

# ECONOMICS

The study of economics investigates the consequences of scarcity, which forces people, organizations, and governments to choose among competing objectives. Economics looks at these choices and how they affect the production of goods and services, market prices, national output, unemployment, inflation, economic growth, and the use and distribution of resources within and across nations. Part of the social and behavioral sciences in the Columbian College of Arts and Sciences, the economics program exposes students to macroeconomics, microeconomics, labor economics, the economics of industry, international finance, international trade and development, money and banking, the economics of government and public policy, and econometrics.

Visit the Department of Economics website (<https://economics.columbian.gwu.edu/>) for additional information.

## UNDERGRADUATE

### Bachelor's program

- Bachelor of Arts with a major in economics (<https://bulletin.gwu.edu/arts-sciences/economics/ba/>)
- Bachelor of Science with a major in economics (<https://bulletin.gwu.edu/arts-sciences/economics/bs/>)

### Combined programs

- Dual Bachelor of Arts or Bachelor of Science with a major in economics and Master of Public Policy (<https://bulletin.gwu.edu/arts-sciences/economics/combined-ba-or-bs-and-mpp/>)

### Minor

- Minor in economics (<https://bulletin.gwu.edu/arts-sciences/economics/minor/>)

## GRADUATE

### Master's programs

- Master of Science in the field of applied economics (<https://bulletin.gwu.edu/arts-sciences/economics/ms-applied-economics/>)

### Combined programs

- Dual Master of Science in the field of applied economics and Graduate Certificate in accountancy (<https://bulletin.gwu.edu/arts-sciences/economics/dual-ms-applied-economics-gc-accountancy/>)
- Dual Master of Science in the field of applied economics and Graduate Certificate in budget and public finance (<https://bulletin.gwu.edu/arts-sciences/economics/dual-ms-applied-economics-gc-budget-public-finance/>)
- Dual Master of Science in the field of applied economics and Graduate Certificate in business analytics (<https://bulletin.gwu.edu/arts-sciences/economics/dual-ms-applied-economics-gc-business-analytics/>)

- Dual Master of Science in the field of applied economics and Graduate Certificate in data science (<https://bulletin.gwu.edu/arts-sciences/economics/dual-ms-applied-economics-gc-data-science/>)
- Dual Master of Science in the field of applied economics and Graduate Certificate in digital marketing and analytics (<https://bulletin.gwu.edu/arts-sciences/economics/dual-ms-applied-economics-gc-digital-marketing-communications/>)
- Dual Master of Science in the field of applied economics and Graduate Certificate in environmental resource policy (<https://bulletin.gwu.edu/arts-sciences/economics/dual-ms-applied-economics-gc-environmental-resource-policy/>)
- Dual Master of Science in the field of applied economics and Graduate Certificate in financial management (<https://bulletin.gwu.edu/arts-sciences/economics/dual-ms-applied-economics-gc-financial-management/>)
- Dual Master of Science in the field of applied economics and Graduate Certificate in geographical information systems (<https://bulletin.gwu.edu/arts-sciences/economics/dual-ms-applied-economics-gc-gis/>)
- Dual Master of Science in the field of applied economics and Graduate Certificate in sport management (<https://bulletin.gwu.edu/arts-sciences/economics/dual-ms-applied-economics-gc-sport-management/>)

## Doctoral program

- Doctor of Philosophy in the field of economics (<https://bulletin.gwu.edu/arts-sciences/economics/phd/>)

## FACULTY

### Faculty

Professors: M.D. Bradley, M.X. Chen, B.R. Chiswick, J.J. Cordes, V. Fon, J.E. Foster, S. Joshi (*Chair*), G.L. Kaminsky, P. Labadie, A.S. Malik, M.O. Moore, D.O. Parsons, J. Pelzman, R.F. Philips, R.M. Samaniego, J.C. Shambaugh, S.C. Smith, N. Vonortas, A.M. Yezer, T. Sinclair

Associate Professors: P. E. Carrillo, I.R. Foster, R.C. Jedwab, W.P. Mullin, S.M. Suranovic, C. Wei, J. Weiner, B.D. Williams

Assistant Professors: S. Hamilton, E.W.K. Hovander, D. Mackay, P. Tien, T. Williams, A. Fenizia, E. Kuka, N. Li, T. Regan, Y. Zhao

## COURSES

### Explanation of Course Numbers

- Courses in the 1000s are primarily introductory undergraduate courses
- Those in the 2000s to 4000s are upper-level undergraduate courses that also may be taken for graduate credit with permission and additional work assigned

- Those in the 6000s and 8000s are for master's, doctoral, and professional-level students
- The 6000s are open to advanced undergraduate students with approval of the instructor and the dean or advising office

Departmental Prerequisite: ECON 1011 and ECON 1012 are prerequisites to all other undergraduate courses offered by the Department of Economics.

Courses at the 8000 level are specifically designed for economics graduate students and typically require knowledge of calculus and one or more of the core theory and econometrics courses. Less well-prepared graduate students in other disciplines may register for 6000-level courses after having completed one of the following pairs of courses: ECON 6217 and ECON 6218; ECON 6218 and ECON 6219; ECON 2101 and ECON 2102; or ECON 2103 and ECON 2104, unless the course description indicates that these prerequisites have been waived. Intermediate-level micro and macro courses taken elsewhere usually satisfy this requirement, but introductory or first-year courses do not. Graduate students in economics can take 6000-level courses only with permission of their advisor.

#### **ECON 1000. Dean's Seminar. 3 Credits.**

The Dean's Seminars provide Columbian College first-year students focused scholarship on specific intellectual challenges. Topics vary by semester; see department for more details.

#### **ECON 1001. Principles of Mathematics for Economics. 3 Credits.**

Prepares students for college instruction in principles of microeconomic and macroeconomic theory, as well as instruction in business, social science, and basic science courses that do not require knowledge of calculus. Restricted to students who have successfully completed high school algebra I and basic geometry prior to matriculation and who have taken the Assessment and Learning in Knowledge Spaces (ALEKS) placement examination at GW; No minimum ALEKS score is required for this course.

#### **ECON 1002. Introduction to Personal Finance. 3 Credits.**

Students gain practical foundational knowledge on personal finance (budgeting, managing credit, financing an education, buying a car or a house, investing and saving for retirement) and an understanding of the importance of financial literacy.

#### **ECON 1011. Principles of Economics I. 3 Credits.**

Major economic principles, institutions, and problems in contemporary life. Microeconomics—supply and demand, the price system and how it works, competitive and monopolistic markets. Prerequisites: ECON 1001 with a grade of B- or above or ALEKS test score of 61 or above. Credit cannot be earned for this course and HONR 2043.

#### **ECON 1012. Principles of Economics II. 3 Credits.**

Continuation of ECON 1011. Major economic principles, institutions, and problems in contemporary life. Topics in macroeconomics, including national income concepts, unemployment and inflation, institutions of monetary control. Prerequisite: ECON 1011 OR HONR 2043. Credit cannot be earned for this course and HONR 2044.

#### **ECON 1099. Variable Topics. 1-36 Credits.**

#### **ECON 2101. Intermediate Microeconomic Theory. 3 Credits.**

Analysis of household economic behavior, including derivation of demand functions. Analysis of firm behavior, including derivation of supply frameworks. Demand and supply interaction under various market structures and in factor markets. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 or HONR 2044; and MATH 1221 or MATH 1231 or MATH 1252. Credit cannot be earned for this course and ECON 2103.

#### **ECON 2102. Intermediate Macroeconomic Theory. 3 Credits.**

Investigation of the determinants of national income, inflation, unemployment, and interest rates. Alternative business cycle theories, with emphasis on the role of imperfect information, uncertainty, and expectations. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 or HONR 2044; and MATH 1221 or MATH 1231 or MATH 1252. Credit cannot be earned for this course and ECON 2104.

#### **ECON 2103. Intermediate Microeconomic Theory: A Mathematical Approach. 3 Credits.**

Analysis of household economic behavior, including derivation of demand functions, and of firm behavior, including derivation of supply frameworks; demand and supply interaction under various market structures and in factor markets; reliance on constrained and unconstrained optimization techniques when analyzing household and firm behavior. Corequisite: MATH 1232. Recommended for students pursuing the BS degree in economics. Prerequisites: ECON 1011 and ECON 1012; or HONR 2043 and HONR 2044; MATH 1221 or MATH 1231 or MATH 1252. Credit cannot be earned for this course and ECON 2101.

#### **ECON 2104. Intermediate Macroeconomic Theory: A Mathematical Approach. 3 Credits.**

Development and application of mathematical models of aggregate economic behavior with a focus on the intertemporal choices made by households, firms, and governments. Corequisite: MATH 1232. Recommended for students pursuing the BS degree in economics. Prerequisites: ECON 1011 and ECON 1012; or HONR 2043 and HONR 2044; and MATH 1221 or MATH 1231 or MATH 1252. Credit cannot be earned for this course and ECON 2102.

#### **ECON 2121. Financial Economics. 3 Credits.**

Economic analysis of key financial institutions, markets, and variables. Investigation of performance of asset markets and the roles of money, credit, interest rates, exchange rates. Examination of private sector institutions. Roles of regulators. Prerequisites: ECON 1011 and ECON 1012; or HONR 2043 and HONR 2044. Credit cannot be earned for this course and FINA 3301.

#### **ECON 2122. Monetary Theory and Policy. 3 Credits.**

Analysis of classic and modern monetary theories and their application to current economic conditions. The links between theory and policy. The altered role of money over time; the new money technology. Prerequisites: ECON 1011 and ECON 1012.

**ECON 2123. Introduction to Econometrics. 3 Credits.**

Construction and testing of economic models: regression theory, parameter estimation, and statistical techniques applicable to economic models. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 or HONR 2044; and MATH 1221 or MATH 1231; and STAT 1051 or STAT 1053 or STAT 1111. Same As: STAT 2123.

**ECON 2136. Environmental and Natural Resource Economics. 3 Credits.**

Analysis of a variety of environmental and natural resource problems. The economic causes of these problems, their consequences, and the relative merits of alternative policies for dealing with them. Prerequisites: ECON 1011 and ECON 1012; or HONR 2043 and HONR 2044.

**ECON 2151. Economic Development. 3 Credits.**

Theories and empirical studies of the economic problems of developing countries. Prerequisites: ECON 1011 or HONR 2043 and ECON 1012 or HONR 2044. Credit cannot be earned for this course and ECON 6250.

**ECON 2151W. Economic Development. 3 Credits.**

Includes a significant engagement in writing as a form of critical inquiry and scholarly expression to satisfy the WID requirement. Prerequisites: ECON 1011 and ECON 1012.

**ECON 2157. Urban and Regional Economics. 3 Credits.**

Analysis of the determinants of urban growth and development; firm location; the functioning of urban land and housing markets. Prerequisites: ECON 1011 and ECON 1012.

**ECON 2158. Industrial Organization. 3 Credits.**

Analysis of market structure, conduct, and performance of firms in a market economy, with emphasis on case studies of U.S. industries. Prerequisite: ECON 1011–ECON 1012.

**ECON 2159. Government Regulation of the Economy. 3 Credits.**

Economic analysis of antitrust and regulation in the American economy. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 or HONR 2044; and ECON 2101 or ECON 2103 or ECON 2158.

**ECON 2167. Economics of Crime. 3 Credits.**

Analysis of crime, both empirical and theoretical, that examines the links between law and economics, the economics of criminal participation, and the economics of law enforcement. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 or HONR 2044.

**ECON 2169. Introduction to the Economy of China. 3 Credits.**

Background, organization, and operation of the economy. Appraisal of performance and analysis of problems of development. Prerequisites: ECON 1011 or HONR 2043 and ECON 1012 or HONR 2044.

**ECON 2180. Survey of International Economics. 3 Credits.**

Basic concepts of international trade and international finance, emphasizing policy issues. Does not satisfy ECON major or minor elective requirements if taken concurrent with or after successful completion of ECON 2181, or ECON 2182, or ECON 3181. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 or HONR 2044. Credit cannot be earned for this course and ECON 6280.

**ECON 2181. International Trade Theory and Policy. 3 Credits.**

International trade and the effects of trade on consumers, producers, and workers; cause and effect of international movement of factors, e.g., foreign direct investment, outsourcing, and migration; impacts of trade policies and trade agreements. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 or HONR 2044. Credit cannot be earned for this course and ECON 6283.

**ECON 2182. International Macroeconomic Theory and Policy. 3 Credits.**

Topics include the balance of payments, the determination of exchange rates and prices in open economies, the interaction of the exchange rate and domestic economic activity, international financial markets, and exchange rate and financial crises. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 and HONR 2044. Credit cannot be earned for this course and ECON 6284.

**ECON 2195W. Special Topics. 3 Credits.**

Includes a significant engagement in writing as a form of critical inquiry and scholarly expression to satisfy the WID requirement.

**ECON 2198. Special Topics in Economics - Regional. 3 Credits.**

Topics cover individual countries or regions of the world and vary depending on current issues of interest and faculty availability. Prerequisites: ECON 1011 and ECON 1012.

**ECON 2199. Special Topics in Economics. 3 Credits.**

Topics vary depending on current issues of interest and faculty availability. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 or HONR 2044.

**ECON 3098. Variable Topics - Regional Economics. 1-9 Credits.**

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**ECON 3099. Variable Topics. 1-12 Credits.****ECON 3105. Economic Forecasting. 3 Credits.**

Theory and empirical analyses of economic trends and fluctuations; use of economic indicators and simple econometric models. Prerequisites: ECON 1011 and ECON 1012; and ECON 2102 or ECON 2104; and ECON 2123.

**ECON 3142. Labor Economics. 3 Credits.**

Analysis of labor supply and demand; measurement and theory of unemployment; occupational choice; wage differentials; labor market issues and policies. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 or HONR 2044; and ECON 2101 or ECON 2103.

**ECON 3148. Health Economics. 3 Credits.**

Analysis of economic theories and applications to the demand for and supply of healthcare. Examination of the role of government in healthcare, public health, and unhealthy behavior (e.g., smoking). Prerequisites: ECON 2101 or ECON 2103.

**ECON 3161. Public Finance: Expenditure Programs. 3 Credits.**

Economic analysis of government spending and social regulation program; public goods, externalities, income transfer and social insurance programs, and benefit-cost analysis of government programs. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 or HONR 2044; and ECON 2101 or ECON 2103.

**ECON 3162. Public Finance: Taxation. 3 Credits.**

Economic analysis of taxes. Topics include individual and corporate income taxes, payroll taxes, sales and excise taxes, property and wealth taxes, design of tax systems, and effects of taxation on labor and capital markets. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 and HONR 2044; and ECON 2101 or ECON 2103.

**ECON 3165. Economics of Human Resources. 3 Credits.**

Economic analysis of education and training, labor market discrimination, marriage and the family, and social security. Prerequisites: ECON 1011 and ECON 1012; and ECON 2101 or ECON 2103.

**ECON 3190. Law and Economics. 3 Credits.**

An introduction to the economic analysis of legal systems. How laws alter behavior and how laws might be designed to satisfy efficiency and fairness criteria. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 or HONR 2044; and ECON 2101 or ECON 2103.

**ECON 3191. Game Theory. 3 Credits.**

Introduction to game theory, covering concepts such as Nash equilibrium, evolutionary games, backward induction and subgame perfection, Bayesian–Nash games of imperfect information, adverse selection, and moral hazard. Prerequisites: ECON 1011 or HONR 2043; and ECON 1012 or HONR 2044; and ECON 2101 or ECON 2103.

**ECON 3198. Advanced Topics in Economics - Regional. 3 Credits.**

Topics cover individual countries or regions of the world and vary depending on current issues of interest and faculty availability. Prerequisites: Depending on the topic: ECON 2101 (or ECON 2103) or ECON 2102 (or ECON (2104) or ECON 2123.

**ECON 3199. Advanced Topics in Economics. 3 Credits.**

Topics vary depending on current issues of interest and faculty availability. Prerequisites: Depending on the topic: ECON 2101 (or ECON 2103) or ECON 2102 (or ECON (2104) or ECON 2123.

**ECON 4198W. Proseminar in Economics. 3 Credits.**

Preparation and presentation of a research paper in any field of economics agreed upon by the student and instructor. Restricted to seniors in the economics program. Prerequisites: ECON 2101 or ECON 2103; and ECON 2102 or ECON 2104; and ECON 2123 or STAT 2123 or STAT 2112 or STAT 2118; and completion of at least three ECON elective courses taken at the 2000 level or above. Includes a significant engagement in writing as a form of critical inquiry and scholarly expression to satisfy the WID requirement.

**ECON 4199. Independent Research - Economics. 3 Credits.**

Independent research. Prerequisites: ECON 1011 and ECON 1012; and completion of 12 credits of upper-division economics courses, including ECON 2101 or ECON 2103 and ECON 2102 or ECON 2104, with a minimum grade-point average of 3.4; and approval of an independent research project by a faculty member of the economics department.

**ECON 5099. Variable Topics. 1-99 Credits.****ECON 6217. Survey of Economics I. 3 Credits.**

Intermediate-level microeconomic theory for graduate students in fields other than economics.

**ECON 6218. Survey of Economics II. 3 Credits.**

Continuation of ECON 6217. Intermediate-level macroeconomic theory for graduate students in fields other than economics.

**ECON 6219. Managerial Economics. 3 Credits.**

Intermediate microeconomic theory, with emphasis on production and costs, market structure and pricing, risk analysis, and investment theory and capital budgeting. Credit cannot be earned for both this course and ECON 6219.

**ECON 6237. Economics of the Environment and Natural Resources. 3 Credits.**

Analysis of public policy problems relating to the environment and natural resources development and management. Prerequisite: ECON 6217.

**ECON 6249. Industrial Org-TComm Industry. 3 Credits.****ECON 6250. Survey of Economic Development. 3 Credits.**

An introduction to economic problems faced by less developed countries. Emphasis on applications to policymaking and evaluation. Recommended background: background in microeconomics and macroeconomics. Credit cannot be earned for this course and ECON 2151.

**ECON 6253. Survey of Economic Development. 3 Credits.**

Introduction to the economic analysis of problems of, and policies to improve, economic development in less developed countries. Prerequisites: Departmental approval. Recommended background: Prior completion of a principles of economics course that includes micro- and macroeconomics content; intermediate microeconomics and statistical analysis/econometrics are highly recommended.

**ECON 6255. Economics of Technological Change. 3 Credits.**

Economics of research and development; innovation and growth; the role of government in the development and use of new technology.

**ECON 6269. Economy of China. 3 Credits.**

Analysis of organization, operation, policies, and problems. Development of the economy since 1949.

**ECON 6280. Survey of International Economics. 3 Credits.**

Introductory international trade and finance, primarily for students in the Elliott School. Topics include the economic effects of trade liberalization and protection, exchange rate determination, and macroeconomic policies in an open economy. Recommended background: introductory microeconomics and macroeconomics. Credit cannot be earned for this course and ECON 2180.



**ECON 6283. Survey of International Trade Theory and Policy. 3 Credits.**

For graduate students in fields other than economics. Survey of international economics and policy; application of comparative advantage and other arguments for trade; impact of trade on a domestic economy; new arguments for protectionism; and regional trading blocs. Credit cannot be earned for this course and ECON 2181.

**ECON 6284. Survey of International Macroeconomics and Finance Theory and Policy. 3 Credits.**

For graduate students in fields other than economics. Open economy macroeconomics; international finance; balance of payments accounting; exchange markets; alternative models of balance of payments determination and adjustment; behavior of flexible exchange rate systems. Credit cannot be earned for this course and ECON 2182.

**ECON 6290. Principles of Demography. 3 Credits.**

Introduction to basic demographic perspectives and data; methods for analysis of population size, distribution, and composition; determinants and consequences of population trends. Departmental prerequisite waived. Same as GEOG 6290/ SOC 6290/ STAT 6290.

**ECON 6292. Topics in International Trade. 3 Credits.**

Topics on international trade issues and policy. Primarily for master's students in programs other than economics. May be repeated for credit if topic differs.

**ECON 6293. Topics in International Finance. 3 Credits.**

Topics on macroeconomic issues and policies in open economies, including exchange rate regimes, determinants of international capital flows, currency crises, financial contagion, current account sustainability and sovereign crises, fiscal problems, and macro-policies in emerging markets and mature economies.

**ECON 6294. Topics in Economic Development. 3 Credits.**

Topics on economic development issues and policy vary depending on faculty availability and interest. Primarily for master's students in programs other than economics. May be repeated for credit if topic differs.

**ECON 6295. Special Topics. 3 Credits.**

Topics vary, depending on current issues of interest and faculty availability.

**ECON 6298. Reading and Research. 3 Credits.**

Independent research. Restricted to master's candidates.

**ECON 6300. Mathematical Methods for Economics. 3 Credits.**

Instruction in the mathematical background required to appreciate and understand the use of mathematics in economic analysis, including multivariable calculus, integral calculus, and linear algebra. Restricted to students in the MS in applied economics program or with the permission of the instructor.

**ECON 6301. Applied Microeconomic Theory. 3 Credits.**

The principal areas of microeconomic theory: consumer demand, decision-making under uncertainty, production and costs, game theory, product markets, factor markets, and market failures. Emphasis on applying theory to issues in the real world. Restricted to students in the MS in applied economics program. Prerequisites: ECON 6300; students may enroll concurrently in ECON 6301 and ECON 6300 with the permission of the instructor.

**ECON 6305. Applied Macroeconomic Theory. 3 Credits.**

Development of an integrated framework for analyzing the determination of macroeconomic variables such as total production, unemployment and inflation; interpreting macroeconomic data and policy. Restricted to students in the MS in applied economics program or with the permission of the instructor.

**ECON 6321. Applied Managerial Economics. 3 Credits.**

The application of economic principles and methodologies to key management decisions within organizations. Recommended background: Prior completion of a course in intermediate microeconomics.

**ECON 6323. Applied Behavioral Economics. 3 Credits.**

The application of economic principles and methodologies to key management decisions within organizations. Recommended background: Prior completion of a course in intermediate microeconomics.

**ECON 6325. Applied Game Theory. 3 Credits.**

Equilibrium concepts based on the Nash Equilibrium; application of these concepts to oligopolistic markets, long-term relationships in repeated games, auctions, reputation formation, and others. Recommended background: Prior completion of a course in intermediate microeconomics and one semester of undergraduate calculus.

**ECON 6327. Causal Inference and Research Design. 3 Credits.**

Empirical techniques in applied economic research, focusing on causal inference methods such as regression discontinuity, difference-in-differences, instrumental variables, panel methods, sample selection/matching issues, and clustering techniques.

**ECON 6330. Applied Macroeconomics and Money. 3 Credits.**

Motivations for employing the modern, expanded tools of a central bank; historical and present limitations. Recommended background: Prior completion of a course in intermediate macroeconomics.

**ECON 6335. Applied Financial Derivatives. 3 Credits.**

Introduction to the theoretical and practical aspects of financial and derivative markets; application of quantitative and statistical approaches to a variety of problems. Recommended background: Prior completion of a course in intermediate microeconomics.

**ECON 6337. Applied Environmental Economics. 3 Credits.**

Examines market failure and applies microeconomic principles to evaluate and measure the damages caused by polluting activities, the benefits of improving environmental quality, and the role of government in regulating the environment.

**ECON 6340. Applied Labor Economics and Public Policy. 3 Credits.**

Topics in labor economics, including unemployment, unions, immigration, the minimum wage, pensions, worker mobility, and inequality. Recommended background: Prior completion of a course in intermediate microeconomics. Recommended background: Prior completion of a course in intermediate microeconomics.

**ECON 6344. Applied Industrial Organization. 3 Credits.**

The behavior of firms and implications of market structure and resource allocation; market participants, the role of transaction costs, product differentiation, imperfect knowledge, and market contestability. Public policy related to monopoly regulation and antitrust law. Use of standard microeconomic empirical and theoretical tools, including an introduction to game theory. Recommended background: Prior completion of a course in intermediate microeconomics and one semester of undergraduate calculus.

**ECON 6350. Applied Development Economics. 3 Credits.**

The complex causes of underdevelopment and contemporary ideas about how to make development succeed; theory underlying development economics, as well as the analytical tools used in development research. Students are expected to have a working understanding of the concepts of calculus. Recommended background: Prior completion of a course in intermediate microeconomics or intermediate macroeconomics.

**ECON 6374. Probability and Statistics for Economics. 3 Credits.**

Basics of research design, probability theory, mathematical expectations, univariate and bivariate statistical comparison tools, and a brief introduction to regression analysis. Restricted to students in the applied economics program or with the permission of the instructor. Recommended background: Knowledge of calculus and matrix algebra is necessary for the homework, experience using programming tools SPSS, STATA, R, or SAS is advantageous but not required, prior exposure to elementary statistics/econometrics as an undergraduate is preferred but not required.

**ECON 6375. Applied Econometrics. 3 Credits.**

Introduction to the skills needed to critically evaluate and conduct econometric analysis. Including interpreting regression results and econometric methods to estimate and test economic models and address causal questions using observational data. Restricted to students in the MS in applied economics program or with the permission of the instructor. Prerequisites: ECON 6300 and ECON 6374 or equivalent.

**ECON 6376. Time Series Analysis. 3 Credits.**

The tools required to understand, implement, and interpret common models used in time series econometrics. Students become proficient with performing basic time series analysis and forecasting using time series statistical software. Restricted to students in the MS in applied economics program or with the permission of the instructor. Prerequisites: ECON 6305 and ECON 6374 or equivalent.

**ECON 6378. Machine Learning with Python for Economists. 3 Credits.**

Foundational machine learning techniques, including regression, classification, support vector machines, dimensionality reduction, clustering, random forest, and boosting. Implementing Python and surveying artificial neural networks and deep learning.

**ECON 6379. Causal Inference and Research Design. 3 Credits.**

Empirical techniques in applied economic research, focusing on causal inference methods such as regression discontinuity, difference-in-differences, instrumental variables, panel methods, sample selection/matching issues, and clustering techniques. Prerequisites: ECON 6300 and ECON 6374 or equivalents.

**ECON 6997. Independent Research. 1-3 Credits.**

This course is limited to master's degree candidates in Economics. Before permission is granted to register for ECON 6997, the student must submit a written plan of study for the approval of the staff member of the department who will be directing the research. The written plan must also be approved by the program director. This course may be repeated once for credit but to no more than a total of 6 credits.

**ECON 8301. Microeconomic Theory I. 3 Credits.**

Theory of unconstrained optimization; optimization subject to equality and inequality constraints, along with applications. Profit maximization, utility maximization and cost minimization, concave and quasi-concave functions, monotone comparative statics, duality theory, the envelope theorem and Le Chatelier principle, and the Kuhn-Tucker conditions.

**ECON 8302. Microeconomic Theory II. 3 Credits.**

Expected utility theory, general equilibrium in a pure exchange economy and economy with production, welfare theorems and the core theory of the competitive firm in the short run and long run, monopoly and price discrimination, models of oligopoly. Prerequisite: ECON 8301.

**ECON 8303. Microeconomic Theory III. 3 Credits.**

Theory of games, including Nash equilibrium and its refinements and comparative statics, evolutionary game theory, multistage games and subgame perfection, repeated games and oligopolistic supergames, static and dynamic Bayesian games, auction theory, and bargaining theory. Prerequisite: ECON 8301 and ECON 8302.

**ECON 8305. Macroeconomic Theory I. 3 Credits.**

Alternative theories of income, employment, and the price level; impact of monetary and fiscal policy; role of expectations in the economy; and microfoundations of macroeconomic models and dynamic analysis.

**ECON 8306. Macroeconomic Theory II. 3 Credits.**

Extensions of alternative models of income determination, economic growth, and the application of analytical frameworks to the U.S. and international economies. Prerequisite: ECON 8305.

**ECON 8307. Macroeconomic Theory III. 3 Credits.**

Extensions to stochastic and dynamic general equilibrium frameworks, with emphasis on economic policy. Prerequisite: ECON 8306.

**ECON 8323. Monetary Theory and Policy I. 3 Credits.**

Theory of monetary policy within the framework of contemporary American central banking.

**ECON 8324. Monetary Theory and Policy II. 3 Credits.**

Continuation of ECON 8323. Theory of monetary policy within the framework of contemporary American central banking.

**ECON 8337. Environmental Economics. 3 Credits.****ECON 8341. Labor Economics I. 3 Credits.**

Theory of wages and employment, analysis of labor supply and demand. Analysis of unemployment; unions; wage regulation.

**ECON 8342. Labor Economics II. 3 Credits.**

Continuation of ECON 8341. Theory of wages and employment, analysis of labor supply and demand. Analysis of unemployment; unions; wage regulation.

**ECON 8345. Industrial Organization I. 3 Credits.**

Economic theory and evidence regarding industrial market structure, conduct, and economic performance.

**ECON 8346. Industrial Organization II. 3 Credits.**

Continuation of ECON 8345. Economic issues in antitrust and government regulation of the U.S. economy.

**ECON 8351. Development Economics I. 3 Credits.**

Major analytic concepts, measures, theoretical models, and empirical methods of development economics.

**ECON 8352. Development Economics II. 3 Credits.**

Continuation of ECON 8351. In-depth examination of special research topics with emphasis on methods in applied microeconomics.

**ECON 8357. Regional Economics. 3 Credits.**

Study of regional planning and growth models, including input-output, programming, and econometric models used by planning agencies; analysis of interregional production, trade, migration, firm location, and pricing models.

**ECON 8358. Urban Economics. 3 Credits.**

Analysis of spatial relationships among economic activities within an urban area including the urban land, labor, and housing markets; urban transportation models; fiscal relationships among jurisdictions.

**ECON 8363. Public Finance I. 3 Credits.**

Theoretical and empirical analysis of the economic role of the public sector and the effects of public expenditures on resource allocation and income distribution. Topics include public goods, externalities, social insurance, and benefit-cost analysis.

**ECON 8364. Public Finance II. 3 Credits.**

Theoretical and empirical analysis of the effects of taxes and transfers on the allocation of resources and income distribution. Topics include partial and general equilibrium models of tax incidence, effects of taxes on labor supply, saving, and portfolio choices of households and on investment and financing decisions of firms.

**ECON 8375. Econometrics I. 3 Credits.**

Statistical foundations for econometrics; standard methods of estimation and inference for classical and generalized regression models. Same as STAT 8375.

**ECON 8376. Econometrics II. 3 Credits.**

Topics may include asymptotic theory, statistical endogeneity, instrumental variables estimation, discrete and limited dependent variable models, and time-series models. Same as STAT 8376. Prerequisite: ECON 8375.

**ECON 8377. Econometrics III. 3 Credits.**

Econometric methods for systems of equations and panel data, with additional topics that may vary from year to year. Prerequisite: ECON 8376.

**ECON 8378. Economic Forecasting. 3 Credits.**

Introduction to the theoretical and applied aspects of economic forecasting. Topics include the role of forecasting, univariate time-series analysis, single equation models, multiple series models, and evaluation of forecasts. Prerequisites: ECON 8375 or permission of the instructor.

**ECON 8379. Laboratory in Applied Econometrics. 3 Credits.**

Application of econometric theory and the use of econometric software; students are required to write an empirical research paper. The course usually deals exclusively with either micro or macroeconomic issues. May be repeated for credit provided the topic differs.

**ECON 8381. International Trade Theory. 3 Credits.**

International trade theory, including alternative models of the gains from trade and evaluations of the new justifications for protectionism, and analysis of commercial policy, factor flows, and trade and investment with multinational corporations. Prerequisites: Most sections require calculus or permission of the instructor.

**ECON 8382. International Finance and Open-Economy Macroeconomics. 3 Credits.**

International finance, including alternative models of balance of payments behavior and adjustment, payments accounting, exchange markets, and alternative exchange-rate regimes.

**ECON 8383. International Financial Markets. 3 Credits.**

Financial economics and international financial markets. Topics include standard asset pricing theory, uncertainty in open economy macroeconomics models, financial market micro-structure, and incomplete markets.

**ECON 8395. Advanced Special Topics. 3 Credits.**

Topics vary depending upon current interests and faculty availability. Open to graduate students in economics. May be repeated for credit.

**ECON 8397. Paper Proposal Seminar. 3 Credits.**

Formulation of a paper proposal and development of paper and dissertation research strategies. Restricted to PhD students in economics in pre-candidacy.

**ECON 8997. Independent Research. 3 Credits.**

Prior to enrollment, a written plan of study must be submitted for approval of both the faculty member directing the research and the director of graduate studies for the PhD program or the department chair. May be repeated for a total of 6 credits. Restricted to doctoral degree candidates in economics. Prerequisites: departmental approval.

**ECON 8998. Advanced Reading and Research. 3-9 Credits.**

May be repeated for credit. Restricted to doctoral candidates in economics in pre-candidacy who have completed 48 credits of coursework.

**ECON 8999. Dissertation Research. 3-9 Credits.**

Students who have completed their coursework in pre-candidacy may register subject to department approval. May be repeated for credit. May not substitute for elective coursework. Restricted to PhD in economics students.