

## Descriptions – Crop and Soil Sciences

of

### Courses

#### 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 geneecology.

#### 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. 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

Fall of odd-numbered years. 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

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.

#### 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.

#### 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

See Animal Science.

## EARTH SCIENCE

See Geology.

## ECONOMICS

## EC

Courses are classified as follows:

Applied Welfare Economics—410.  
Labor Economics and Industrial Relations—305, 306, 455, 457.  
Money and Banking—318, 330, 470.  
International Economics—428.  
Public Finance—406, 407, 408.  
Price and Value Theory—324, 325, 426.  
Income and Employment Theory—326, 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. Not open to students with credit in IDC 204.

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. Not open to students with credit in IDC 205.

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 326 and EC 327.

#### 305. Industrial Relations and Trade Unionism

Fall, Winter, Spring, Summer. 4(4-0)

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.

- 306. Government Programs for Workers**  
(456.) Winter. 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 200 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. 3(3-0) EC 200 and EC 210.  
Theory of production and cost. Theory of the firm under varying market structures.
- 325. Microeconomics II**  
Fall, Winter, Spring, Summer. 3(3-0) EC 200 and EC 201, or EC 210, and EC 324.  
Consumer choice and theory of demand. Theory of distribution and factor rewards. Welfare economics and general equilibrium theory.
- 326. Macroeconomics I**  
(320.) Fall, Winter, Spring, Summer. 3(3-0) EC 200 and EC 201 or EC 210.  
Review of national income accounting. Determination of aggregate output, employment, the price level, and the inflation rate. Policy applications.
- 327. Macroeconomics II**  
(321.) Fall, Winter, Spring, Summer. 3(3-0) EC 326.  
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 200 or EC 210, Juniors.  
The stock market; principles of investment; analysis of selected industries and corporations; regulation by the Securities and Exchange Commission.
- 337. American Social and Economic History: Foundations**  
Winter. 4(4-0) *Interdepartmental with and administered by the Department of History.*  
Multiple sources of economic growth in economic, social and political change, education, science and technology, political action, and other factors, mid-19th century.
- 338. American Social and Economic History: Modern Trends**  
Spring. 4(4-0) *Interdepartmental with and administered by the Department of History.*  
Urbanization, origins and implications of largescale organizations in business and other sectors of society, and sources of economic growth since mid-19th century.
- 361. Economic Development of Asia**  
Fall. 3(3-0) EC 200 and EC 201 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 200 and EC 201 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 200 and EC 201 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.
- 371A. European Economic History to 1800**  
Fall. 4(4-0) *Interdepartmental with and administered by the Department of History.*  
Economic history of medieval and early modern Europe stressing the nature of agrarian societies, the growth of cities, the divergence of the European economies, and the Industrial Revolution in England.
- 371B. European Economic History after 1800**  
Winter. 4(4-0) *Interdepartmental with and administered by the Department of History.*  
The industrialization of Europe stressing urbanization, national rivalry, problems of the maturation of capitalist institutions, and the social and ecological impact of economic growth in the twentieth century.
- 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 200 and EC 201 or EC 210 or EC 251H and 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) Juniors.  
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 200, EC 201, or approval of department. *Interdepartmental with the Department of Urban and Metropolitan Studies.*  
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**  
Winter. 3(3-0) EC 200, EC 201. *Interdepartmental with the Department of Urban and Metropolitan Studies.*  
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 200, EC 201. *Interdepartmental with the Department of Urban and Metropolitan Studies.*  
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) *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 man's economic use of land and space resources. Input-output relationships; development, investment, and enterprise location decisions. Land markets; property rights, area planning; zoning and land use controls.
- 421. Economic Thought I**  
Fall, Summer. 4(4-0) EC 200 and EC 201, 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 200 and EC 201, 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 aggregate and general-equilibrium economic systems.
- 428. International Trade**  
(427.) Fall, Winter, Spring, Summer. 3(3-0) EC 200 and EC 201, or EC 210. EC 428 and EC 429 are a two-term sequence. *Student 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.

**Descriptions – Economics  
of  
Courses**

**429. International Finance**

Fall, Winter, Spring, Summer. 3(3-0) EC 200 and EC 201, 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 200 and EC 201, 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 430.

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 200 and EC 201, 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.

**440. Radical Political Economy**

Spring. 3(3-0) EC 200 and EC 201, or EC 210, or EC 251H and 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 STT 316.

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 200 or EC 201 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 200 and EC 201, 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, and 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 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 Urban Education**

Spring. 3(3-0) EC 201 or EC 210. Interdepartmental with and administered by the Department of Urban and Metropolitan Studies.

Political economy of urban schools. Education as a commodity; efficient production and distribution, supply and demand for education, financing education, planning education to meet job needs and social mobility.

**470. Monetary Theory**

Fall. 3(3-0) EC 327.

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.

**800. Economic Analysis I**

Fall, Winter. 4(4-0) EC 324.

Consumption, exchange and production.

**801. Economic Analysis II**

Winter, Spring. 4(4-0) EC 800.

The Firm. Market behavior and price formation (competition, monopoly and mixed cases). Distribution.

**802. Economic Analysis III**

Spring, Summer. 4(4-0)

Comparative statics analysis of macroeconomic problems.

**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.

**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.

**811. Public Program Analysis**

Spring. Summer of odd-numbered years. 3(3-0) EC 324 or approval of department. Interdepartmental with the departments of Resource Development, and Agricultural Economics. Administered by the Department of Agricultural Economics.

Application of benefit-cost analysis to public programs of resources development. Issues and case studies in budgeting, investment criteria, pricing, externalities, and coordination.

**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; imput 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.

**815. Labor Force Behavior**

Spring. 4(4-0) LIR 809, EC 457 or approval of department. Interdepartmental with and administered by the School of Labor and Industrial Relations.

Theoretical and empirical analysis of factors affecting labor force participation rates, unemployment levels, employment distribution, hours of work, and labor mobility. Concepts and measurement methods.

**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.

**831. Mathematical Economics I**

Fall of even-numbered years. 3(3-0) EC 812, MTH 214, MTH 334.

Economic behavior of firms, households, commodity markets. Relation of traditional theories to programming models, theory of games and other decision theories. Dynamic models of behavior. Equilibrium of multiple markets.

**832. Mathematical Economics II**

Winter of odd-numbered years. 3(3-0) EC 813; MTH 215, MTH 334.

Mathematical models of growth and fluctuations dealing with macroeconomics, monetary theory, fiscal policy. The cobweb, static and dynamic multipliers, multiplier-accelerator models, trade cycle models. Relations among stocks, flows and time lags.

**833. Mathematical Programming**

Spring. 3(3-0) EC 800; or EC 812A; MTH 334. Interdepartmental with the departments of Agricultural Economics, and Statistics and Probability. Administered by the Department of Agricultural Economics.

Linear programming. Theory of linear economic models. Topics in nonlinear programming.

**835. Introduction to Econometrics**

Fall, Spring, Summer. 3(3-0) EC 325; STT 422. Interdepartmental with the Department of Agricultural Economics.

Specification, estimation and interpretation of economic models. Applications to empirical problems.

**IDC. Sub-Saharan Africa Seminar**

For course description, see Interdisciplinary Courses.

**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.

**857. Wage Theory**

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.

**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.

**860. Economics of the Firm**

Fall, Winter, Summer. 4(4-0) Graduate students in Business Administration. Not open to Economics majors.

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

**861. American Economy**

Fall, Winter, Spring, Summer. 4(4-0) Thirty credits in MBA core program. Not open to Economics and Agricultural Economics majors.

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

**862. Business and Public Policy**

Winter. 4(4-0) EC 860 or approval of department. Not open to majors.

Problem of government regulation of business. Economic models which relate to regulation. Regulatory legislation, regulatory bodies, and alternatives available.

**876. Statistical Inference in Economics I**

Fall. 3(3-0) EC 812A or EC 801; 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.

## Descriptions – Economics

### of Courses

- 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.
- 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.
- 880. Organization and Control in the Political Economy: Institutions and Theory**  
Winter of even-numbered years. 4(4-0)  
Interdepartmental with the Department of Management.  
Organization and technique in choice and implementation of economic (especially planning, programming) functions of political authority.
- 881. Organization and Control in the Political Economy: Selected Problems**  
Winter of odd-numbered years. 4(4-0)  
Approval of instructor. Interdepartmental with the Department of Management.  
Analysis of role and tasks, appropriate techniques and organizational structures of political agencies in planning and management of complex programs.
- 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. Variable credit.
- 900. Selected Problems in Advanced Microeconomic Theory**  
Fall, Winter, Spring, Summer. 3(3-0)  
May reenroll for a maximum of 12 credits. EC 812A, EC 812B, EC 812C; EC 813C.  
Advanced applications of economic methodology to the analysis of household and firm behavior; risk; uncertainty, and transactions costs.
- 901. Selected Problems in Advanced Macroeconomic Theory**  
Fall, Winter, Spring, Summer. 3(3-0)  
May reenroll for a maximum of 12 credits. EC 813A, EC 813B.  
Analysis of the behavior and interaction of multivariate systems.
- 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.

- 990B. Industrial Organization and Public Policy Workshop**  
Fall, Winter, Spring. 3 to 16 credits.  
Approval of department.  
Critical evaluation of research reports by staff and other students. Students writing doctoral dissertations in the appropriate areas are encouraged to participate in workshop and may do so while registered for EC 999.
- 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 participate in workshop and may do so while registered for EC 999.
- 990D. Economic Development Workshop**  
Fall, Winter, Spring, Summer. 3 to 16 credits. EC 850, EC 851, EC 852 or approval of department.  
Critical evaluation of research reports by staff and students. Students writing doctoral dissertations in Development are encouraged to participate in the workshop and may do so while registered for EC 999.
- 999. Doctoral Dissertation Research**  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

## EDUCATION

## ED

### College of Education

- 101A. Exploring Elementary Teaching**  
Fall, Winter, Spring. 3(1-4) Preeducation major.  
Emphasis on the nature of teaching in the elementary school achieved through field experience while serving as a teacher aide in an elementary classroom. Concurrent lecture sessions focus on techniques of classroom management and operation.
- 1235. Introduction to Careers in Vocational and Practical Arts Education: Industrial Arts**  
(124D.) Winter and Fall of even-numbered years, Spring of odd-numbered years. 2(2-0) Credits earned in this course are included in computation of GPA and MAPS but are not included in the 180 credits required for graduation.  
Opportunities in teaching industrial education; analysis of students' potentialities for this field.
- 141A. General Industrial Arts**  
Winter and Fall of odd-numbered years, Spring of even-numbered years. 3(0-6) Approval of department.  
Introductory experiences in all major areas of industrial arts. Organized under a comprehensive general shop organization similar to that utilized in the modern secondary school.
- 141B. General Woodwork**  
Winter and Fall of odd-numbered years, Spring of even-numbered years. 3(0-6) Approval of department.  
Handwork, patternwork, carpentry, introductory machinework, finishing. Designed to exemplify, in both organization and equipment, desirable practices in today's secondary schools.
- 200. Individual and the School**  
Fall, Winter, Spring, Summer. 5(3-2)  
Sophomores. Must be admitted to a teacher education program.  
Major psychological factors in the school learning-teaching situation; concepts in human development related to problems in the school situation; teacher's role in motivation, conceptual learning, problem solving, and the development of emotional behavior, attitudes and values, learning of skills, retention and transfer; and measurement of student abilities and achievement.
- 230. Introduction to Careers in Vocational and Practical Arts Education**  
Principles and practices for teachers when helping middle school and high school students develop awareness of career opportunities and develop career preparation plans.  
**A. Agriculture and Natural Resources**  
(124A., 1245.) Fall. 2(1-2) Open only to teaching majors or minors in agriculture and natural resources. Interdepartmental with Agriculture and Natural Resources.  
To assist agriculture and natural resources teachers in developing concepts pertaining to the nature and functions of persons in agriculture and natural resources occupations and development of competencies which will assist in making their students aware of these functions.  
**B. Business and Distributive Education**  
(1255.) Winter. 2(1-2) Open only to teaching majors or minors in business and distributive education.  
To assist business teachers in developing concepts pertaining to the nature and functions of persons in the business world and in developing competencies which will assist in making their students aware of these functions.
- 241A. Advanced Woodwork**  
Winter and Fall of even-numbered years, Spring of odd-numbered years. 3(0-6) ED 141B or approval of department.  
Safe operation of woodworking machines in home and school shop. Care and maintenance of shop tools and equipment.
- 241B. General Metalwork**  
Winter and Fall of odd-numbered years, Spring of even-numbered years. 3(0-6) Approval of department.  
Bench metal, sheet metal, forging, welding, plating, casting, and machining. Designed to exemplify desirable facilities and course organization for the modern secondary school.
- 241C. Industrial Arts Crafts**  
Winter and Fall of even-numbered years, Spring of odd-numbered years. 3(0-6) Approval of department.  
Typical crafts in outstanding public school programs of industrial arts. Work in plastics, leather, silver, aluminum, copper, metal enameling, lapidary, ceramics, and model making.
- 241D. Printing and Graphics**  
Winter and Fall of even-numbered years, Spring of odd-numbered years. 3(0-6) Approval of department.  
Hand composition, press work, printing, book-binding, block printing, plate making, silk screen work, and photography. Designed to exemplify a desirable approach to the work of this area in the modern secondary school.