451. Design of Language Processors I  
Fall. 3(3-0) 313; concurrently, 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) 451.  
Continuation of 451. Semantics and generation  
of intermediate code. Fragments of code opti-  
mization, register allocation and machine code  
generation. Macro facilities, compiler generators  
and interpreters. Implementation of designed  
compilers.

453. Design of Language  
Processors III  
Spring. 3(3-0) 452.  
Continuation of 452. Readings from the curent  
literature. Completion of compiler project.

490. Selected Topics  
Fall, Winter, Spring, Summer. 3(3-0)  
May re-enroll for a maximum of 9 credits if a  
different topic is taken. Approval of depart-  
mnt.  
A new developing area of computer science  
selected by the department.

495. Independent Study  
Fall, Winter, Spring, Summer. 1 credit.  
May re-enroll for a maximum of 4 credits in  
295 and 455 combined. Approval of depart-  
mnt.  
Independent undergraduate research in com-  
puter science.

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

805. Clustering and Scaling  
Algorithms  
Fall. 3(3-0) 300, S4 441 or approval of depart-  
mnt.  
Algorithms that organize large amounts of  
data. Includes metric clustering, hierarchical  
clustering and multi-dimensional scaling.

810. Introduction to Linear System  
Theory  
(Fall.) Fall. 3(3-0) MTH 214. Interdeparment 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 rep-  
resentation of systems, state space and state  
space models, an introduction to control theory,  
applications to economic and social systems.

811. System Methodology and  
Simulation  
Winter. 3(3-0) 610, S4 441. Interdepartment 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, simul-  
ation of discrete object stochastic systems,  
simulation languages, applications to physical,  
economic and social systems.

813. System Project  
Spring. 3(3-0) 811. Interdepartmental with  
Systems Science and Social Science (College of)  
and administered by Systems Science.  
Individual or team application of simulation  
method to system design and/or management.

817. Nonparametric Pattern  
Recognition  
Winter. 3(3-0) 300, S4 441, MTH 334.  
Nonstatistical approach to pattern recognition.  
Discriminant functions, optimization techniques,  
feature extraction, nonparametric learning and  
algorithms for recognition. Error analysis.

818. Parametric Pattern  
Recognition  
Spring. 3(3-0) S4 442, MTH 334.  
Decision-theoretic approach to pattern recog-  
nition using decision rules, parameter estimation,  
suboptimal strategies, optimum strategy without  
learning, learning and sequential recognition.
315. Criminal Investigation
(395, 335) Winter, Spring. 4(4-0) 375.
Theory of investigation, crime scene conduct, collection and preservation of physical evidence and methods used in scientific interpretation of evidence.

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

330. Organizational Theory in Criminal Justice
Fall, Winter. 4(4-0) 110, 235.
A historic and a comparative overview of the criminal justice process. Current theories and research on organizations and the function of operational units. Role of law enforcement in a democracy, service, crime deterrence, discretion, enforcement policies and evaluation of effectiveness.

335. Police Process
Fall, Winter, Spring. 4(4-0) 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.

355. Juvenile Justice Process
Fall, Winter, Spring. 4(4-0) 235.
Prevalent interdisciplinary issues, ideas, principles and assumptions pertaining to delinquency phenomena, an overview of variables related to delinquency, duties, and responsibilities.

365. Corrections Process
(268) Fall, Winter, Spring. 4(4-0) 235.
The correctional modes applied to juvenile and adult offenders. Theoretical approaches to changing and controlling criminal behavior and practical limitations. Impact of methods on past correctional behavior.

375. Criminal Law Process
Fall, Winter, Spring. 5(5-0) 235.
Administration of criminal justice; investigation, detection, arrest, search, seizure, charging, adjudication, sentencing, probation, corrections, parole. Constitutional safeguards and legal controls on official action emphasized.

392. Criminal Justice Research and Innovation
Fall, Winter, Spring. 5(1-1) 110 and 235.
The utilization of research in planned change. Problems in conducting and interpreting research concerned with decision-making. The limitations of research and selected alternative strategies in bringing about change.

400H. Honors Study
Fall, Winter, Spring, Summer. 1 to 3 credits. May re-enroll for a maximum of 6 credits. Seniors or approval of instructor.
Individually selected programs of supervised group or individual study dealing with some phase of the criminal justice system.

401. Independent Study
Fall, Winter, Summer. 1 to 3 credits. May re-enroll for a maximum of 6 credits. 318, 325, 355, 365, 375, 392 or approval of instructor.
Individual study of the various fields of emphasis in criminal justice, under direct supervision of appropriate faculty member.

409. Issues in Criminal Justice
Fall, Winter, Spring. 3 or 4 credits. May re-enroll for a maximum of 10 credits when different topics are taken. 318, 335, 355, 365, 375, 392.
Forum for course offerings on special issues in criminal justice, by visiting instructors or regular faculty.

492K. Fundamentals of Traffic Law
Fall, Summer. 3(0-0) Interdepartmental and administered by the College of Education.
An overview investigation of the substance abuse phenomena with emphasis on alcohol. Sociological, psychological and medical aspects are discussed with implication for prevention, treatment, and rehabilitation.

433. Alcohol and Drugs
A Social Dilemma
(425) Winter. 3(0-0) Senior or approval of school. Interdepartmental with the College of Education.
An overview investigation of the substance abuse phenomena with emphasis on alcohol. Sociological, psychological and medical aspects are discussed with implication for prevention, treatment, and rehabilitation.

435. Analysis of Police Operations
Winter, Spring. 4(4-0) 318, 335, 355, 365, 375, 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, budget, manpower allocation, enforcement policies and specialization.

440. Introduction to Highway Traffic Administration
Fall. 4(0-0) Approval of instructor.
Systems approach to highway traffic administration emphasizing the interrelationships among agencies having management responsibilities and their accident prevention and loss reduction countermoves to combat system failures. Future needs and alternatives.

441. Police and Court Traffic Administration
Spring. 4(0-0) Approval of instructor.
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.

455. Analysis of Delinquency Programs
Winter, Spring. 4(4-0) 318, 325, 335, 355, 365, 375, 392 or approval of school.
Complexity of delinquency phenomena; evolution of programs and organizations which prevent, evaluate and treat specific youth problems.

465. Analysis of Correctional Operations
Fall, Spring. 4(4-0) 318, 335, 355, 365, 392 or approval of school.
A critical analysis of existing institutions and community corrections programs; administrative methods of program implementation and evaluation. Prevalent correctional operational policies. Problems of effecting change.

472. Criminal Law
Fall, Winter, Spring. 4(4-0) 318, 335, 355, 365, 375, 392, or approval of school.
Substantive criminal law as a means of defining and preserving social values. Criminal law theory, legislative roles in criminal justice, victimless crimes, survey of crimes and defenses, constitutional limitations.

485. Security Systems
Fall. 4(0-0)
Capabilities and limitations of security systems, both public and private, with particular reference to crime and crime-related problems. Interrelationships between security and other criminal justice agencies.

490. Criminal Justice Practicum
Fall, Winter, Spring. Variable credit. May re-enroll for a maximum of 12 credits. 318, 335, 355, 365, 375, 392; majors only.
Planned program of research internship, observation, study, and work in selected criminal justice agencies. Supplements classroom study with participation in criminal justice systems of United States and foreign nations.

492. Methods of Criminal Justice Research
Fall, Winter. 4(4-0) 318, 355, 365, 392 or approval of school.
Elements of scientific perspective; analysis of published reports to illustrate theory interacting with practice. Conceptual frameworks, negotiating access to and collection of data, design choice, analytic techniques, and final reporting.

495. Crime Prevention Seminar
Fall, Winter, Spring. 4(4-0) 318, 335, 355, 365, 375, 392, Seniors.
The prevention of crime and the concept of deterrence, stressing a systemic approach to the law, the police, the community, and corrections. A synthesis of the undergraduate program stressing a systemic perspective, commitment to planned change, and total community involvement.

501. Independent Study
Fall, Winter, Spring, Summer. 1 to 6 credits. May re-enroll for a maximum of 6 credits. Seniors or approval of school.
Individual research and writing in student's field of interest. Requires approval and direction by professor associated with major field of interest.

509. Special Issues in Criminal Justice
Fall, Winter, Spring. Summer. 3 to 5 credits. May re-enroll for a maximum of 15 credits when different topics are taken. Majors or approval of school.
Forum for study of issues not given continuous consideration in the graduate program.

812. Criminal Justice Management Issues
Fall, Winter, Spring. 4(3-1) Majors or approval of school.
New management requirements of the criminal justice complex in transition. Problems and innovative concepts of criminal justice system development, decision theory, information needs, planning, budgeting, and new managerial perspectives.
813. Criminal Justice Personnel Systems Development  
Winter, Spring. 4(3-1) 812.  
Personnel administration approaches to improvement of criminal justice systems such as personnel administration by objectives, and systems analysis approach to human resource development models consonant with criminal justice systems evolution.  

814. Fiscal Administration in Criminal Justice  
Winter, Spring. 4(3-1) 812.  
Transition from traditional budgeting to program budgeting. Evaluation systems in criminal justice agencies. Implications of criminal justice systemic budgeting models.  

815. Seminar in Criminal Investigation  
Fall, Winter, Spring. 3(3-0) Majors or approval of school.  
Seminar in investigative techniques; criminalistics; case studies; including discussion on quantum of proof and the probability value of physical evidence.  

816. Seminar in Forensic Science  
Winter. 3(3-0) Majors or approval of school.  
An investigation of the role of forensic science in the administration of justice; case studies; laboratory techniques; interpretation of proof.  

817. Independent Study in Forensic Science  
Fall, Winter, Spring. 3(0-0) Majors or approval of school.  
Directed laboratory work in forensic science.  

818. Social Control, Criminal Justice and Community Relations  
(823). Fall, Spring. 4(4-0) 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.  

822. Historical and Comparative Criminal Justice  
Fall, Spring. 3(3-0) Majors or approval of school.  
Criminal justice systems are examined on a global basis exclusive of the United States. Emphasis is placed on major different legal philosophies.  

825. Criminal Justice Educational Program Development  
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.  

830. 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.  

831. Criminal Justice Systems Development  
Fall, Winter. 4(4-0) Majors 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.  

832. Criminal Justice Information Systems  
Fall, Spring. 4(4-0) 812.  
New management requirements of the criminal justice complex in transition. Problems and innovative concepts of criminal justice system development, decision theory, information needs, planning, budgeting, and new managerial perspectives.  

833. Project Planning and Evaluation  
Winter, Spring. 4(4-0) 492; 530 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.  

835. Police Policy Development  
Fall, Winter, Spring. 4(4-0) 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.  

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

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

855. Case Studies in Delinquency Control  
Fall. 4(4-0) 355, 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.  

856. Juvenile Corrections  
Spring. 4(4-0) 855.  
A more theoretical extension of 355 and 455. Review and analysis of entire treatment and rehabilitation process for juvenile offenders.  

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

866. 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. Charge capable administration styles and decision making as functions of objectives.  

871. Law of Corrections  
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.  

872. Law of Criminal Procedure  
Fall, Winter, Spring. 4(4-0) A law course.  
Constitutional limitations on police activity. Due process, bill of rights, right to counsel, arrest, search and seizure, electronic eavesdropping, entrapment, confession, lineups, scope of exclusionary rules.  

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

885. Security Management  
Fall. 4(4-0) 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.  

892. Quantitative Methods in Criminal Justice  
Spring. 4(4-0) 885.  
Statistical problems and issues of concern to professional security administrators. "Growing edge" technologies. Specialized programs—e.g., government internal security controls; employee dishonesty, drug-lifting.  

900. Practicum  
Fall, Winter, Spring, Summer. 1(0-4) to 6(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.  

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

998. Comprehensive Readings  
Fall, Winter, Spring, Summer. 1 to 4 credits. May re-enroll for a maximum of 9 credits. Majors or approval of school.  
Individualized reading program for students who elect not to complete a thesis. Means of extending breadth and depth of course work to achieve mastery of criminal justice areas of interest.  

A-42
889. Thesis Research
Fall, Winter, Spring, Summer. 1 to 6 credits. May re-enroll for a maximum of 6 credits. Majors or approval of school. Planned research and writing directed by student's thesis committee.

930. Seminar on Criminal Justice Systems
Winter. 3(3-0) 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.

990. 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.

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 Resource Development, and Natural Resources.
Use of soil-water resources in a technological society as it relates to environmental quality. Nature of pollution problems and their possible solutions. Food production and world population.

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 S 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 pastures for livestock and for soil improvement and conservation.

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

405. Principles of Plant Breeding
Winter. 4(3-2) 250. Interdepartmental with the Horticulture Department.
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 re-enroll for a maximum of 9 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, Spring, Summer. 2(2-0) or 3(3-0) May re-enroll for a maximum of 9 credits of different topics are taken. Approval of department.
Topics will be selected from crop production, crop physiology, turfgrass management, organic soils, turfgrass soils and soil fertility.

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.

424. Forest Soils
Spring. 4(3-3) CSS 210; FOR 220 or 304. 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) 210.
Assessment of the fertility of soils and 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) 210 and BOT 361; CSS 390 recommended.
Salient features of soil physical and biological properties related to plant growth, principles and applications. Emphasis on root responses to the environment. Bioenergetics of the root-soil interface.

442. Soil Microbiology
Spring. 3(3-0) MPH 200 or 301 or 401. 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. 4(0-8) 210 or approval of department.
Determination of soil properties by field examination of soils. 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) 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.