Crop and Soil Sciences—CSS

870 Techniques of Analyzing Unbalanced Research Data
Spring. 4(4-0) Interdepartmental with Animal Science; Forestry; Fisheries and Wildlife; Horticulture. Administered by Department of Animal Science. RB: (STT 464) R: Open only to graduate students in the College of Agriculture and Natural Resources. SA: ANS 943 Not open to students with credit in ANS 943. Linear model techniques to analyze biological research data characterized by missing and unequal number of observations in classes. Simultaneous consideration of multiple factors. Prediction of breeding values and estimation of population parameters from variance and covariance components.

890 Independent Study
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to graduate students in College of Agriculture and Natural Resources, College of Engineering, or College of Natural Sciences. Individual study on field, laboratory, or library research.

891 Current Topics in Ecology and Evolution
Summer. 1 credit. Given only at W.K. Kellogg Biological Station. A student may earn a maximum of 8 credits in all enrollments for this course. Interdepartmental with Zoology; Plant Biology. Administered by Department of Zoology. Presentation and critical evaluation of theoretical and empirical developments by visiting scientists.

891B Selected Topics in Plant Breeding and Genetics
Fall, Spring, Summer. 1 to 2 credits. A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with Horticulture; Forestry. Administered by Department of Horticulture. R: Open only to graduate students in Plant Breeding and Genetics or approval of department. Selected topics in plant breeding.

892 Plant Breeding and Genetics Seminar
Fall, Spring, Summer. 1(1-0) A student may earn a maximum of 8 credits in all enrollments for this course. Interdepartmental with Horticulture: Forestry. Administered by Department of Horticulture. Experience in review, organization, oral presentation, and analysis of research.

893 Selected Topics
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open only to graduate students in College of Agriculture and Natural Resources, College of Engineering, or College of Natural Science. Selected topics in crop and soil sciences of current interest and importance.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to master's students in Crop and Soil Sciences. Master's thesis research.

921 Contemporary Statistical Models in Biology
Fall of odd years. 3(3-0) RB: (STT 465) or approval of department. Working knowledge of SAS. Estimating functions. Growth models, generalized linear models, linear and non-linear mixed models. Field experiments with spatial trends. Longitudinal data. Modeling in the presence of spatial and temporal correlations.

941 Quantitative Genetics in Plant Breeding
Spring of even years. 2(1-2) Interdepartmental with Forestry; Horticulture. RB: (CSS 819 and STT 464) Theoretical and genetic basis of statistical analysis of quantitative traits using genetic markers. Computational tools for the study of quantitative traits.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to doctoral students in Crop and Soil Sciences.

EARTH SCIENCE

446 Laboratory Investigations in Earth Science
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Approval of department. Laboratory techniques and investigations in geological sciences or oceanology.

800 Special Problems in Earth Science
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Approval of department. Individual faculty directed study on topics in earth science.

ECONOMICS

201 Introduction to Microeconomics
Fall, Spring, Summer. 3(3-0) Not open to students with credit in EC 251H. Economic institutions, reasoning and analysis. Consumption, production, determination of price and quantity in different markets. Income distribution, market structure, and normative analysis.

201T Introduction to Microeconomics
Fall, Spring, Summer. 3(2-0) Not open to students with credit in EC 201 or EC 251H. Microeconomic reasoning and analysis. Determination of price and quantity in different markets. Income distribution, market structure, and normative analysis. Extensive use of computer exercises and internet technology.

293 Cooperative Education for Business Students
Fall, Spring, 1(1-0) A student may earn a maximum of 3 credits in all enrollments for this course. Interdepartmental with Marketing and Supply Chain Management; Hospitality Business. Administered by Department of Marketing and Supply Chain Management. R: By permission of the Department only. Integration of pre-professional educational employment experiences in industry and government with knowledge and processes taught in the student's academic program. Educational employment assignment approved by the Department of Marketing and Supply Chain Management.

301 Intermediate Microeconomics
Fall, Spring. 3(3-0) P:M: (MTH 133 or MTH 153H or MTH 126) Not open to students with credit in EC 251H. Theories of consumer choice, production, cost, perfect competition, and monopoly. Welfare economics, general equilibrium, externalities, and public goods.

302 Intermediate Macroeconomics
Fall, Spring. 3(3-0) P:M: (EC 201 and EC 301) or (EC 251H) Not open to students with credit in EC 302. Aggregate demand, supply management and fiscal policy. Aggregate demand, supply management and fiscal policy.
453 Women and Work: Issues and Policy Analysis
Spring. 3(3-0) Interdepartmental with Environmental Economics and Policy; Women's Studies. Administered by Department of Agricultural Economics. RB: (EC 201 or EC 251H) and (EC 202 or EEP 201 or concurrently) R: Not open to freshmen or sophomores.


460 American Industry: Structure and Behavior
Fall, Spring. 3(3-0) P:M: (EC 251H or EC 301)
Market structure and performance. Empirical analysis of market definition, concentration, product differentiation, vertical integration, innovativeness, collusion, and entry deterrence.

480 Analysis of Labor Markets
Fall, Spring. 3(3-0) P:M: (EC 251H or EC 301) and (EC 201 or EC 251H)
Labor supply and demand. Human capital, search, migration, and labor turnover. Analysis of unemployment and wage growth. Structure of wages, including economics of discrimination.

498 Economics of Health Care
Fall of odd years. 3(3-0) RB: (EC 201 or EC 251H)

499 Senior Seminar for Economics Majors (W)
Fall, Spring. 3(3-0) P:M: (EC 251H or EC 301) and (EC 252H or EC 302) and (EC 420 or concurrently) and completion of Tier I writing requirement. R: Open only to seniors in Economics.
Capstone course for economics majors. Reading and discussion concerning selected economics topics. Preparation and presentation of student research project.

801 Mathematical Applications in Economics
Fall. 3(3-0) RB: (MTH 124 or MTH 132) R: Open only to master's students in Economics. Open only to graduate students in the Department of Agricultural Economics and doctoral students in the Business Administration major or approval of department.

803 Managerial Economics
Fall, Spring. 3(3-0) R: Open only to MBA students. Not open to students with credit in EC 805 or EC 812A.
Analysis of the firm. Economizing in the use of resources, optimal combinations of products, pricing, competitive forces in regional and international markets affecting the firm.

805 Microeconomic Analysis
Fall. 3(3-0) R: Open only to master's students in Economics. Open only to graduate students in the Department of Agricultural Economics and doctoral students in the Business Administration major or approval of department.
Microeconomic theory with calculus. Production, costs, demand, markets, general equilibrium and welfare theory.

812A Microeconomics I
Fall. 3(3-0) C: EC 811A concurrently.
Introduction to microeconomic theory, including analysis under uncertainty. Theory of production in perfectly competitive markets. General equilibrium in the presence of perfect competition. Efficiency properties of competitive equilibria.

812B Microeconomics II
Spring. 3(3-0) P:M: (EC 812A)
Introduction to social choice. Market failure, including market failure, including externalities, public goods, imperfect and market failure.

813A Macroeconomics I
Fall. 3(3-0) R: Open only to Ph.D. students in Economics, the Department of Agricultural Economics, and the Business Administration major or approval of department.

813B Macroeconomics II
Spring. 3(3-0) P:M: (EC 813A) C: 811B concurrently.
New classical theories of business cycles and growth. Theories of price and wage rigidities, search, imperfect competition, and credit rationing in macroeconomic models. Asset pricing.

815 Economic Thought I
Fall. 3(3-0)
Ancient, scholastic, and mercantilist economic thought. Origins and development of classical political economy. Socialist and Romantic reactions to classicism.

816 Economic Thought II
Spring. 3(3-0)
818 Introduction to Econometrics
Spring. 3(3-0) Interdepartmental with Agricultural Economics; Statistics and Probability. P.M.: (EC 801 and STT 430) R: Not open to Economics Ph.D. students. SA: EC 820

819 Economic Role of Government
Spring. 3(3-0)
The legal system and legal foundations of economic structure and performance. Property rights, the taking issue, and compensation.

820A Econometrics IA
Fall. 3(3-0) Interdepartmental with Statistics and Probability. RB: Multivariate Calculus R: Open only to Ph.D. students in Economics, in the Department of Agricultural Economics, and the Business Administration major or approval of department.
Statistical tools for econometrics. Applications of statistical tools, including probability distributions, estimation, hypothesis testing, and maximum likelihood to econometric problems.

820B Econometrics IB
Fall. 3(3-0) P.M.: (EC 811A and EC 820A)

821 Econometrics II
Fall. 3(3-0) Interdepartmental with Agricultural Economics; Statistics and Probability. P.M.: (EC 820A and EC 820B) or (STT 430 and EC 818)

822 Econometrics III
Spring. 3(3-0) Interdepartmental with Agricultural Economics; Statistics and Probability. P.M.: (EC 820A and EC 820B) or (STT 430 and EC 818)
Dynamic models and time series data. ARMA models. ARCH models. Unit roots, cointegration and error correction. Rational expectations models.

823 Applied Econometrics
Fall. 3(3-0) P.M.: (EC 820A and EC 820B) or (STT 430 and EC 818)
Problems of estimating models and testing hypotheses from economic theory. Applications of various econometric models to economic problems and policy analysis.

827 Economic Forecasting
Spring. 2(2-0) P.M.: (MBA 814) R: Open only to MBA students.

829 The Economics of Environmental Resources
Fall. 3(3-0) Interdepartmental with Agricultural Economics; Forestry; Park, Recreation and Tourism Resources; Resource Development. Administered by Department of Agricultural Economics.
Economic principles related to environmental conflicts and public policy alternatives. Applications to water quality, land use, conservation, development, and global environmental issues.

830 Advanced Macroeconomics and Monetary Theory
Fall. 3(3-0) P.M.: (EC 812B and EC 813B)

831 Problems in Monetary Theory and Policy
Spring. 3(3-0) P.M.: (EC 809 or EC 813A) and (EC 820A and EC 820B)
Surveys several topics on macroeconomics with a strong applied emphasis.

835 Public Expenditures
Fall. 3(3-0) P.M.: (EC 805 or EC 812A)
Allocative and distributional effects of public expenditure. Public goods and externalities. Selected topics in public expenditure analysis such as cost-benefit analysis, fiscal federalism, mechanism design, public choice, general equilibrium models.

836 Public Revenues
Spring. 3(3-0) P.M.: (EC 805 or EC 812A)

840 International Trade: Theory and Commercial Policy
Fall. 3(3-0) P.M.: (EC 805 or EC 812A)
Commodity composition of trade. Welfare and distributional effects of measures such as tariffs, quotas, and export subsidies. International economic policy. Regional and multilateral trade policy.

841 Exchange Rates and Capital Flows
Spring. 3(3-0) P.M.: (EC 805 and EC 809) or (EC 812A and EC 813A)

850 Growth, Development, and Human Resources
Fall. 3(3-0) P.M.: (EC 805 or EC 812A)
Theoretical and empirical models of the microeconomics of development, focusing on household and individual behavior related to investment in human resources and its consequences.

851 Microeconomics in Development
Spring. 3(3-0) P.M.: (EC 805 and EC 809) or (EC 812A and EC 813A)
Theoretical and empirical models of the microeconomics of development, focusing on land, labor, credit and insurance markets. Analysis of household and individual responses to risk, dynamic decisions with respect to savings, consumption and labor supply, and models of learning. EC 851 is designed to be a continuation of EC 852.

860 Market Structure and Behavior
Fall. 3(3-0) P.M.: (EC 805 or EC 812A)
The consequences of concentration and entry conditions. Theory of the firm as it relates to size, scope, integration, motivation. Static market behavior. Antitrust treatment of cartels and mergers.

861 Dynamic Market Behavior and Performance
Spring. 3(3-0) P.M.: (EC 805 or EC 812A)

880 Labor Economics I
Fall. 3(3-0) P.M.: (EC 805 or EC 812A) and (EC 820A and EC 820B) or (STT 430 and EC 818)
Labor supply and measurement of the labor force. Labor demand. Mobility, turnover, and migration. Equalizing wage differentials. Trade union growth, goals, bargaining and effects.

881 Labor Economics II
Spring. 3(3-0) P.M.: (EC 805 or EC 812A) and (EC 820A and EC 820B) or (STT 430 and EC 818)

895 Graduate Reading in Economics
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
Faculty guided research projects.

911 Strategic Behavior in Economic Environments
Fall. 3(3-0) P.M.: (EC 812B)
Topics in cooperative and non-cooperative game theory. Applications include: oligopoly and bargaining theories, strategic voting and principal agent models, endogenous coalition formation, signalling, strategic trade, and auctions theories.

912 Risk, Uncertainty and Information
Spring. 3(3-0) P.M.: (EC 812A and EC 812B) RB: (EC 812A)
Effects of risk in economic environments. Topics include: expected utility theory, risk aversion, stochastic dominance, mean-variance models, state preference models, general equilibrium models with risk, information theory.

923 Advanced Environmental and Resource Economics
Spring of even years. 3(3-0) Interdepartmental with Agricultural Economics; Forestry; Park, Recreation and Tourism Resources; Resource Development. Administered by Department of Agricultural Economics. RB: (AEC 829 and EC 805)
Advanced economic theory of environmental management and policy. Treatment of externalities and market and non-market approaches to environmental improvement. Topics in conservation and sustainable economic growth. Applications to research and policy.
Economics—EC

925 Environmental and Resource Economics Research
Spring. Odd years. 3(3-0) Interdepartmental with Agricultural Economics; Forestry; Resource Development; Park, Recreation and Tourism Resources. Administered by Department of Agricultural Economics. RB: (AEC 829 and EC 805) SA: AEC 991H. Topics such as contingent or non-market valuation, institutional analysis, pollution prevention, environmental quality and location, recreational demand modeling, and environmental risk management. Research process in environmental and resource economics.

950 Research Seminar in Applied Economics
Spring. 3(3-0) R: Open only to Ph.D. students in Economics. Current research topics in applied economics.

951 Research Seminar in Economic Theory
Spring. 3(3-0) R: Open only to Ph.D. students in Economics. Current research topics in economic theory.

952 Research Seminar in Econometrics
Spring. 3(3-0) R: Open only to Ph.D. students in Economics. Current research topics in econometrics.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to Ph.D. students in Economics. Doctoral dissertation research.

EDUCATIONAL ADMINISTRATION  EAD

Department of Educational Administration
College of Education

315 Student Leadership Training
Fall, Spring. 3(2-2) Student leadership role, skills, and technique, consistent with the principles and demands of a democratic multicultural society.

451 Models of Special Education Administration and Services
Spring. 3(2-2) Interdepartmental with Counseling, Educational Psychology and Special Education. Administered by Department of Counseling, Educational Psychology, and Special Education. R: Open only to students admitted to the teacher certification program in emotional impairment or learning disabilities or to master's students in the Special Education major. Application of theory and research to special education program design and implementation.

800 Organization Theory in Education
Fall, Spring. 3(3-0) Organizational theory and research applied to educational administration. Topics include comparative organization settings, external environments, organizational effectiveness, and ethics.

801 Leadership and Organizational Development
Spring, Summer. 3(3-0) Interaction of leadership with organizational culture and development within a variety of educational organizations.

802 Building a Learning Organization
Spring. 3(3-0) Disciplines and practices for crafting a learning organization. Examination of Eastern, Western, and Quantum models of organization dynamics. Emphasis on strategies and skills for increasing human capacity.

803 Planning, Budgeting, and Evaluation
Spring. 3(3-0) Planning, budgeting, and evaluation in educational organizations. Topics include needs assessment, funding sources, and processes for estimating costs and revenues.

804 Administration of Human Resources in Education
Fall, Summer. 3(3-0) Tasks of personnel management in schools, colleges, and other educational organizations, including recruitment, selection, orientation, development, compensation, and evaluations. Focus on attracting and retaining a quality workforce in education.

805 Administration in Higher Education
Fall, 3(3-0) Theories, systems, structures and processes of college and universities. Comparison of the organization, leadership, and governance of higher education institutions to other non-profit organizations.

806 Learning Leadership and Organizational Analysis I
Fall, 2(2-0) R: Open only to graduate students in K-12 Educational Administration. Leadership of K-12 schools and associated community organizations. Theory and skills to discern organizational dynamics of schools and community. Professional ethics of K-12 school leadership.

807 Learning Leadership and Organizational Analysis II
Spring. 2(2-0) P.M: (EAD 806) R: Open only to graduate students in K-12 Educational Administration. Data-based organizational analysis of K-12 schools and school-community relations. Leadership skills to define vision strategies. Case analysis and double-loop learning.

808 Professional Inquiry and Reflection
Seminar Fall, Spring. 1(1-0) P.M: (EAD 806) (EAD 807) R: Open only to graduate students in K-12 Educational Administration. Skills and methods of disciplined reflection applied to issues of leadership practice. Methods of reflection and applications of multiple theories to cases of practice.

809 Interpersonal Dimensions of Leadership
Spring, Summer. 1(1-0) P.M: (EAD 806 and EAD 807 and EAD 808) R: (EAD 820 and EAD 821) R: Open only to graduate students in the K-12 Educational Administration. Assessment of different approaches to school leadership. School leader as reflective practitioner and effective communicator in school and community contexts.

810 Use of Technology in School Administration
Fall. 3(3-0) Learning and leading in the knowledge age with special focus on the role of technology in educational management, communication, and curriculum and instruction.

820 Internship in Educational Administration I
Fall, Spring. 1 to 3 credits. R: Open only to graduate students in K-12 Educational Administration. Supervised internship in an educational institution focused on school leadership issues.

821 Internship in Educational Administration II
Spring, Summer. 1 to 3 credits. R: Open only to graduate students in K-12 Educational Administration. Supervised internship in an educational and/or community organization focused on school-community leadership issues.

845 Teaching, Learning, and School Restructuring
Spring. 3(3-0) Relationship between school-wide interventions and improvement in classroom teaching; school restructuring and reculturing, strategies for school improvement, approaches to teaching and learning.

852A Elementary and Middle School Administration
Fall, Summer. 3(3-0) Administration and supervision of elementary and middle schools. Alternative organizational arrangements, curricula, and practices. Problems and strategies for improving K-8 education.

852B Secondary School Administration
Fall, Summer. 3(3-0) Administration and supervision of secondary schools. Alternative organizational arrangements, curricula, and practices. Problems and strategies for improving secondary schools.

853A Legal, Fiscal, and Policy Environment of Schools

853B Schools, Families, and Communities
Fall. 3(3-0) Comparative and historical analysis of education within the broader social context. Families, communities, and the private sector. Social problems, social policies, and school practice.

853C Instructional Supervision
Spring, Summer. 3(3-0) R: (EAD 800) Supervision and evaluation of teaching and learning, and strategies for improvement of K-12 education.

854 Introduction to Inquiry for Educational Leaders
Fall. 3(3-0) R: Open only to graduate students in K-12 Educational Administration. Inquiry and applied research methods and skills to inform school-based decision making for school improvement. Constructing, analyzing, and interpreting student and school-level databases. Evaluating, assessing, and creating strategic instructional and organizational development plans.