951. Cytogenetics in Plant Breeding
Winter of odd-numbered years. 3(3-0)
BOT 887, 916, or approval of department.
Interdepartmental with the Horticulture Department.
Application of cybotgenic 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.

953. Cytogenetics in Plant Breeding Laboratory
Winter of odd-numbered years. 3(0-6)
951 or concurrently. Interdepartmental with and administered by the Horticulture Department.
Laboratory course to accompany 951.

999. Research
Fall, Winter, Spring, Summer. Variable credit.

DAIRY SCIENCE

College of Agriculture and Natural Resources

214. Dairy Production
Fall, Spring. 4(3-2)

233. Dairy Cattle Judging
Spring. 3(0-6)
Desired type in dairy cattle. Judging and showing procedures. Competitive judging. Teams selected to represent Michigan State University in national competition.

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 the 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. Breeding improvement programs.

433. Dairy Cattle Nutrition
Winter. 4(3-2) ANS 325.
Principles of nutriment 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) FSI 240. 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.

471. Dairy Seminar
Spring. 1(1-0) Seniors.
Review and Integration of information leading to successful operation of the dairy enterprise. Present day trends and problems. Introduction to evaluation and interpretation of scientific reports.

Winter. 3(4-0)
For course description, see Interdisciplinary Courses.

540. 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:

Money and Banking—318, 522, 330.
International Economics—427.
Public Finance—406, 407, 408.
Price and Value Theory—324, 325, 426.
History of Economic Thought—421, 422.
Industrial Organization and Competition—444, 445, 446, 447.

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. 4(4-0) ECON 215 or 228, or concurrently. Students may not earn credit in 210 if they have credit in either 200 or 201.
Introductory course in economic theory, employing mathematics, where useful, as a tool analysis. Covers economic behavior, money and the price system, income distribution, and elements of employment theory.

251H. Households, Firms and Markets
Fall. 5(4-0) Honors College students.
Microeconomic theory and its applications to analysis and policy. Substitutes for 201, 324 and 325.

252H. Aggregative Economics and Public Policy
Spring. 5(5-0) Honors College students.

305. Industrial Relations and Trade Unionism
Fall, Winter, Spring, Summer. 3(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.

318. Money, Credit and Banking
Fall, Winter, Spring, Summer. 4(4-0)
200 or 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.

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

321. Macroeconomics II
Fall, Winter, Spring. 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. 3(3-0) and 201 or 210.
Theory of production and cost. Theory of the firm under varying market structures.

325. Microeconomics II
Fall, Winter, Spring. 3(3-0) 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.

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 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) 200 and 201 or 210. 

390. Urban Economics  
Fall. 4(4-0) 200, 201. 
Location theory and urban development. Economic aspects of particular community problems like housing, transportation, welfare and poverty. Strategies for urban development.

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

400. Independent Study  
Fall, Winter, Spring, Summer. 1 to 4 credits. 
Senior 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) 200 or 210. 
Expenditure theory and 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 burden 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  
Fall. 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 payment, 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) 300 and 201, or 210. 
Forefathers of classical economics. Development of classical economic thought from Adam Smith to J. S. Mill. The Socialists reaction.

422. Economic Thought II  
Winter, Spring. 4(4-0) 200 and 210, 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 214. 
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, Summer. 3(3-0) 200 and 201, or 210. 

430. Stagnation and Development in Emerging Societies  
350. Winter, Summer. 4(4-0) 200 and 201, or 210. 
Obstacles to economic growth, theories of economic development, reorganizing agriculture and industry; problems in mobilizing the economy to accommodate new production techniques; population problems.

431. Principal Issues in Promoting Economic Development  
350. Winter, Spring. 4(4-0) 300 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, Summer. 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.

448. Structure of American Industry  
Spring. 3(3-0) 444. 
Analysis and critique of industry structure, behavior, and performance. The functions of public control.

451. Methods of Economic Research and Forecasting  
Spring. 4(4-0) 320 and 324; STT 210 or 217. 
Research design, testing of economic hypotheses, elementary methods of projection, forecasting, estimation, and introduction to econometrics.

455. Public Policy and Labor Relations  
365. Winter, Summer. 3(3-0) 365. 
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) 365 or Seniors. 

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.

465. Mathematical Theory of Labor Markets  
Winter, Spring, Summer. 4(4-0). 
Mathematical analysis of labor force composition, distribution of unemployment, wage determination, real wages, and labor mobility. Applications to agricultural, industrial, and regional developments.

470. Monetary Theory  
(Spring) 322. 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 either economics, agricultural economics or College of Business, or approval of department. Interdepartmental with and administered by the Mathematics Department.

500. Economic Analysis  
Fall, Winter. 4 credits. 324 or 385. 
Students may not receive credit in both 300 and 811. 
801. Economic Analysis II
Winter, Spring. 4 credits. 800 or 811. Students may not receive credit in both 801 and 812. Monopolistic and oligopolistic competition. General equilibrium analysis. Aggregate income and employment theory.

802. Economic Analysis III
Spring, Summer. 4 credits. 801 or 812. Students may not receive credit in both 802 and 813. Aggregate income and employment theory. Study of money and credit as related to income, employment and prices.

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

806A. Fiscal Policy
Fall. 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.

806B. 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.

806C. Government Finance
Spring. 3 credits. Approval of department. Revenue adequacy, fiscal controls, intergovernmental fiscal relations, tax burdens, subsidies, government costs and benefits.

812A. Microeconomics I: Choice and Exchange
Fall. 3(3-0) 324, 325; 480 or MTH 215 or concurrently. Consumption exchange, the axiomatics of choices, involving time, introduction to welfare.

812B. Microeconomics II: Production and Distribution
Winter. 3(3-0) 812A. Production-variational properties, the multi-product firm, programming analysis. 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
Fall. 3(3-0) 320, 321; 480 or MTH 215 or concurrently. Macroe 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; 812C or concurrently. The disaggregated general equilibrium system. Input-output economics. Welfare.

815. Labor Force Behavior
Spring. 4(4-0) 437, Interdepartmental with and administered by the School of Labor and Industrial Relations. Theoretical and empirical analysis of labor force participation rates, wage levels, employment distribution, hours of work, and labor mobility. Concepts and measurement methods.

818A. Monetary Theory
Fall. 4 credits. 319, 320. Money, the financial system, and interest theory as related to the determination of aggregate output, employment, and prices.

818B. Monetary Policy
Winter. 4 credits. 818A. Goals, techniques and effectiveness of monetary and financial 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. Examination of structure, behavior, and performance in industries.

821C. Problems Related to Regulated Industries
Spring. 3 credits. Approval of department. Depatures 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.

828C. International Exchanges and Capital Flows
Spring. 3 credits. 828B. 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) 816, 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, multiplier-accelerator models, trade cycle models. Relations among stocks, flows and time lags.

833. Mathematical Programming
Spring. 3(3-0) 860; or 812A, 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. Econometrics and Price Analysis
(AEC 831) Fall, Spring. Summer. 3(3-0) 325; STT 432. Interdepartmental with the Agricultural Economics Department. Specification, estimation and interpretation of economic 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 consideration of alternative hypotheses explaining these trends including classical, Marxist, 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) 320, 324, 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. 318, 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.
555. 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.

557. Wage Theory
Fall, 3 credits. 390, 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.

558. Industrial Relations
Winter. 3 credits. 305 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 integrally 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.

559. Labor Legislation and Public Policy
Spring. 3 credits. 305 and approval of department. Criteria for public policy concerning unions and collective bargaining; current problems in labor legislation; role of federal and state governments in industrial relations; decision-making process in labor legislation.

560. 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 in organizing and directing productive activities; optimal combinations of products, pricing, competitive forces in markets affecting the firm.

561. American Economy
Fall, Winter, Spring, Summer. 4 credits. Thirty credits in MBA core program. Not open to Economics and Agricultural Economics majors.

562. Business and Public Policy
Winter, Spring. 4 credits. 860 or approval of department. Not open to majors.

576. Statistical Inference in Economics I
Fall. 3(3-0) 812A or 801, 877, 443 or 883; or approval of department. Interdepartmental with the Agricultural Economics, and Statistics and Probability Departments.

877. Statistical Inference in Economics II
Winter. 3(3-0) 876 or approval of department. Interdepartmental with the Agricultural Economics, and Statistics and Probability Departments.

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

880. Organization and Control in the Political Economy: Institutions and Theory
Winter. 4(4-0) Interdepartmental with the Department of Management.
Organization and technique in choice and implementation of economic (especially planning, programming) functions of public authority.

881. Organization and Control in the Political Economy: Selected Problems
Spring. 4(4-0) Approval of instructor. Interdepartmental with and administered by the Department of Management.
Analysis of role and tasks, appropriate techniques and organizational structures of political agencies in planning and management of complex programs.

895. Graduate Reading in Economics
Fall, Winter, Spring, Summer. Variable credit.

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

911. Theory of the Firm and the Consumer
Fall, 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. 2(2-0) 811 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.

914. Welfare Economics
Spring. 3 credits. 812 or approval of department.
Individual values, Pareto optimality and social welfare.

915. Economic Dynamics
Spring. 3(0-0) 811 and 813 or approval of department.
Models of economic behavior over time with emphasis on stability conditions, the trade cycle, and economic growth.

972. Methodological Approaches to Research
Fall of odd-numbered years. 3(0-0) 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 values. Critical appraisal of research studies.

990A. Monetary Theory and Policy Workshop
Winter, Spring. 3 to 16 credits. 812, 814, 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, 822, 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, Summer. Variable credit. Approval of department.

EDUCATION

College of Education

101. Introduction to Teaching
A. Elementary Education.
Fall, Winter, Spring. 3(1-4) Approval of department.
Teaching profession, American educational heritage, teaching of children and youth, preparation and opportunities.