

**Descriptions — Crop and Soil Sciences  
of  
Courses**

**819. Plant Breeding Systems**

(CSS 822.) Winter. 3(3-0) CSS 821, STT 422. Interdepartmental with the departments of Forestry and Horticulture. Administered by the Department of Horticulture.

Breeding systems for improvement of self and cross pollinated and of vegetatively propagated crops. The genetic basis for parent selection.

**821. Genetic Concepts in Plant Breeding**

Fall. 3(3-0) CSS 350 or ZOL 441. Interdepartmental with the departments of Forestry and Horticulture.

Genetic structure of plant populations, gene action, inbreeding, outbreeding, heterosis, linkage and recombination, genetic architecture of traits, genetic distance.

**825. Clay Mineralogy**

(GLG 825.) Winter. 4(3-4) CSS 840, CSS 850 or approval of department. Interdepartmental with the Department of Geological Sciences.

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.

**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**

Winter of odd-numbered years. 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.

**836. Evolution of Crop Plants**

Fall of even-numbered years. 3(3-0) CSS 821 or approval of department. Interdepartmental with the departments of Forestry and Horticulture. Administered by the Department of Horticulture.

Cultural and biological aspects of evolution under domestication; origin and diversity of cultivated plants.

**838. Tissue Culture for Plant Breeding**

(HRT 840.) Winter of even-numbered years. 3(2-2) BOT 414, CSS 821. Interdepartmental with the departments of Forestry and Horticulture. Administered by the Department of Horticulture.

The application of plant cell, protoplast and tissue culture methodologies and principles to crop improvement.

**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**

Fall of odd-numbered years. 3(3-0) MPH 426 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**

Fall of odd-numbered years. 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.

**865. Organic Chemistry of Soils**

Spring of odd-numbered years. 3(3-0) CEM 242.

Relationship of natural and synthetic organic chemicals to chemical and biochemical processes in the 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.

**920. Applied Regression Analysis**

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

Multiple regression, model selection, the general linear model and confounding in factorial sets of treatments.

**940. Theoretical Population Genetics**

Winter. 4(4-0) MTH 113, STT 422 or approval of department. Interdepartmental with the departments of Forestry and Horticulture. Administered by the Department of Forestry.

Discussion of mathematical theories in population genetics and experimental works on natural and laboratory populations.

**941. Quantitative Genetics in Plant Breeding**

Spring of even-numbered years. 4(4-0) STT 423, CSS 817 or approval of department. Interdepartmental with the departments of Forestry and Horticulture.

Calculation and implication of genetic parameters. Linkage. Coancestry and inbreeding. Covariance between relatives. Heritability and selection. Genotype by environment interaction. Emphasis on relationship of quantitative genetics to plant breeding.

**944. Physiological Genetics**

Winter of odd-numbered years. 3(3-0) BOT 413; CSS 821. Interdepartmental with the departments of Forestry and Horticulture. Administered by the Department of Forestry.

Control of variation in higher plants including adaptive physiology, quantitative genetics, growth correlation, biochemical genetics, hybrid physiology, and genealogy.

**999. Doctoral Dissertation Research**

Fall, Winter, Spring, Summer. Variable credit.

**EARTH SCIENCE**

See Geological Sciences.

**ECONOMICS**

**EC**

**College of Business and Graduate  
School of Business  
Administration**

**201. Introduction to Microeconomics**

Fall, Winter, Spring, Summer. 4(4-0) Open to Freshmen. Not open to students who have credit in EC 251H or EC 210.

Economic institutions, reasoning and analysis. Consumption, production, determination of price and quantity in different markets, income distribution, market structure and normative analysis.

**202. Introduction to Macroeconomics**

(EC 200.) Fall, Winter, Spring, Summer. 4(4-0) Open to Freshmen. Not open to students who have credit in EC 252H or EC 210.

Determinants of Gross National Product, unemployment, inflation and economic growth. National income accounting, fiscal policy; aggregate demand and supply management.

**210. Fundamentals of Economics**

Fall, Winter. 4(4-0) MTH 215 or concurrently. Students may not earn credit in EC 210 if they have credit in either EC 201 or EC 202.

Economic principles, institutions and reasoning using mathematics, when useful, as a tool of analysis. Consumption, production, the market system, income distribution and elements of employment and inflation theory.

**251H. Households, Firms and Markets**

Fall. 5(5-0) Honors College students. Not open to students who have credit in EC 201, EC 324 and EC 325.

Microeconomic theory and its applications to analysis and policy. Substitutes for EC 201, EC 324, and EC 325.

**252H. Macroeconomics and Public Policy**

Winter. 5(5-0) Honors College students. Not open to students who have credit in EC 202, EC 326 and EC 327.

Theory of national income, unemployment, inflation and economic growth and its application to economic analysis and policy. Substitutes for EC 200, EC 326 and EC 327 combined.

**305. Industrial Relations and Trade Unionism**

Fall, Winter, Spring, Summer. 4(4-0) EC 201 or EC 202.

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.

**306. Government Programs for Workers**  
*Winter, Spring. 4(4-0) EC 201. Interdepartmental with Public Affairs Management.*  
 Economics of selected government institutions and programs for workers. Social security, worker's compensation, Unemployment Insurance, OSHA, employment and training programs, wages and hours legislation, anti-discrimination programs.

**318. Money, Credit and Banking**  
*Fall, Winter, Spring, Summer. 4(4-0) EC 202 or EC 210.*  
 Commercial banking and the money supply. The Federal Reserve System, the Treasury, and other financial institutions. Sources and uses of funds in the financial market.

**324. Microeconomics I**  
*Fall, Winter, Spring, Summer. 4(4-0) EC 201, EC 202 or EC 210. Not open to students who have credit in EC 251H.*  
 Consumer choice and theory of demand. Theory of production and cost. Theory of the firm under varying market structures.

**325. Microeconomics II**  
*Fall, Winter, Spring, Summer. 3(3-0) EC 324. Not open to students who have credit in EC 251H.*  
 Theory of distribution and factor rewards. Welfare economics and general equilibrium theory. Externalities and public goods. Decision-making under uncertainty. Other advanced topics.

**326. Macroeconomics I**  
*Fall, Winter, Spring, Summer. 3(3-0) EC 201, EC 202 or EC 210. Not open to students who have credit in EC 252H.*  
 Review of national income accounting. Determination of aggregate output, employment, the price level, and the inflation rate. Policy applications.

**327. Macroeconomics II**  
*Fall, Winter, Spring, Summer. 3(3-0) EC 326. Not open to students who have credit in EC 252H.*  
 Consumption theories, investment theories, role of expectations, theories of economic growth and cycles, stabilization policies, and other advanced topics.

**330. Investments and Security Markets**  
*Fall, Spring. 3(3-0) EC 202 or EC 210, Juniors.*  
 The stock market; principles of investment; analysis of selected industries and corporations; regulation by the Securities and Exchange Commission.

**361. Economic Development of Asia**  
*Fall. 3(3-0) EC 201, EC 202 or EC 210.*  
 Population and resources; comparison of three economic systems: Communism in China, free enterprise in Japan and socialism in India; the role of Japan in regional trade and development.

**362. Economic Development of Latin America**  
*Winter. 3(3-0) EC 201, EC 202 or EC 210.*  
 Concentration of political and economic power as related to income distribution, tax structures, agrarian reform; inflation, trade, exchange rates, integration; population and employment policy.

**363. Economic Development of Tropical Africa**  
*Spring. 3(3-0) EC 201, EC 202 or EC 210. Interdepartmental with Public Affairs Management.*  
 African economic development in historical perspective. Analysis of contemporary economic development problems faced by tropical African countries. Alternative strategies for African economic development.

**400. Independent Study**  
*Fall, Winter, Spring, Summer. 1 to 4 credits. Seniors or approval of department.*  
 Research and reading course for students interested in doing independent work in economics.

**401. Interpreting Economic News and Research**  
*Winter. 3(3-0) EC 201, EC 202 or EC 210 or EC 251H; EC 252H.*  
 Reporting and interpreting economic news and research. Sources of data and research information. Critical examination of written and broadcast reports through application of economic principles. Case studies.

**406. Public Expenditure: Theory and Policy**  
*Fall, Spring. 4(4-0) EC 201 or EC 210. Interdepartmental with Public Affairs Management.*  
 Expenditure theory; objectives and rationale of government activity in the market system; efficiency criteria in government decision-making; planning-programming-budgeting systems and cost-benefit analysis.

**407. Public Revenues**  
*Winter. 4(4-0) EC 201 or EC 210.*  
 Principles and theory of the distribution of tax burdens and the incidence of taxation. Income, sales, property, and other major revenue sources.

**408. State and Local Finance**  
*Spring. 4(4-0) EC 201 or EC 210 or EC 251H.*  
 Fiscal problems at the state and local levels of government, including revenues, expenditures, borrowing, and intergovernmental fiscal relations.

**410. Medical Economics**  
*Spring. 3(3-0) EC 201, EC 202 or approval of department.*  
 Demand, supply and economic efficiency in the markets for health services. Demand for medical care, organization forms, methods of payment, utilization and cost, and public policy for health care.

**412. The Economics of Poverty and Income Distribution**  
*Winter. 3(3-0) EC 201, EC 202.*  
 Theory of the distribution of income and wealth. Concepts and measurement of welfare. Definitions of poverty. Effects of public and private programs on the poor.

**413. Urban Economics**  
*Fall. 4(4-0) EC 201, EC 202.*  
 Location theory and urban development. Economics of city size and urban-suburban conflict. Economic aspects of certain community problems like housing, transportation, welfare and poverty. Strategies for urban development.

**417. Land Economics**  
*Fall, Spring. 4(4-0) EC 201. Interdepartmental with Public Affairs Management, and Food Systems Economics and Management and the Department of Resource Development. Administered by the Department of Resource Development.*  
 Factors affecting the economic use of land. Input-output relationships, development, property rights, zoning and land use controls, public land. Application of economic principles to selected land use policies.

**421. Economic Thought I**  
*Fall, Summer. 4(4-0) EC 201, EC 202 or EC 210.*  
 Forerunners of classical economics. Development of classical economic thought from Adam Smith to J. S. Mill. The socialist reaction.

**422. Economic Thought II**  
*Winter, Spring. 4(4-0) EC 201, EC 202 or EC 210.*  
 The decline of classical economics and the rise of marginalist value and distribution theory. Marxism and institutionalism.

**426. Introductory Mathematical Economics**  
*Spring. 3(3-0) EC 324, EC 326, MTH 214.*  
 Mathematical analysis of production, cost, and consumer choice. Mathematical models of aggregative and general-equilibrium economic systems.

**428. International Trade**  
*Fall, Winter, Spring, Summer. 3(3-0) EC 201, EC 202 or EC 210. EC 428 and EC 429 are a two-term sequence. Students should take the courses in succeeding terms, though they may begin with either course.*  
 Pure theory of trade and comparative advantage. Free trade versus protection. Customs unions. U.S. commercial policy. Trade problems of less-developed nations.

**429. International Finance**  
*Fall, Winter, Spring, Summer. 3(3-0) EC 201, EC 202 or EC 210. EC 428 and EC 429 are a two-term sequence. Students should take the courses in succeeding terms, though they may begin with either course.*  
 Balance-of-payments accounting. Foreign exchange markets. Balance-of-payments mechanisms. The international monetary system.

**430. Stagnation and Development in Emerging Societies**  
*Winter, Summer. 4(4-0) EC 201, EC 202 or EC 210.*  
 Obstacles to economic growth, theories of economic development, reorganizing agriculture and industry; problems in mobilizing the economy to accommodate new productive techniques; population problems.

**431. Principal Issues in Promoting Economic Development**  
*Spring. 4(4-0) EC 201, EC 202.*  
 Structural change and growth, capital formation and investment criteria; financing development; foreign trade and finance in development; government and planning.

**434. Comparative Economic Systems**  
*Fall, Winter, Summer. 4(4-0) EC 201, EC 202 or EC 210.*  
 Characteristics and functions of an economic system. Analysis of alternative patterns of economic control, planning and market structure. Experiences under capitalism, socialism and mixed economies. Consideration of their theories and philosophies.

**Descriptions — Economics  
of  
Courses**

**436. The Development of the American Economy**  
Fall. 4(4-0) EC 201, EC 202.

Causes and consequences of U.S. development. Quantitative analysis of topics, such as British trade policies, slavery, industrialization, immigration, the Great Depression and income distribution.

**438. Soviet Economy**  
Winter. 4(4-0) EC 201 or EC 202.

History and analysis of Soviet planning, including input-output, banking, the pricing system, labor markets and capital allocation.  
Approved through Winter 1992.

**440. Radical Political Economy**  
Spring. 3(3-0) EC 201, EC 202 or EC 210, or EC 251H, EC 252H.

Development and contemporary characteristics of capitalism from Marxian-radical perspective. Historical materialism and class analysis. Radical critique of modern economics. Relationship of inequality, racism, alienation and other problems to the structure of capitalism.

**444. Private Enterprise and Public Policy**  
Fall, Winter, Spring, Summer. 3(3-0) EC 201 or EC 210.

Competition and monopoly in the American economy. Problems of antitrust.

**445. Economics of Regulated Industries**  
Winter. 4(4-0) EC 444.

Government policy and role of competition in the public utility and transportation industries.

**451. Introduction to Econometric Methods**  
Fall, Spring. 4(4-0) EC 324, EC 326; STT 422 or STT 442 or MTA 317.

Specification, estimation and interpretation of econometric models. Understanding and evaluation of current quantitative work in economics.

**453. Women and Work: Issues and Policy Analysis**  
Winter. 3(3-0) PAM 201 or EC 201 or EC 202 or approval of department. Interdepartmental with and administered by Public Affairs Management.

Quantity and quality of labor force participation by women, current status and past trends. Issues analyzed include differential earnings and occupations of men and women, employment discrimination and labor legislation.

**455. Labor and the Law**  
Spring. 4(4-0) EC 305.

Development and current status of labor law as it applies to unions, employers, employees and collective bargaining. Economic and social issues regulated by, and posed by, labor law.

**457. Analysis of Labor Markets**  
Spring. 4(4-0) EC 201, EC 202 or EC 210.

Theories of labor market behavior, empirical evidence and policy implications. Topics include labor supply, labor demand, wage differentials (due to education, discrimination, and union membership), competition and mobility.

**460. Regional Economics**  
Winter. 4(4-0) R D 417 or EC 324. Interdepartmental with Food Systems Economics and Management, Public Affairs Management, and the Department of Resource Development. Administered by the Department of Resource Development.

Forces affecting location decisions of firms, households and governments. Applications to agricultural, industrial, and regional developments.

**461. Regional Economics Laboratory**  
Spring. 1(0-2) R D 460 and approval of department. Interdepartmental with Public Affairs Management, and Food Systems Economics and Management and the Department of Resource Development. Administered by the Department of Resource Development.

Evaluation and use of analytical models designed to solve regional economic problems.

**463. Economics of Education**  
(UMS 463.) Winter. 3(3-0) EC 201 or EC 210 or approval of department. Interdepartmental with the Department of Teacher Education.

Relationship between education and the economy. Production of education, and the analysis of education as an investment. Supply and demand for teacher services. Financing education.

**470. Monetary Theory**  
Fall. 3(3-0) EC 326.

Relationship between money and interest rates, prices and output.

**480. Mathematics for Economists**  
Fall. 5(5-0) MTH 113, graduate status in either economics, agricultural economics or College of Business, or approval of department. Interdepartmental with and administered by the Department of Mathematics.

Matrix algebra, determinants, quadratic forms, characteristic values. Partial derivatives, chain rule, Jacobian matrix. Taylor series, constrained optimization, linear differential equations. Mathematics introduced and developed using student's background in economics.

**803. Managerial Economics**  
Fall, Winter, Summer. 4(4-0) Graduate students in Business Administration or approval of department. Not open to undergraduates or to those with credit in EC 805A, EC 812A, or EC 860.

Analysis of the firm. Problems facing management; economizing in use of resources, optimal combinations of products, pricing, competitive forces in markets affecting the firm.

**804. Macroeconomic Models**  
Fall, Winter, Spring, Summer. 4(4-0) Graduate students in Business Administration or approval of department. Not open to undergraduates or to those with credit in EC 805B, EC 813A or EC 861.

Determinants of the national income, employment, and capital formation. National income accounts. Business fluctuations. Fiscal and monetary policy.

**805A. Microeconomics Theory**  
Fall, Winter. 3(3-0) MTH 113, EC 324; not open to students with credit in EC 812A.

A review of microeconomic theory with calculus: production, costs, demand, markets, general equilibrium and welfare theory.

**805B. Macroeconomic Theory**  
Fall, Spring. 3(3-0) MTH 113, EC 326; closed to students with credit in EC 813A.

A review of macroeconomic theory with calculus; comparative statics of macroeconomic models; theories of inflation and unemployment.

**806A. Public Expenditures**  
Fall. 3(3-0) Approval of department.

Public sector allocation and redistribution. Public goods, externalities, market imperfections, property rights. Cost-benefit analysis and PPBS. Alternative theories of the state. Political theories of public expenditures.

**806B. Public Revenues**  
Winter. 3(3-0) Approval of department.

Theory of taxation. Incidence and economic effects, especially on income and wealth redistribution. Institutional and policy analysis of the U.S. federal tax system.

**806C. State and Local Public Finance**  
Spring. 3(3-0) Approval of department.

State and local expenditure systems in theory and practice; tax and nontax revenues; intergovernmental fiscal relationships; the fiscal problems of metropolitan governments.

**806D. Economic Role of Government**  
Spring. 3(3-0)

Analysis of fundamentals of economic role of government with focus on social control and social change; legal basis of economic institutions; applications to specialized problems and institutions.

**807. Survey of Microeconomic Analysis**  
Winter, Spring. 3(3-0) EC 805A or EC 812A.

Analytical methods taught through journal readings and practical examples from public finance, labor economics, industrial organization, and international trade. Such topics as measurement of tax incidence and effects of unemployment insurance.

**808. Techniques of Microeconomic Analysis**  
Spring. 3(3-0) EC 803 or EC 805A or EC 812A.

Techniques of microeconomic analysis taught through examples drawn from current economic events; an emphasis on getting answers to problems encountered by practicing economists.

**809. Macroeconomic Analysis**  
Winter, Spring. 3(3-0) EC 804 or EC 805B or EC 813A.

Analysis techniques taught through readings and examples from monetary economics, economic development, and international finance. Such topics as macroeconomic forecasting, sources of economic growth, and exchange constraints on monetary policy.

**810. Economics of Public Choice**  
Winter. 3(3-0) Approval of department. Interdepartmental with the departments of Agricultural Economics, and Resource Development. Administered by the Department of Agricultural Economics.

Economics of alternative institutions for collective action. Emphasis on property rights and natural resources. Public goods, externalities non-marginal change, commonwealth, income and power distribution, grants, welfare criteria and market failure.

- 812A. Microeconomics I**  
*Winter. 3(3-0) EC 324, EC 325; EC 480 or MTH 215 or concurrently.*  
Theories of consumption and production; duality, cost and expenditure functions; input demand; revealed preference.
- 812B. Microeconomics II**  
*Spring. 3(3-0) EC 812A.*  
Functional forms in production and consumption; competitive equilibrium; theories of non-competitive markets; imperfect information and behavior under uncertainty; multiproduct firms.
- 812C. Microeconomics III**  
*Fall. 3(3-0) EC 812B.*  
General equilibrium and welfare; optimality of competition; market failures; economics of linear and nonlinear programming and input-output analysis.
- 813A. Macroeconomics I**  
*Fall. 3(3-0) EC 326, EC 327; EC 480 or MTH 215 or concurrently.*  
Income accounting and price indices; comparative statics of macroeconomics models; consumption and investment functions; the money supply.
- 813B. Macroeconomics II**  
*Winter. 3(3-0) EC 813A.*  
Demand for money; portfolio theory; theories of inflation and unemployment.
- 813C. Macroeconomics III**  
*Spring. 3(3-0) EC 813B.*  
Models of macroeconomic disequilibrium; macro dynamics and the effects of search; theories of neoclassical and optimal economics growth.
- 818A. Monetary Theory**  
*Fall. 3(3-0) EC 812C, EC 813C, and EC 835 and approval of department.*  
Monetary and interest theories.
- 818B. The Theory of Monetary Policy**  
*Winter. 3(3-0) EC 818A or approval of department.*  
Theories of the transmission of monetary policy to output, employment and prices.
- 818C. Problems in Monetary Policy**  
*Spring. 3(3-0) EC 818B.*  
Goals and techniques of monetary policy.
- 821A. Competition and Monopoly in American Industry**  
*Fall. 3(3-0) Approval of department.*  
Examination of structure, behavior, and performance in industries.
- 821B. Government Policy Toward Private Enterprise**  
*Winter. 3(3-0) Approval of department.*  
Evolution of government policy with respect to such problems as conspiracy, monopoly, mergers, unfair practices, and discrimination. Economic and legal appraisal of policy alternatives.
- 821C. Problems Related to Regulated Industries**  
*Spring. 3(3-0) Approval of department.*  
Departures from market competition as a policy norm, as in public utilities and transportation.
- 826A. Theory of International Trade**  
*Fall. 3(3-0) EC 428 or approval of department.*  
Classical and modern theories of international trade. Application of modern techniques of economic analysis to international trade theory.
- 826B. Theory of International Trade Policy**  
*Winter. 3(3-0) EC 826A.*  
Various means by which a government may influence the volume, character, and direction of its foreign commerce. In this connection an analysis is made of the theory of the tariff, the subsidy, exchange control, and quotas. Emphasis on the economic impact of trade controls upon a nation and the world.
- 826C. International Exchanges and Capital Flows**  
*Spring. 3(3-0) EC 826B.*  
Theory of exchange rates and international money markets especially with reference to other than current account items in balances of payments. Analysis of sources, causes, effects of capital flows with developing economies considered as a special case.
- 835. Introduction to Econometrics**  
*Spring, Summer. 3(3-0) EC 325, STT 422; not open to students with credit in EC 836. Interdepartmental with the Department of Agricultural Economics.*  
Specification, estimation and interpretation of economic models. Applications to empirical problems.
- 836. Econometric Methods**  
*Winter. 3(3-0) STT 442; EC 325 or EC 803 or EC 805A or EC 812A; not open to students with credit in EC 835.*  
Properties of least squares and maximum likelihood estimators of single and simultaneous equations economic models.
- 841A. History of Economic Thought: Classical**  
*Fall. 3(3-0)*  
Early thought, mercantilism, physiocracy, and classical economics.
- 841B. History of Economic Thought: Heterodox**  
*Winter. 3(3-0)*  
Historicism, socialism, and institutionalism.
- 841C. History of Economic Thought: Modern**  
*Spring. 3(3-0)*  
Development of marginalism, general equilibrium theory, employment theory, and mathematical economics.
- 850. The Development of Economic Institutions**  
*Fall. 3(3-0) EC 430 or approval of department.*  
Cross-cultural analysis of factors influencing the organization of economies. Motivation, values, and technological change. Growth of markets, entrepreneurship, industrial labor force and the diffusion of knowledge.
- 851. The Economics of Secular Change**  
*Winter. 3(3-0) EC 324, EC 326 or approval of department.*  
Empirical studies of long-run economic trends and a consideration of alternative hypotheses explaining these trends including classical Marxian, Harrod-Domar, and other general theories of economic development. Population growth, technological change, capital formation, occupational distribution, urbanization, and international trade.
- 852. Economic Problems of Underdeveloped Areas**  
*Spring. 3(3-0) EC 324, EC 326 or approval of department.*  
Overcoming problems relating to early stages of economic development; investment priorities, mobilizing savings, balance of payment considerations; and policies and programs of various types.
- 855. The Industrial Revolution in Europe**  
*Winter of even-numbered years. 3(3-0) EC 318, EC 324. Interdepartmental with the Department of History.*  
The preconditions that led to the momentous changes in agriculture and industry in Europe from 1700-1914.
- 857A. Wage Theory I**  
*Fall. 3(3-0) EC 324, EC 326 or approval of department. Interdepartmental with the School of Labor and Industrial Relations.*  
Advanced analysis of: theories of wage determination; labor market research, economic effects of collective bargaining upon the national wage structure, output, employment, distribution of national income, the price level; nature and effects of government wage policies.
- 857B. Wage Theory II**  
*Winter. 3(3-0) EC 324, EC 326 or approval of department.*  
Advanced analysis of education, on-the-job training, family background, and discrimination as determinants of earnings. Causes and measurement of inequality and social mobility. Macroeconomic view of labor market.
- 858. Collective Bargaining**  
*Fall, Winter, Spring. 3(3-0) EC 305 or approval of department. Open to graduate students in economics and related fields such as labor and industrial relations, psychology, sociology, anthropology, political science, business, and history. Interdepartmental with and administered by the School of Labor and Industrial Relations.*  
Problems and issues in the administration and negotiation of collective bargaining agreements; includes both economic and noneconomic aspects of industrial relations policies and practices.
- 876. Statistical Inference in Economics I**  
*Fall. 3(3-0) EC 812A or EC 805A; STT 443 or STT 863; or approval of department. Interdepartmental with the departments of Agricultural Economics, and Statistics and Probability.*  
Review and extension of single-equation regression models. Properties of least-squares estimators under alternative specifications. Problems of analyzing nonexperimental data. Errors in variables, autoregressive and heteroscedastic models.
- 877. Statistical Inference in Economics II**  
*Winter. 3(3-0) EC 876 or approval of department. Interdepartmental with the departments of Agricultural Economics, and Statistics and Probability.*  
Specification interpretation and estimation of simultaneous equation models. Nonlinear models. Bayesian approach to estimation problems. Recent developments in econometrics.

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**878. Statistical Inference in Economics III**  
Spring, 3(3-0) EC 877 or approval of department. Interdepartmental with the departments of Agricultural Economics, and Statistics and Probability.  
Validation and application of dynamic econometric models. Bayesian approach to estimation problems. Recent developments in econometric methods and in applied econometric research.

**891. Topics in Applied Econometrics**  
Spring, 3(3-0) EC 835 or EC 877.  
Topics in applied econometrics with particular attention to problems of testing hypotheses in the context of economic models.

**895. Graduate Reading in Economics**  
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 8 credits.

**900. Special Topics in Economic Theory**  
Fall, Winter, Spring. 3(3-0) May reenroll for a maximum of 12 credits. EC 812C; EC 813C.  
Special topics in economic theory of current interest and importance.

**911. Public Program Analysis**  
Spring, 3(3-0) AEC 863, EC 805A, EC 805B; or approval of department. Interdepartmental with the departments of Agricultural Economics and Resource Development. Administered by the Department of Agricultural Economics.  
Policy aspects of nonmarket value estimation, shadow pricing, time preference, and risk analysis applied to systematic choice of agricultural, natural and human resource regulatory and public investment programs.

**972. Methodological Approaches to Research**  
Fall of even-numbered years, Summer of odd-numbered years. 3(3-0) Two terms of graduate study in social science or approval of department. Interdepartmental with and administered by the Department of Agricultural Economics.  
Selection, planning and conduct of research. Alternative research approaches. Role of theory, beliefs and valuations. Critical appraisal of research studies.

**990C. Mathematical Economics and Econometrics Workshop**  
Fall, Winter, Spring. 3 to 16 credits. EC 812A, EC 832; or approval of department. Interdepartmental with the Department of Agricultural Economics.  
Critical evaluation of research reports by staff and other students. Students writing doctoral dissertations in the appropriate areas are encouraged to enroll in the workshop.

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

**EDUCATION**

See Counseling, Educational Psychology and Special Education; Educational Administration; Health Education, Counseling Psychology and Human Performance; and Teacher Education.

**EDUCATIONAL ADMINISTRATION EAD**

(Name changed effective July 1, 1984. Formerly department of Administration and Curriculum.)

**College of Education**

**415A. Leadership Training**  
(EAD 415.) Fall, Winter, Spring. 2(1-2)  
Prepares students for leadership roles and responsibilities through the development of skills and techniques consistent with principles of our democracy.

**415B. Topics Leadership Training**  
Fall, Winter, Spring. 2(1-2) EAD 415A.  
Leadership roles and responsibilities with specialized populations. Topics include women, minorities, and fraternal organizations.

**805A. Educational Development Planning: Basic Concepts**  
Winter. 3(3-0) Approval of department.  
Basic concepts of economic, social and political development are studied as they place demands upon educational planners to cope with them. The distribution of development benefits is stressed.

**805B. Educational Planning and National Development**  
Spring, 3(3-0) EAD 805A.  
Formulation of educational development strategies and plans to deal with crucial national and community development problem areas paying particular attention to meeting the special needs of audiences with special problems.

**805C. Higher Education in Developing Countries**  
Fall. 3(3-0) Approval of department.  
National and international development roles of higher educational institutions and personnel. Major focus on science and the appropriate technology for applying scientific knowledge to developmental problems in specific socio-cultural settings.

**806. Education Through Cooperative Extension**  
Winter. 3(3-0) AEE 828 or EAD 860 or approval of department. Interdepartmental with and administered by the Department of Agricultural and Extension Education.  
Cooperative extension programs in the United States with emphasis on Michigan model: philosophy, history, scope, organizational structure, programs and methods.

**816E. Instructional Simulation**  
(ED 823, EAC 816E.) Fall, Summer. 3(2-2) Teaching experience. Interdepartmental with and administered by the Department of Teacher Education.  
Design and use of simulations and instructional games in the curriculum for development of social skills, values and affects.

**816J. Studies in Nonformal Education**  
(EAC 816J.) Summer. 4(3-2) Approval of department.  
International invitational workshop for specialists, project planners, staff trainers and practitioners. Worldwide selection of contemporary case studies of nonformal education. Focus is on out-of-school education for development.

**816K. Curriculum for Nonformal Education**  
Winter. 3(3-0) T E 810A, T E 810C or EAD 860.

Principles of curriculum related to nonformal education programs. Consideration of various fields of out-of-school education and training associated with community level rural and urban human resource development.

**839. African Research**  
(IDC 838., EAC 839.) Fall, Winter, Spring. 2 to 4 credits. May reenroll for a maximum of 8 credits. Graduate standing or approval of instructor. Interdepartmental with African Languages and the departments of Anthropology, Geography, History, Political Science, and Sociology. Administered by the Department of Anthropology.  
African-related archival and field research topics and methodologies viewed from perspective of relevant social science and humanistic disciplines associated with the African Studies Center.

**851A. Foundations of Administration: Theory and Organization**  
Fall, Winter, Summer. 3(3-0) Approval of department.  
Emphasizes basic administrative theory and research, focuses on current practice and emerging trends in such problems and issues as personnel, plant, finance, community school programs, and instructional improvement. Intended primarily for persons actively preparing for administrative positions in schools and other educational agencies.

**851B. Foundations of Administration: Practice and Problems**  
Winter, Spring, Summer. 3(3-0) EAD 851A or approval of department.  
Emphasizes basic administrative theory and research, focuses on current practice and emerging trends in such problems and issues as personnel, plant, finance, community school programs, and instructional improvement. Intended primarily for persons actively preparing for administrative positions in schools and other educational agencies.

**851C. Seminar: Educational Leadership and Organizational Climate**  
Winter. 3 credits. Approval of instructor.  
Exploration of dimensions and alternative ways to measure educational leadership and organizational climate. Use of existing instruments for diagnostic or research projects.

**851D. Project Planning Evaluation and Management**  
Fall. 3(3-0) Approval of instructor.  
Educational projects as an organizational strategy for developing and supporting innovation and change. Emphasis on planning evaluation and management techniques for project development funding and implementation.

**852A. Administration of Educational Institutions: Elementary School Administration**  
Winter, Summer. 3(3-0) Twelve graduate credits in Education including EAD 851A, EAD 851B or approval of department.  
Exploration of the nature and scope of responsibilities of areas in educational administration. Designed to serve as an initial application of administrative theory for those aspiring to one of the several areas.