquency Programs
Winter, Spring, 4(4-0) C J 318, C J 335, C J 355, C J 365, C J 375, C J 392 or approval of school.

Complexity of delinquency phenomena, evolution of programs and organizations which prevent, evaluate and treat specific youth problems.

452. Criminal Law
Fall, Spring, 4(4-0) C J 318, C J 335, C J 355, C J 365, C J 375, C J 392 or approval of school.

Substantive criminal law as a means of defining and preserving social values. Criminal law theory, legislative role in criminal justice, victimless crimes, survey of crimes and defenses, constitutional limitations.

455. Security Systems
Fall, 4(4-0) C J 318, C J 335, C J 355, C J 365, C J 375, C J 392;

Majors only. Planned program of research internship, observation, study and work in selected criminal justice agencies; supplemented with emphasis on participation in criminal justice systems of United States and foreign nations.

492. Methods of Criminal Justice Research
Fall, Winter, Spring, 4(4-0) C J 318, C J 335, C J 355, C J 365, C J 392 or approval of school.

Elements of scientific perspective, analysis of published research to illustrate theory interacting with practice. Conceptual frameworks, negotiating access to and collection of data, design choices, analytic techniques, and final reporting.
821. Independent Study in Forensic Science
Fall, Winter, Spring. 3(0-6) Majors or approval of school.
Directed laboratory work in forensic science.

822. Social Control, Criminal Justice and Community Relations
(FALL) Fall, Spring, 4(4-0) C J 318.
A broad-ranging seminar with a field studies aspect, emphasizing community responsibility in criminal justice processes, in the context of social change and social control.

823. Project Planning and Evaluation
Winter, Spring. 4(4-0) C J 402; C J 820 recommended.
Process of managing new projects from inception through implementation and evaluation. Establishing priorities, securing funding, administering projects and designing and implementing useful evaluative research. Individual exercises in designing projects.

824. Criminal Justice Systems
Fall, Winter, Spring. 3(0-6) Majors or approval of school.

825. Criminal Justice Educational Programming
Spring. 4(4-0) Majors or approval of school.
Designed for students preparing for careers as criminal justice educators. Discussion of issues, administrative problems, and curricula for criminal justice programs.

826. Teaching Internship
Fall, Winter. 4(4-0) Majors or approval of school.
Assumption of complete responsibility for teaching a course in a criminal justice program. Guidance in planning lesson content and evaluating instruction provided. Attendance at a series of associated seminars required.

827. Research for Planning
Fall, Winter. 4(4-0) Majors or approval of school.
Techniques of applied research specially associated with the planning of operational and managerial criminal justice systems. Emphasis upon empirical basis for organizational planning programs.

828. Criminal Justice Systems Development
Fall, Winter. 4(4-0) C J 812 or approval of school.
Systems analysis approach to the development of criminal justice goals, priorities and strategies. Emphasis upon total systemic resource allocation, output and consonance.

829. Criminal Justice Information Systems
Fall, Spring. 4(4-0) C J 812 or approval of school.
The function, logical design and implementation of information systems in criminal justice agencies. Emphasis upon use of information systems in managerial decision making.

830. Project Planning and Evaluation
Winter, Spring. 4(4-0) C J 402; C J 820 recommended.
Process of managing new projects from inception through implementation and evaluation. Establishing priorities, securing funding, administering projects and designing and implementing useful evaluative research. Individual exercises in designing projects.

831. Police Policy Development
Fall, Winter, Spring. 4(4-0) C J 812.
Public policy issues affecting the definition of police goals and strategies. Facts and values which influence policy decision; the processes of policy development and linkage with delivery systems.

832. Police Systems Development and Management
Fall, Winter, Spring. 4(4-0) C J 812.
Analytic techniques of defining goals, and designing, testing and evaluating police operational strategies. Managerial support requirements and goals of specific police systems.

833. Highway Traffic Administration
Winter. 4(4-0)
The Federal-state-local partnership in highway traffic administration. Laws, standards and policies regulating the accident prevention and loss reduction countermeasures of governmental agencies and private industry. Problems and needs.

834. Case Studies in Delinquency Control
Fall. 4(4-0) C J 355, C J 455.
Evaluation of primary and secondary delinquency prevention, control and treatment programs. Current hypotheses, recent developments in the field. Use of cases to evaluate past and current practices and future needs.

835. Juvenile Corrections
Spring. 4(4-0) C J 355.
A more theoretical extension of C J 355 and C J 455. Review and analysis of entire treatment and rehabilitation process for juvenile offenders.

836. Correctional Programming
Fall. 4(4-0) Majors or approval of school.

837. Correctional Management
Spring. 4(4-0) Majors or approval of school.
Planning, organizing, controlling and evaluating in relation to measurable correctional objectives. Establishing objectives from well defined alternatives. Change capable administration styles and decision making as functions of objectives.

838. Correctional Practice
Spring. 4(4-0) Majors or approval of school.
Constitutional limitations and impact of law on correctional practice. Due process, judicial sentencing, probation, prisoners' rights, parole grant, revocation of probation and parole.

839. Law of Corrections
Spring. 4(4-0) Majors or approval of school.
Constitutional limitations on police activity. Due process, bill of rights, right to counsel, arrest, search and seizure, electronic eavesdropping, entrapment, confessions, lineups, scope of exclusionary rules.

840. Law of Administrative Procedure
Fall. 4(4-0) Majors or approval of school.

841. Security Management
Fall. 4(4-0) C J 485 or concurrently, or approval of instructor.
The organization and management of security units, in industry, businesses, governments, institutions, etc. The protection of manpower, facilities, and other assets. Administrative, legal and technical problems. Loss prevention and control.

842. Advanced Security Management
Winter. 4(4-0) C J 885.
Salient problems and issues of concern to professional security administrators. "Growing edge" technologies. Specialized programs—e.g., government internal security controls; employee dishonesty; shoplifting.

843. Practicum
Fall, Winter, Spring. 1(0-4) to 5(0-24) Majors or approval of school.
Planned program of research observation, study and work in selected criminal justice agencies. Designed to supplement classroom study with participation in domestic and foreign criminal justice systems.

844. Quantitative Methods in Criminal Justice
Spring. 4(4-0) C J 492.
Views the relationship and application of statistical techniques to theory building and concept construction. Gives an overview of statistical methods with an emphasis on those most useful for research in criminal justice.

845. Comprehensive Readings
Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 4 credits. Majors or approval of school.
Individualized reading program for students who elect not to complete a thesis. Means of achieving mastery of criminal justice areas of interest.

846. Thesis Research
Fall, Winter, Spring. 1 to 6 credits. May reenroll for a maximum of 6 credits. Majors or approval of school.
Planned research and writing directed by student's thesis committee.

847. Seminar on Criminal Justice Systems
Winter. 3(3-U) Graduate students.
Topical issues on the development, functioning, and interrelationships of components of criminal justice systems and how systemic coherence can be achieved within a democratic society.

848. Readings in Criminal Justice and Criminology
Fall. 3 to 5 credits. Graduate students.
Topical reading of major research contributions to criminology and criminal justice. Consideration of applicability of criminological research to functioning of the criminal justice system.

Criminal Justice – Descriptions of Courses
992. Research Utilization and Application in Criminal Justice

Spring. 3(3-0) Majors or approval of school.

Substantive and administrative problems of conducting research and existing attempts to solve these. Utilization of research in bringing about change in the criminal justice system. Methods of maximizing research utility.

CROP AND SOIL SCIENCES

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.

202. Soils and Man's Environment
Winter. 3(3-0) Interdepartmental with the departments of Fisheries and Wildlife and Resources.

Soil properties, tillage, rotation, conservation management of soils, drainage, and irrigation. Soil management vs. soil fertility to plant composition and animal health. Emphasis is placed on changing soils to serve man.

210. Fundamentals of Soil Science
Fall. Winter. 5 credits.

Principles of the origin and development of soils. Relationship of properties to utilization and soil fertility to plant composition and animal health. Emphasis is placed on changing soils to serve man.

250. Plant and Animal Genetics
Winter. 5(5-0) B $ 211.

Fundamentals of modern genetics with particular focus on problems and application in agriculture and natural resources.

301. Forage Crops
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.

331. Soil Management
Winter. 4(4-0) CSS 210.

Management of soils, drainage, and irrigation, organic matter, tillage, rotation, conservation practices, soil reaction, lime, fertilizers, and micronutrients. Soil management vs. soil conservation. Special study in general crops, horticultural crops, greenhouse crops, turf and organic soils.

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.

390. Soil Conservation and Land Use
Winter. 3(3-0) CSS 210.

Concepts of soil erosion by water and wind and methods for soil conservation including control of erosion and sedimentation. Interpretation of soil properties for land use decisions.

402. Principles of Weed Control in Field Crops
Fall. 4(3-2) CEM 133, BOT 301.

Principles underlying weed control practices for agronomic crops. Factors involved in mechanical, chemical and biological control and basic physiological aspects of herbicide applications.

405. Crop Improvement and Seed Production
Winter. 4(3-2) CSS 250.

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

408. Principles of Plant Breeding
Winter. 4(3-2) CSS 250.

Interdepartmental with the Department of Horticulture.

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

411. Special Problems in Agronomy
(407.) Fall, Winter, Spring. Summer. 1 to 4 credits. May enroll for a maximum of 6 credits if different problem is taken.

Special crop problems in production, physiology, ecology, weed control, turfgrass management, storage, preservation and seed studies. Special soils problems in fertility, geography, classification, conservation, management, organic soils and turfgrass soils.

412. Topics in Agronomy
Fall, Winter, Summer. 2(2-1) or 3(3-0) May enroll for a maximum of 9 credits if different topics are taken. Approval of department.

Topics will be selected from crop production, crop physiology, turfgrass management, organic soils, turfgrass soils, soil fertility and genetic analysis.

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 enroll for a maximum of 4 credits.

424. Forest Soils
Spring. 4(3-2) CSS 210: FOR 220 or FOR 264. Interdepartmental with and administered by the Department of Forestry.

Interrelationships of forest site and the growth of forests. Classification and productivity of forest soils. Effects of silvicultural and forest management practices on the soil. Two-day field trip required.

430. Soil Fertility and Fertilizers
Spring. 3(4-1) CSS 210.

Assessment of site and soil of alteration of fertility by the use of fertilizers, lime, manure, and cropping systems. The role of colloids in ion fixation and exchange. Soil and tissue tests. The history, technology, and use of fertilizers.

440. Soil Biophysics
Winter. 3(3-0) CSS 210 and BOT 301; CSS 380 recommended.

Salient features of soil physical and biological properties related to plant growth, principles and applications. Emphasis on root responses to the environment. Biocenergetics of the root-soil interface.

442. Soil Microbiology
Spring. 3(3-0) MPH 200 or MPH 301.

Interdepartmental with and administered by the Department of Microbiology and Public Health.

Major groups of microorganisms of importance in soils are studied with emphasis on ecological, biochemical, and physical aspects.

470. Soil Classification
Fall, Spring, Summer of odd-numbered years. 40-8: CSS 210 or approval of department.

Determination of soil properties by field examination. Classification of soils. Preparation of land use report based upon soil maps of assigned areas. Field trips required.

480. Soil Geography and Land Use of North America
Spring. 3(2-1) CSS 210 or approval of department.

Properties, geography and dominant land use of the major soils of North America.

485. Seed Science
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.

1DC. The Impact of Animal Resource Management Upon the World's Developing Nations

For course description, see Interdisciplinary Courses.

801. Crop Ecology
Fall of even-numbered years. 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 of even-numbered years. 3(3-0)

Approval of department.

Role of physiological factors determining maximum crop yield and quality.

805. Herbicidal Action and Metabolism
Spring of odd-numbered years. 3(3-0) CSS 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.