413. Dairy Farm Management  
Spring. 3(2-2)  
Analysis of dairy farm organization and operations. Dairy herd management practices. Dairy cattle housing with emphasis on economical and efficient usage. Use of dairy records in dairy farm operation.

424. Dairy Cattle Breeding  
Spring. 4(2-4) ANS 461.  
Applications of population genetics to improving dairy cattle. Use of selection, aids to selection, and systems of mating to formulate breeding plans. Inheritance of economic traits. Breed improvement programs.

433. Dairy Cattle Nutrition  
Winter. 4(3-2) ANS 325.  
Principles of ruminant nutrition and application to actual feeding practices in commercial dairy herds. Rumen fermentation as related to feed utilization, milk production and milk composition.

444. Milk Secretion  
Winter. 4(3-2) Interdepartmental and administered jointly with the Physiology Department.  

445. Endocrinology and Reproduction of Farm Animals  
Fall. 4(3-2) FSL 340. Interdepartmental and administered jointly with the Physiology Department.  
Endocrine and reproductive systems are presented with emphasis upon characteristics which can be altered for economic benefit and upon causes, prevention, and treatment of endocrine abnormalities.

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

Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 10 credits. For course description, see Interdisciplinary Courses.

850. Topics in Dairy Science  
Fall, Winter, Spring. Variable credit. May re-enroll for credit. Approval of department. Topics from breeding, management, nutrition, or physiology, changing from term to term to include recent technical advances.

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

EARTH SCIENCE  
See Geology.

ECONOMICS  

College of Business  

Courses are classified as follows:  
Labor Economics and Industrial Relations--305, 455, 456, 457.  
Money and Banking--318, 330, 470.  
International Economics--427.  
Public Finance--406, 407, 408.  
Price and Value Theory--324, 325, 426.  
History of Economic Thought--431, 432.  
Industrial Organization and Control--444, 445, 448.  

200. Introduction to Economics  
Fall, Winter, Spring, Summer. 4(4-0) Open to Freshmen. Students may begin sequence with either 200 or 201.  
Problem of unemployment; meaning and determination of national income; the multiplier; the accelerator; fiscal policy; deficit spending; monetary policy; banks creation of money; international aspects of the employment problems.

201. Introduction to Economics  
Fall, Winter, Spring, Summer. 4(4-0) Open to Freshmen. Students may begin sequence with either 200 or 201.  
Problem of resource allocation; price determination (demand, supply); applications to agricultural policy; diminishing returns; behavior of the firm (determination of quantity of output, hiring of factors); aspects of international trade.

210. Fundamentals of Economics  
Fall, Winter, Spring, Summer, 4(4-0) MTH 215 or 228; or concurrently. Students may not earn credit in 210 if they have credit in 200 or 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.

251H. Households, Firms and Markets  
Fall. 5(5-0) Honors College students. Microeconomic theory and its applications to analysis and policy. Substitutes for 201, 324 and 325.

252H. Aggregative Economics and Public Policy  

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

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

320. Macroeconomics I  
Fall, Winter, Spring, Summer. 3(3-0)  
200 and 201 or 210.  

321. Macroeconomics II  
Fall, Winter, Spring, Summer. 3(3-0)  
320.  
Expansion of role of monetary factors in macroeconomic theory. Theories of economic growth and cycles. Study of macroeconomic problems of inflation, unemployment, and other current policy problems.

324. Microeconomics I  
Fall, Winter, Spring, Summer. 3(3-0)  
200 and 201, or 210.  
Theory of production and cost. Theory of the firm under varying market structures.

325. Microeconomics II  
Fall, Winter, Spring, Summer. 3(3-0)  
200 and 201, or 210, and 324.  

330. Investments and Security Markets  
Fall, Spring. 3(3-0) 200 or 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) Juniors. Interdepartmental and administered by the History Department.  
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) Juniors. Interdepartmental and administered by the History Department.  
Urbanization, origins and implications of large-scale 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) 200 and 201 or 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) 200 and 201 or 202.  
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) 200 and 201 or 210.
Interdepartmental with Public Affairs Management.

### 371A. European Economic History to 1800
Fall. 4(4-0) Juniors. Interdepartmental with and administered by the History Department.
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) Juniors. Interdepartmental with and administered by the History Department.
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.

### 380. Urban Economics
Fall. 4(4-0) 200, 201.
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.

### 390. The Economics of Poverty
Winter. 3(3-0) 200, 201.

### 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.

### 406. Public Expenditure: Theory and Policy
Fall, Spring. 4(4-0) 201 or 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) 201 or 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) 200, 201, or approval of department.
Demand, supply and economic efficiency in the markets for health services. Demand for medical care, organization forms, methods of pay-ment, utilization and cost, and public policy for health care.

### 417. Land Economics
Fall, Spring. 4(4-0) Interdepartmental with the Resource Development Department, Public Affairs Management and Food Systems Economics and Management and administered by the Resource Development Department.
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) 200 and 201, or 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) 200 and 201, or 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) 320, 324; MTH 914.
Mathematical analysis of production, cost, and consumer choice. Mathematical models of aggregate and general-equilibrium economic systems.

### 427. International Trade and Finance
Fall, Winter, Spring. 5(5-0) 200 and 201, or 210.

### 430. Comparative Economic Systems
Fall, Winter, Summer. 4(4-0) 200 and 201, or 210.
Obstacles to economic growth, theories of economic development, recognizing 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) 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) 200 and 201, or 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.

### 444. Private Enterprise and Public Policy
Fall, Winter, Spring. 3(3-0) 201 or 210.
Competition and monopoly in the American economy. Problems of antitrust.

### 445. Economics of Regulated Industries
Winter. 4(4-0) 444.
Government policy and role of competition in the public utility and transportation industries.

### 451. Methods of Economic Research and Forecasting
Spring. 4(4-0) 320 and 324; 577
Research design, testing of economic hypotheses. Elementary methods of projection, forecasting, estimation, and introduction to econometric.

### 455. Public Policy and Labor Relations
(308). Fall, Winter, Spring, Summer. 5(5-0) 305
Evolution of public policy concerning trade unions and collective bargaining. Causes and effects of labor-management disputes, public and private methods and agencies for dispute settlement.

### 456. Economics of Social Security
Spring. 3(3-0) 305 or Seniors.
Problems of unemployment, old age, and medical care from standpoint of economic theory, political philosophy, and our changing economic and social structure. Worker's Compensation Laws, Railroad Retirement Act, Civil Service Retirement Act, and Social Security Act.

### 457. Manpower Economics
Fall, Winter, Summer. 5(5-0) 200 and 201, or 210.

### 460. Location Analysis
Winter. 4(4-0) 417 or 324 or FSM 401. Interdepartmental with the Resource Development Department, Public Affairs Management and Food Systems Economics and Management and administered by the Resource Development Department.
Forces affecting location decisions of firms, households and governments. Applications to agricultural, industrial, and regional developments.

### 470. Monetary Theory
(352). Fall. 3(3-0) 321.
Relationship between money and interest rates, prices and output.

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

### 490H. Honors and Senior Seminar
Fall, Spring. 4(4-0) May re-enroll for a maximum of 8 credits. Honors College students or economics Seniors with 3.30 grade point average. 491H and 252H recommended. Directed reading and student research in contemporary economic problems.

### 800. Economic Analysis I
Fall, Winter. 4 credits. 324.
Consumption, exchange and production.
801. Economic Analysis II
Winter, Spring. 4 credits. Students may not receive credit in both 801 and 812. The firm, market behavior and price formation (competition, monopoly and mixed cases). Distribution.

802. Economic Analysis III
Spring, Summer. 4 credits. Students may not receive credit in both 802 and 813-820. Comparative statics analysis of macroeconomic problems.

803. Seminar in Industrial Relations
For course description, see Interdisciplinary Courses.

803A. Fiscal Policy
Fall. 3 credits. Approval of department. Economics of government surpluses, deficits, and debt. Examination of fiscal theories and programs to maintain economic stability, high level employment and income, economic progress, and other goals.

803B. Public Revenues
Winter. 3 credits. Approval of department. Theory and development of revenue systems. Incidence and economic effects of taxes. Studies of selected national, state and local revenue structures for comparative analysis.

803C. Government Finance
Spring. 3 credits. Approval of department. Revenue adequacy, fiscal controls, intergovernmental fiscal relations, tax burdens, subsidies, government costs and benefits.

810. Economics of Public Choice
Winter. 3(3-0) Approval of department. Interdepartmental with the Resource Development and Agricultural Economics Departments and administered by the Agricultural Economics Department. Economics of alternative institutions for collective action. Emphasis on property rights and natural resources. Public goods, externtalities, non-marginal change, consumption, income and power distribution, grants, welfare criteria and market failure.

811. Public Program Analysis
Spring, Summer. Three-credit course open to students. 3(3-0) FSM 491 or EC 324 or approval of department. Interdepartmental with the Resource Development and Agricultural Economics Departments and administered by the Agricultural Economics Department. 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: Choice and Exchange
Spring. 3(3-0) 324, 325; 480 or MTH 215 or concurrently. Consumption exchange, the axiomatics of choice, involving time, introduction to welfare.

812B. Microeconomics II: Production and Distribution
Winter. 3(3-0) 812A. Production—variable proportions, the multi-product firm, consumer surplus, analysis of distribution—the micro theory.

812C. Microeconomics III: The Firm and Market
Spring. 3(3-0) 812B. Theories of the firm, market behavior—perfect and imperfect markets. Game theory.

813A. Macroeconomics I: Comparative Statics
Spring. 3(3-0) 320, 321; 480 or MTH 215 or concurrently. Macro models and macro function; the interaction of macro markets.

813B. Macroeconomics II: Dynamics
Winter. 3(3-0) 813A. Stochastic and dynamic models. Growth and technical change. The macro theory of distribution.

813C. General Equilibrium and Welfare
Spring. 3(3-0) 813B; 813C or concurrently. The disaggregated general equilibrium system. Input-output economics. Welfare.

815. Labor Force Behavior
Spring. 4(4-0) 457. 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 credits. 812C, 813C, and 835 and approval of department. Monetary and interest theories.

818B. The Theory of Monetary Policy
Winter. 3 credits. 814A or approval of department. Theories of the transmission of monetary policy to output, employment and prices.

818C. Problems in Monetary Policy
Spring. 3 credits. 815B. Goals and techniques of monetary policy.

821A. Competition and Monopoly in American Industry
Fall. 3 credits. Approval of department. Examination of structure, behavior, and performance in industries.

821B. Government Policy Toward Private Enterprise
Winter. 3 credits. 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 credits. Approval of department. Departures from market competition as a policy norm, as in public utilities and transportation.

826A. Theory of International Trade
Fall. 3 credits. 427 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 credits. 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 credits. 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. 3(3-0) 812; MTH 214, 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. 3(3-0) 813; MTH 215, 334. Mathematical models of growth and fluctuations dealing with macroeconomics, monetary theory, fiscal policy. The cobweb, static and dynamic multipliers, multipliers-accelerator models, trade cycle models. Relations among stocks, flows and time lags.

833. Mathematical Programming
Spring. 3(3-0) 800; or 814A; MTH 334. Interdepartmental with the Agricultural Economics, and Statistics and Probability Departments and administered by the Agricultural Economics Department. Linear programming. Theory of linear economic models. Topics in nonlinear programming.

835. Introduction to Econometrics
(AEC 531). Fall, Spring, Summer. 3(3-0) 325; STT 422. Interdepartmental with the Agricultural Economics Department. Specification, estimation and interpretation of econometric models. Applications to empirical problems.

838. Interdisciplinary Seminar on Africa
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) 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) 320, 324, or approval of department. Empirical studies of long-run economic trends and a compilation 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) 380, 394, 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.

854. The Emergence of Commercial Capitalism
Winter of odd-numbered years. 3 credits. 315, 324. Interdepartmental with the History Department. The rise of the mercantilist economies of Europe with stress on the growth of internal and international trade and finance during the 16th and 17th centuries.

855. The Industrial Revolution in Europe
Winter of even-numbered years. 3 credits. 315, 324. Interdepartmental with the History Department. The preconditions that led to the momentous changes in agriculture and industry in Europe from 1700-1914.

857. Wage Theory
Fall. 3 credits. 320, 324, 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. Industrial Relations
Winter. 3 credits. 395 and 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 and administered jointly with 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 credits. 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 credits. 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, Spring. 4 credits. 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) 812A or 801; 877A or 862, or approval of department. Interdepartmental with the Agricultural Economics, and Statistics and Probability Departments. 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

911. Theory of the Firm and the Consumer
Fall, Winter, Summer. 3(3-0) 812 or approval of department. Imperfect markets, rational behavior and other advanced topics.

912. Activity Analysis in Economic Theory
Winter. 3(3-0) Approval of department. Linear programming, with an introduction to the theory of games. Production with fixed technical preparations.

913. General Equilibrium Economics
Winter. 3(3-0) 813 or approval of department. General equilibrium economics: statics and dynamics. General equilibrium economics involving time and risk. Integration of the micro-theories of production, consumption and markets with the macroeconomic variables. Dynamics as development through time.

979. 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 Agricultural Economics Department. Selection, planning, and conduct of research. Alternative research approaches. Role of theory, beliefs and valuations. Critical appraisal of research studies.

990A. Monetary Theory and Policy Workshop
Winter, Spring. 3 to 16 credits. 812, or 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 999.

990B. Industrial Organization and Public Policy Workshop
Fall, Winter, Spring. 3 to 16 credits. 812, 821A, or 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 999.

990C. Mathematical Economics and Econometrics Workshop
Fall, Winter, Spring. 3 to 16 credits. 812A, 832; or approval of department. Interdepartmental with the Agricultural Economics 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 999.

990D. Economic Development Workshop
Fall, Winter, Spring. 3 to 16 credits. 850, 851, 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 999.

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