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 493, CSS 817 or approval of department. Interdepartmental with the departments of Forestry and Horticulture. Calculation and implication of genetic parameters. Linkage, Coancestry and inbreeding, Covariation 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 892. Interdepartmental with the departments of Forestry and Horticulture. Controlled 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 202H) 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 concurrent. 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  
Spring. 3(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. 3(5-0) Honors College students. 
Not open to students who have credit in EC 201, EC 326 and EC 327. Theory of rational 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 201, 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.  

325. Microeconomics II  
Fall, Winter, Spring. 3(3-0) EC 324. Not open to students who have credit in EC 251H.  

326. Macroeconomics I  
Fall, Winter, Spring. 3(3-0) EC 201, EC 202 or EC 210. Not open to students who have credit in EC 251H.  
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.  

422. Economic Thought I  
Fall, Spring, 4(4-0) EC 201.  

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.

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.

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.

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. Comparative Economic Systems  
Fall, Winter, Summer, 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.

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 412 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 320 or approval of department. Interdepartmental with and administered by Public Affairs Management.

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.  

470. Monetary Theory  
Fall, 3(3-0) EC 326.  
Relationship between money and interest rates, prices and output.

480. Mathematics for Economists  
Fall, 3(3-0) 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.  
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 812A, 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 334; 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 336; 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 PBRS. Alternative theories of the state. Political theories of public expenditures.

806B. Public Revenues
Winter. 3(3-0) Approval of department. Taxation of theory. 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 805 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 805 or EC 812A. 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-comprehensive markets; imperfect information and behavior under uncertainty; multiproduct firms.

812C. Microeconomics III
Fall. 3(3-0) EC 821B. 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.

815A. Monetary Theory
Fall. 3(3-0) EC 812C, EC 813C, and EC 815 and approval of department. Monetary and interest theories.

815B. 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.

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.
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 Marxism, Harrod-Domar, and other general theories of economic development. Population growth, technological change, capital formation, occupational distribution, urbanization, and international trade.

855. The Industrial Revolution in Europe
Winter of even numbered years. 3(3-0) EC 318, EC 321. Interdepartmental with the Department of History.
The preconditions that led to the momentous changes in agriculture and industry in Europe from 1700-1914.

857A. Labor Economics I
Fall. 3(3-0) EC 324, EC 326 or approval of department. Interdepartmental with the School of Labor and Industrial Relations.
Labor supply; labor demand; job search and job matching; labor mobility and migration; effects of government policies on labor markets.

857B. Labor Economics II
Winter. 3(3-0) EC 324, EC 326 or approval of department.
Theories of wage determination, wage differentials, and equalizing differences. Human capital, education, training, family background, and discrimination as determinants of earnings. Causes and measurement of income inequality and social mobility.

857C. Labor Economics III
Spring. 3(3-0) EC 324, EC 326 or approval of department.
Economic aspects of unions, collective bargaining and labor relations. Internal labor markets and the economics of personnel. Macroeconomic issues in labor markets.

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 865A, STT 443 or STT 386, or approval of department. Interdepartmental with the departments of Agricultural Economics, and Statistics and Probability.

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.

907. 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.