

**930. Advanced Forest Genetics**  
Fall of odd-numbered years. 2(1-2) Interdepartmental with Forestry and Horticulture. Administered by Forestry.  
P: HRT 819 or HRT 836.  
Applications of genetics, plant breeding, and biotechnology to the improvement, and preservation of diversity, of tree species.

**940. Advanced Soil Physics**  
Fall of even-numbered years. 2(2-0)  
P: CSS 840. R: Open only to graduate students in College of Agriculture and Natural Resources, College of Engineering, or College of Natural Science.  
Modelling major physical transport mechanisms in the soil profile. Aeration, temperature and solute movement. Water movement and evaporation.

**941. Quantitative Genetics in Plant Breeding**  
Spring of even-numbered years. 3(3-0) Interdepartmental with Forestry and Horticulture.  
P: CSS 450, STT 422.  
Theoretical genetic basis of plant breeding with emphasis on traits exhibiting continuous variation. Classical and contemporary approaches to the study and manipulation of quantitative trait loci.

**943. Techniques of Analyzing Unbalanced Research Data**  
Spring, 4(4-0) Interdepartmental with Animal Science, Forestry, Horticulture, and Fisheries and Wildlife. Administered by Animal Science.  
P: STT 464. R: Open only to graduate students in the College of Agriculture and Natural Resources.  
Linear model techniques to analyze research data characterized by missing and unequal number of observations in classes. Simultaneous consideration of multiple factors. Estimable comparisons. Hypothesis testing. Computational strategies. Variance and covariance components. Breeding values.

**999. Doctoral Dissertation Research**  
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course.  
R: Open only to doctoral students in Crop and Soil Sciences.

## EARTH SCIENCE

ES

### Department of Geological Sciences College of Natural Science

**445. Field Studies in Earth Science**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course.  
R: Approval of department.  
Field experience and techniques in geological sciences, meteorology, soil science, or oceanology.

**446. Laboratory Investigations in Earth Science**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course.  
P: ES 445 or concurrently. R: Approval of department.  
Laboratory techniques and investigations in geological sciences, meteorology, soil science, or oceanology.

**800. Special Problems in Earth Science**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course.  
R: Approval of department.  
Individual faculty directed study on topics in earth science.

## ECONOMICS

EC

### Department of Economics The Eli Broad College of Business and The Eli Broad Graduate School of Management

**201. Introduction to Microeconomics**  
Fall, Spring, Summer. 3(3-0)  
R: Not open to students with credit in EC 251H.  
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**  
Fall, Spring, Summer. 3(3-0)  
R: Not open to students with credit in EC 252H.  
Determinants of Gross National Product, unemployment, inflation and economic growth. National income accounting and fiscal policy. Aggregate demand, supply management and monetary policy.

**210. Economics Principles Using Calculus**  
Fall. 3(3-0)  
P: MTH 133 or MTH 153H or MTH 126. R: Not open to students with credit in EC 201 or EC 202.  
A combined microeconomics and macroeconomics course. Emphasis on topics of interest in engineering and management, such as discounting, cost-benefit analysis, innovation, externalities, and the role of government regulation.

**251H. Microeconomics and Public Policy**  
Fall, Spring. 4(4-0)  
R: Not open to students with credit in EC 301.  
Theories of consumer behavior, production and cost. Output and price determination in competition and monopolies. Welfare economics, general equilibrium, externalities, and public goods.

**252H. Macroeconomics and Public Policy**  
Fall, Spring. 3(3-0)  
P: EC 251H; or EC 201, EC 301. R: Not open to students with credit in EC 302.  
Theory of national income, unemployment, inflation and economic growth and its application to economic analysis and policy.

**301. Intermediate Microeconomics**  
Fall, Spring, Summer. 3(3-0)  
P: EC 201, EC 202. R: Not open to students with credit in EC 251H.  
Theories of consumer choice, production, cost, perfect competition, and monopoly. Welfare economics, general equilibrium, externalities and public goods.

**302. Intermediate Macroeconomics**  
Fall, Spring, Summer. 3(3-0)  
P: EC 201, EC 202. R: Not open to students with credit in EC 252H.  
National income accounting. Determination of aggregate output, employment, price level, and inflation rate. Policy implications.

**303. Economic Thought I**  
Fall. 3(3-0)  
P: EC 201 or EC 251H; EC 202 or EC 252H.  
Forerunners of classical economics. Classical economic thought from Adam Smith to J.S. Mill. The socialist reaction.  
SA: EC 403

**304. Economic Thought II**  
Spring. 3(3-0)  
P: EC 201 or EC 251H; EC 202 or EC 252H.  
Decline of classical economics and rise of marginalist value and distribution theory. Marxism and institutionalism.  
SA: EC 404

**306. Comparative Economic Systems**  
Fall. 3(3-0)  
P: EC 201 or EC 251H; EC 202 or EC 252H.  
Characteristics and functions of economic systems. Alternative patterns of economic control, planning, and market structure. Theories, philosophies, and experiences associated with capitalism, socialism, and mixed economies.

**310. Economics of Developing Countries**  
Spring. 3(3-0)  
P: EC 201 or EC 251H  
Overview of economic patterns and policy issues of developing countries such as modern economic growth and structural transformation, state controls versus markets, poverty and human welfare, investments in human resources, and trade and industrialization.

**330. Money, Banking, and Financial Markets**  
Fall, Spring, Summer. 3(3-0)  
P: EC 201 or EC 251H; EC 202 or EC 252H.  
Money markets and financial intermediation. Money, the Federal Reserve System, and monetary policy. Regulation of money markets.

**335. Taxes, Government Spending and Public Policy**  
Fall, Spring, Summer. 3(3-0) Interdepartmental with Public Resource Management.  
P: EC 201 or EC 251H. R: Not open to students with credit in EC 435 or EC 436.  
Economics of the public sector. Public goods, externalities, design and incidence of the tax system. Equity and efficiency effects of government programs.

**340. Survey of International Economics**  
Fall, Spring, Summer. 3(3-0)  
P: EC 201 or EC 251H; EC 202 or EC 252H. R: Not open to students with credit in EC 440 or EC 441.  
Comparative advantage. Costs and benefits of trade. International economic policies. Balance of payments. Foreign exchange markets. The international monetary system. Contemporary trade and international currency issues.

**360. Private Enterprise and Public Policy**  
Fall, Spring, Summer. 3(3-0)  
P: EC 201 or EC 251H.  
Effects of antitrust, economic regulation, and other public policies on competition, monopoly, and other market problems in the United States economy.

**380. Labor Relations and Labor Market Policy**  
Fall, Spring, Summer. 3(3-0)  
P: EC 201 or EC 251H.  
Development, functions, legal framework, and economic effects of unions and collective bargaining. Institutions and economic impacts of government programs. Minimum wages, workers' compensation, unemployment insurance, and antidiscrimination policies.

**385. International Labor Market Policy and Labor Relations**  
Fall. 3(3-0)  
P: EC 201 or EC 251H R: Not open to students with credit in EC 380.  
Comparative treatment of labor policy and labor relations in the United States, Western Europe, Japan, Canada, and Australia. Analysis of how different policies affect wages, living standards, and economic efficiency. Labor markets and integration of national economies.

**401. Advanced Microeconomics**  
Fall, Spring. 3(3-0)  
P: EC 301 or EC 251H.  
Economics of uncertainty and incomplete information. Game theory and theories of oligopoly. Transaction costs. Advanced topics in welfare economics, general equilibrium, externalities, and public goods.