

- 867. Analysis and Evaluation of Prevention and Correctional Programs**
Spring. 3(3-0)
Analysis and evaluation of research relating to adult and juvenile prevention and correctional programming. Application of research design to program evaluation.
- 871. Law of Corrections**
Winter. 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. Criminal Procedure**
Spring. 4(4-0) A law course.
Criminal procedure as applied to police and courts. Due process, Bill of Rights, right to counsel, search and seizure, confessions, bail, prosecution, guilty pleas, trial.
- 874. Law of Administrative Procedure**
Spring. 4(4-0) Majors or approval of school.
Powers and procedures of administrative agencies. Procedural issues and legal basis. Problems connected with administrative processes not subject to effective judicial or legislative supervision. Discretion, judicial review of administrative action and jurisdiction.
- 880. Planning in Criminal Justice**
Fall. 3(3-0) C J 492.
Models for planning. Empirical basis for organizational planning. Role of planning in operational administration. Assessment of current system capabilities.
- 881. Project and Program Implementation**
Winter. 3(3-0) C J 880 or approval of school.
Managerial strategies and factors involved in the effective implementation of projects and programs. Development and use of information and monitoring systems.
- 882. Evaluation Research in Criminal Justice**
Spring. 3(3-0) C J 880, C J 881.
The conduct and utilization of evaluative research in projects, programs and agencies. Strategies for conducting, interpreting and utilizing operational research.
- 885. Security Management**
Fall. 3(3-0) C J 485 or concurrently, or approval of instructor.
The organization and management of security units, in industry, businesses, government, institutions. The protection of manpower, facilities, and other assets. Administrative, legal and technical issues.
- 890. 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.

- 892. Quantitative Methods in Criminal Justice Research.**
Winter. 4(4-0) C J 492, C J 811.
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.
- 897. Policy Change Paper**
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 4 credits. Majors or approval of school.
Development of plan for significant policy change and its implementation in a criminal justice agency.
- 899. Master's Thesis Research**
Fall, Winter, Spring, Summer. 1 to 12 credits. May reenroll for a maximum of 12 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. Seminar in Criminal Justice and Criminology**
Fall. 3 to 5 credits. Graduate students.
Analysis of major research contributions to criminal justice and criminology.
- 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

CSS

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 Agriculture 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 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 132, 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.
- 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.
- 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 reenroll 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.

Descriptions - Crop and Soil Sciences

of Courses

412. Topics in Agronomy

Fall, Winter, Spring, Summer. 2(2-0) or 3(3-0) May reenroll 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 reenroll for a maximum of 4 credits.

424. Forest Soils

Spring. 4(3-3) CSS 210; FOR 220 or FOR 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. 5(4-1) CSS 210.

Major, secondary and micronutrient elements of soils. Role of colloids in ion fixation and exchange, acidity, liming, fertilizer application, technology and soil-plant diagnosis.

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. Bioenergetics 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. 4(0-8) CSS 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) 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.

IDC. 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.

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.

811. Advanced Problems

(810.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 6 credits if different problem is taken. Approval of department.

Field crop problems in management, physiology, ecology, breeding, turfgrass culture, weed control, nutritional quality, tropical crops, crop extension and seed studies. Soils problems in biophysics, chemistry, classification, conservation, fertility, geography, management microbiology, biochemistry, micronutrients, micropedology, mineralogy, organic soils and physics.

812. Selected Topics

Fall, Winter, Spring, Summer. 2(2-0) or 3(3-0) May reenroll for a maximum of 9 credits if different topics are taken. Approval of department.

Topics will be selected from physiology of herbicides, micronutrients, advanced soil physics, advanced soil chemistry.

820. Seminar

Winter, Spring. 1(1-0) May reenroll for a maximum of 3 credits.

Studies and presentation of research in crop and soil sciences.

825. Clay Mineralogy

Winter. 4(3-4) CSS 840, CSS 850 or approval of department. Interdepartmental with and administered by the Department of Geology.

Structures and properties of clays; their origins, occurrence, and utilization. Methods of studying clays including x-ray diffraction, differential thermal analysis, infrared absorption and other chemical and physical techniques.

830. Physiological Genetics

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

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

831. World Food Crops

Spring of odd-numbered years. 3(3-0)

World food crop production and related systems of agriculture which provide this resource. The impact of modern discoveries and opportunities for change.

833. Soil Fertility and Plant Nutrition

(SLS 830, SLS 930.) Winter. 3(3-0) CSS 430 or approval of department.

Fundamental concepts in soil fertility and mineral nutrition of plants; fate of nutrients applied to soils, nutrient uptake, translocation and utilization by plants; principles of laboratory, greenhouse and field research methods.

840. Soil Physics

Fall. 5(3-6) CSS 430, CEM 162 or approval of department.

Physical properties of soil (texture, structure, consistency, aeration, water, temperature, etc.), their quantitative measurement, and relation to plant growth, and agronomic and engineering practices.

842. Advanced Soil Microbiology

Spring. 3(3-0) MPH 425 or approval of department. Interdepartmental with and administered by the Department of Microbiology and Public Health.

Biochemistry, biology, and community ecology of microorganisms indigenous to soil. Emphasis on current research problems.

843. Soil Microbiology Laboratory

Spring. 2(0-6) MPH 842 concurrently or approval of department. Interdepartmental with and administered by the Department of Microbiology and Public Health.

Fundamental techniques of dealing with microorganisms indigenous to soil. Metabolic activity of microorganisms. Interaction between microorganisms and plants.

850. Soil Chemistry

Winter. 5(3-6) CSS 430; CEM 162, CEM 383; or approval of department.

Chemistry of mineral weathering and soil formation, ion activities, ionic exchange and equilibrium reactions, soil pH, specific elements and their chemical analysis, and availability of nutrients to plants.

851. Developmental Genetics and Plant Breeding

Fall of odd-numbered years. 4(3-1) One course each in genetics, statistics and plant breeding.

Plant breeding in relation to genetics of growth and development. Problem sets in statistical treatment of plant breeding data.

860. Soil Biochemistry

Spring of even-numbered years. 4 credits. CSS 850; MPH 442.

Biochemical transformations of mineral nutrients and of natural and exotic organic materials in soils, considered in relation to chemical, physical and ecological systems in the complex soil environment.

870. Origin and Classification of Soils

Winter. 4(3-2) CSS 470, CSS 840, or approval of department.

Genesis, morphology and classification of major soils of the world. Relationships among soils in natural and cultural landscapes. How soil properties affect their use, management and conservation. Land classifications for various purposes.

899. Master's Thesis Research

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

ECONOMICS

EC

College of Business

Courses are classified as follows:
Applied Welfare Economics—410.
Labor Economics and Industrial Relations—305, 455, 456, 457.
Money and Banking—318, 330, 470.
International Economics—427.
Public Finance—406, 407, 408.
Price and Value Theory—324, 325, 426.
Income and Employment Theory—320, 451, 470.
History of Economic Thought—421, 422.
Industrial Organization and Control—444, 445.
Economic Development, Regional Studies, and Comparative Economics Systems—430, 431, 434.

200. Introduction to Economics

Fall, Winter, Spring, Summer. 4(4-0)
Open to Freshmen. Students may begin sequence with either EC 200 or EC 201.

Problem of unemployment; meaning and determination of national income; the multiplier; the accelerator; fiscal policy; deficit spending; monetary policy; banks creation of money; international aspects of the employment problems.

201. Introduction to Economics

Fall, Winter, Spring, Summer. 4(4-0)
Open to Freshmen. Students may begin sequence with either EC 200 or EC 201.

Problem of resource allocation; price determination (demand, supply), applications to agricultural policy; diminishing returns; behavior of the firm (determination of quantity of output, hiring of factors); aspects of international trade.

210. Fundamentals of Economics

Fall, Winter. 4(4-0) MTH 215 or MTH 228; or concurrently. Students may not earn credit in EC 210 if they have credit in either EC 200 or EC 201.

Introductory course in economic theory, employing mathematics, when useful, as a tool analysis. Covers consumer and business behavior, markets and the price system, income distribution, and elements of employment theory.

IDC. Introduction to Latin America III

For course description, see Interdisciplinary Courses.

251H. Households, Firms and Markets

Fall. 5(5-0) Honors College students.
Microeconomic theory and its applications to analysis and policy. Substitutes for EC 201, EC 324, and EC 325.

252H. Aggregative Economics and Public Policy

Winter. 5(5-0) Honors College students.
Theory of national income and its application to analysis and policy. Substitutes for EC 200, EC 320, and EC 321.

305. Industrial Relations and Trade Unionism

Fall, Winter, Spring, Summer. 5(5-0)
Development, aims, structure, and functions of labor and employer organizations. Their relation to economic, political, and legal institutions and their impact on society. Primary issues in collective bargaining.

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, BOT 828, or approval of department. Interdepartmental with the Department of Horticulture.

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.

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

DAIRY SCIENCE DRY

College of Agriculture and Natural Resources

214. Dairy Production
Fall, Spring. 4(3-2)

Dairy cattle in modern agriculture. Normal cow behavior. Feeding, breeding and management of herd. Commercial milk production and marketing milk.

314. Dairy Herdsman Techniques
Winter. 2(0-4) DRY 214, majors only.

Herd health and management procedures, disease prevention and detection, equipment maintenance and record systems for dairy herds.

323. Dairy Cattle Judging
Spring. 3(0-6)

Desired type in dairy cattle. Judging and show ring procedures. Competitive judging. Teams selected to represent Michigan State University in national competition.

371. Seminar
Spring. 1(1-0) Juniors.

Major issues pertinent to the dairy industry are described by authorities from MSU and the dairy industry of Michigan. Students are provided an opportunity for an exchange in ideas.

413. Dairy Farm Management
Spring. 3(2-2)

Analysis of dairy farm organization and operations. Dairy herd management practices. Dairy cattle housing with emphasis on economical and efficient usage. Use of dairy records in the farm operation.

424. Dairy Cattle Breeding
Spring. 4(2-4) ANS 361.

Applications of population genetics to improving dairy cattle. Use of selection, aids to selection, and systems of mating to formulate breeding plans. Inheritance of economic traits. Breed improvement programs.

433. Ruminant Nutrition
Winter. 4(3-2) ANS 325. Interdepartmental with Animal Science.

Principles of ruminant nutrition and application to actual feeding practices in commercial dairy and beef operations. Rumen fermentation as related to feed utilization, growth, milk production and milk composition.

444. Mammary Physiology
Winter. 4(3-2) PSL 240, BCH 200. Interdepartmental and administered jointly with the Department of Physiology.

Anatomy of mammary gland. Hormonal and nervous control of mammary growth, initiation and maintenance of lactation. Biochemistry of milk secretion. Physiology of milking; physiological, pathological and management factors affecting lactation.

445. Endocrinology and Reproductive Physiology
Fall. 4(5-0) PSL 240. Interdepartmental and administered jointly with the Department of Physiology.

Processes of reproduction and endocrinology with special emphasis on anatomy of reproductive systems, folliculogenesis, gametogenesis, reproductive cycle, fertilization, sex determination, gestation and artificial regulation of these reproductive events for economic benefit.

460. Special Problems
Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 10 credits. Approval of department.

IDC. The Impact of Animal Resource Management Upon the World's Developing Nations
For course description, see Interdisciplinary Courses.

850. Topics in Dairy Science
Fall, Winter, Spring. Variable credit. May reenroll for credit. Approval of department.

Topics from breeding, management, nutrition, or physiology, changing from term to term to include recent technical advances.

899. Master's Thesis Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

925. Advanced Ruminant Nutrition
Fall of even-numbered years. 4(4-0) BCH 452, PSL 801 or approval of department.
Microbiology, physiology and biochemistry of ruminant digestion and the absorption and metabolism of rumen fermentation products.

945. Physiology of Mammalian Reproduction
Winter. 4(5-0) DRY 445 or PSL 445 or approval of department. Interdepartmental with the Department of Physiology.
Chemistry and biosynthesis of reproductive hormones. Gonadal, hypothalamic and pituitary development of reproductive potential. Ovulation, fertilization, implantation and placentation will be studied. Relationships of conceptus, uterus and corpus luteum. Parturition.

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

EARTH SCIENCE

See Geology