Economics

The Economics program explores the problems of a modern economy and introduces the methodological tools economists use. It emphasizes the development of analytical models and their application to important economic, social and political issues such as inflation, unemployment, taxation, poverty, pollution, government decision-making and regulation. Our faculty, which is made up of leading teacher-scholars, includes specialists in: economic history, game theory, microeconomics, industrial organization, macroeconomics, monetary economics, political economy and public finance.

The study of economics contributes to a broad liberal arts education and helps students develop superior problem-solving skills. It is an excellent course of study to pursue, whether students plan to enter the workforce after graduation or are considering graduate work in law, engineering or the social sciences. Economics also provides exceptional preparation for careers in business, either immediately following graduation or after completing master's-level graduate work in business (e.g., MBA, MS Finance). In addition to the introductory and intermediate economic theory courses, courses that have particular relevance for business include: Econ 335, Econ 413, Econ 4151, Econ 428, Econ 451, Econ 452 and Econ 467. Economics students with business interests should strongly consider completing at least one internship (academic credit for unpaid internships is available via Econ 299) to obtain practical business experience, and they should discuss with their advisers the possibility of taking courses such as accounting in the Olin Business School.

Contact: Dorothy Petersen, Academic Coordinator
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Website: http://economics.wustl.edu

Faculty

Chair
John Nachbar (http://economics.wustl.edu/nachbar)
PhD, Harvard University

Associate Chair
Marcus Berliant (http://economics.wustl.edu/berliant)
Graduate Placement Officer
PhD, University of California, Berkeley

Professors

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Graduate Admissions Officer, Weidenbaum Center Research Fellow
PhD, Cornell University

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Edward Mallinckrodt Distinguished Professor in Arts & Sciences,
Weidenbaum Center Research Fellow
PhD, Carnegie Mellon University

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Paulo Natenzon (http://economics.wustl.edu/people/paulo-natenzon)
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Academic Coordinator
PhD, Northwestern University

**Affiliated Faculty**

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PhD, Princeton University

Scott A. Baker (http://law.wustl.edu/faculty_profiles/profiles.aspx?id=7283)
JD, University of Chicago
PhD, University of North Carolina at Chapel Hill

**Professors Emeriti**

Lee K. Benham (http://economics.wustl.edu/people/Lee_Benham)
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David Levine (http://www.dklevine.com)
John H. Biggs Distinguished Professor of Economics
PhD, Massachusetts Institute of Technology

Wilhelm Neuefeind (http://economics.wustl.edu/people/William_Biggs_Distinguished_Professor_Economics)
PhD, Universität Bonn

Fredric Q. Raines (http://economics.wustl.edu/people/Frederic_Raines)
PhD, University of Wisconsin

**Majors**

The Major in Economics

Total units required: 37-39

Required courses:

- Econ 1011 Introduction to Microeconomics 3
- Econ 1021 Introduction to Macroeconomics 3
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 131</td>
<td>Calculus I</td>
<td>3</td>
</tr>
<tr>
<td>Math 132</td>
<td>Calculus II</td>
<td>3</td>
</tr>
<tr>
<td>Math 2200</td>
<td>Elementary Probability and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 493</td>
<td>Mathematical Economics</td>
<td>1-3</td>
</tr>
<tr>
<td>or Math 233</td>
<td>Calculus III</td>
<td></td>
</tr>
<tr>
<td>Econ 4011</td>
<td>Intermediate Microeconomic Theory</td>
<td>3</td>
</tr>
<tr>
<td>Econ 4021</td>
<td>Intermediate Macroeconomic Theory</td>
<td>3</td>
</tr>
<tr>
<td>Econ 413</td>
<td>Introduction to Econometrics</td>
<td>3</td>
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</tbody>
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**Total units: 25-27**

**Elective courses:**

Four advanced economics electives (12 units), at least two of which must have an Econ 4011 or Econ 4021 prerequisite.

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**Additional Information**

Majors must complete Econ 4011, Econ 4021 and the Econ 4011/Econ 4021 prerequisite electives in residence during the fall or spring semesters.

The 21 upper-level units (300- and 400-level) required for the major must be independent of other majors or minors (i.e., upper-level economics course work required for the major may not be double-counted for another major or a minor).

**Senior Honors:** Students are invited (in the second semester of the junior year) to participate in the honors program during their senior year if they meet certain academic requirements.

More information on the major, the minors, course offerings and the honors program are in the Economics Undergraduate Guide, available on the department website (http://economics.wustl.edu) and from the department. Students also are encouraged to contact the Academic Coordinator (dottie@wustl.edu) with any questions.

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**Minors**

**The Minor in General Economics**

**Economics Units required:** 15

**Required courses:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Econ 1011</td>
<td>Introduction to Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 1021</td>
<td>Introduction to Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 4011</td>
<td>Intermediate Microeconomic Theory</td>
<td>3</td>
</tr>
<tr>
<td>Econ 4021</td>
<td>Intermediate Macroeconomic Theory</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total units: 12**

**Elective course:** One elective having at least Econ 1011 and/or Econ 1021 as a prerequisite course.

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**Prerequisites:** The prerequisite courses for Econ 4011 are Econ 1011 and Math 132. In addition, Econ 493 or Math 233 must be taken prior to, or concurrent with, enrollment in Econ 4011. The prerequisite courses for Econ 4021 are Econ 1021 and Econ 4011.

**The Minor in Applied Microeconomics**

**Economics units required:** 15

**Required courses:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Econ 1011</td>
<td>Introduction to Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 1021</td>
<td>Introduction to Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 4011</td>
<td>Intermediate Microeconomic Theory</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total units: 9**

**Elective courses:**

- One economics elective having Econ 4011 as a prerequisite course.
- One economics elective having at least Econ 1011 and/or Econ 1021 as a prerequisite course.

**Prerequisites:** The prerequisite courses for Econ 4011 are Econ 1011 and Math 132. In addition, Econ 493 or Math 233 must be taken prior to, or concurrent with, enrollment in Econ 4011.

**Courses**


**L11 Econ 1011 Introduction to Microeconomics**

Determination of prices; distribution of national income; theory of production. For a thorough introduction to economics, Econ 1021 also should be taken.

Credit 3 units. A&S: SS, QA A&S IQ: SSC, AN EN: S

**L11 Econ 1021 Introduction to Macroeconomics**

Business fluctuations; inflation and recession; monetary and fiscal policy; economic development. For a thorough introduction to economics, Econ 1011 also should be taken.

Credit 3 units. A&S: SS, QA A&S IQ: SSC, AN EN: S

**L11 Econ 202 The Great Economists**

Examination of the great economic thinkers, the problems they sought to solve, the historically conditioned assumptions that they bring to their work, and the moral issues they raise. The class reads from the works of Adam Smith, Ricardo, Malthus, Marx, Veblen, Keynes, Schumpeter, Galbraith and others as well as commentary from Heilbroner. These readings are paired with selected texts on the social and moral issues of their times. Open only to participants in Text and Tradition. Same as L93 IPH 201B

Credit 3 units. A&S: TH A&S IQ: HUM Art: HUM EN: H
L11 Econ 2391 Economies as Cultural Systems
Many contemporary approaches to economics downplay or bracket the importance of culture in the workings of economic systems. In this class we focus on approaches to distribution and exchange in which culture and social institutions figure prominently, if not pre-eminently. We sample a diverse array of economies, from gift exchange to the ceremonial destruction of wealth, from Melanesia to Wall Street, in order to evaluate some of the assumptions that undergird market capitalism. These assumptions include the perception of market actors exclusively as calculative, maximizing individuals. Topics to be covered include the Industrial Revolution; utilitarianism; economic anthropology; the formal vs. substantivist debates; ethnography of finance, and Marxist sociology.
Same as L48 Anthro 3391
Credit 3 units. A&S: SS A&S IQ: SSC Art: SSC BU: ETH EN: S

L11 Econ 299 Internship
Students may receive up to 3 units of credit for an unpaid internship. The internship must be approved by the Career Center and supervised by a faculty member. Note: Consult Career Center for further information. This course does not count toward the major or minor in economics.
Credit variable, maximum 3 units.

L11 Econ 326 American Economic History
Basic theoretical concepts applied to analyze the changing structure and performance of the American economy from colonial times to the present. Prerequisites: Econ 1011 and 1021.
Credit 3 units. A&S: SS A&S IQ: SSC BU: BA EN: S

L11 Econ 335 Money and Banking
Money and the monetary system; money creation by the banking system; central bank functions; monetary theory and economic policy. Prerequisites: Econ 1011 and Econ 1021.
Credit 3 units. A&S: SS A&S IQ: SSC BU: BA EN: S

L11 Econ 348 Economic Realities of the American Dream
Exploration of the realities of economic life in the United States and how they correspond to the American Dream. Interdisciplinary perspectives from economics, sociology and other areas of social inquiry. Emphasis on the consistency between empirical data and different concepts of the American Dream. Specific topics to include sources of economic growth and changing living standards, unemployment, impact of globalization on U.S. citizens, economic mobility, poverty and inequality, and social justice. Prerequisites: Econ 1011 and Econ 1021, or consent of the instructors.
Credit 3 units. A&S: SS A&S IQ: SSC BU: BA EN: S

L11 Econ 3501 Political Economy
The course introduces students to the field of political economy. The approach is to apply the economic theory and concepts to political actors and behavior. Students are expected to learn: how economic and political forces may shape the incentives and constraint of political actors (e.g., voters and policy makers); the role of institutions in shaping both political behavior and policy outcomes. Prerequisite: Econ 1011.
Credit 3 units. A&S: SS A&S IQ: SSC EN: S

L11 Econ 352 Health Economics
Analysis of consumer demand for health care, medical technology and the role of health insurance. Emphasis placed on behavior of the physician (whether he acts as an agent for the consumer or on his own behalf); on the use of paramedics, preventive care, outpatient care and the general market organization of the health industry. The major concern is the rising cost of health care and appropriate public policy responses. Prerequisite: Econ 1011.
Credit 3 units. A&S: SS A&S IQ: SSC Art: SSC BU: BA

L11 Econ 3761 International Economics
This course provides an analysis of the international economy, the economic theories that help explain it, and analysis of important current issues of international economic policy. The course covers both trade and monetary issues. Prerequisites: Econ 1011 and Econ 1021.
Same as L97 IAS 376
Credit 3 units. A&S: SS A&S IQ: SSC Art: SSC BU: IS

L11 Econ 380 Labor and the Economy
Economic analysis of labor markets. Theory and policy applications of labor supply and labor demand; explanations of wage and income differentials; migration and immigration; discrimination; labor unions; unemployment. Prerequisite: Econ 1011.
Credit 3 units. A&S: SS A&S IQ: SSC Art: SSC EN: S

L11 Econ 4011 Intermediate Microeconomic Theory
Analytic theory of consumer and producer behavior under perfect and imperfect competition. Coverage of demand theory (indifference curves and utility functions) and preferences under uncertainty, including expected utility and risk aversion. Development of general equilibrium under pure exchange, including the concepts of competitive equilibrium and Pareto efficiency. Discussion of the role of time as it pertains to interest rates, discounting and net present value. Analysis of standard monopoly and simple oligopoly problems. Development of noncooperative game theory, including strategic and extensive-form equilibria and Nash and sub-game perfect equilibria. Thorough training in intermediate theory requires both Econ 4011 and Econ 4021. Prerequisites: Econ 1011, Math 132 and concurrent enrollment in, or prior completion of, either Math 233 or Econ 493 (Mathematical Economics).
Credit 3 units. A&S: SS A&S IQ: SSC EN: S

L11 Econ 4021 Intermediate Macroeconomic Theory
Credit 3 units. A&S: SS A&S IQ: SSC EN: S

L11 Econ 403 Economics of Law
The course provides an introduction to the economic analysis of law. Mastery of basic economic approaches to the study of legal institutions is a valuable skill that benefits a broad range of students. The course covers the fundamental contributions made
by the economic approach in five core areas: property, contracts, torts, litigation and crime. Time permitting we cover other areas of the law such as family, privacy and discrimination law. About 50 percent of the course is devoted to formal economic modeling of legal issues. Approximately 30 percent of the course focuses on empirical tests of the insights from the early theoretical contributions in the field and the theoretical models developed in class. The remaining 20 percent of the course uses classic legal cases to illustrate the real-world applications of the theoretical models developed in class. Prerequisite: Econ 4011. Econ 413 is recommended.
Credit 3 units. A&S: SS A&S IQ: SSC

L11 Econ 413 Introduction to Econometrics
Course provides a basic working knowledge of econometrics. Topics include: translation of economic theory into statistical models; statistical foundations of econometrics; pre-regression analysis; bivariate and multiple regression techniques; hypothesis testing; multicollinearity; specification error; auto-correlation; errors in variables; identification; and simultaneous estimation. Prerequisites: Econ 1011, Econ 1021, and Math 2200 or equivalent.
Credit 3 units. A&S: SS A&S IQ: SSC Art: SSC EN: S

L11 Econ 4151 Applied Econometrics
Introduction to econometrics as it is applied in microeconomics and macroeconomics (modular). Emphasis is on hands-on implementation of the models covered in the course. Topics related to the analysis of microeconomic data include cross-section and panel data linear models and robust inference; instrumental variables estimation; simultaneous equation models; models for discrete choice; and truncation, censoring and sample selection models. Topics related to the analysis of macroeconomic data include linear time series models; practical issues with likelihood-based inference; forecasting; structural identification based on timing restrictions; and computational methods for hypothesis testing. Prerequisites: Econ 4011 and Econ 413.
Credit 3 units. A&S: SS A&S IQ: SSC EN: S

L11 Econ 426 Capital Market Imperfections and Entrepreneurial Finance
Analysis of problems in capital markets for firm financing and institutional structures that address these problems. Investigation of asymmetric information between firms and potential investors and associated moral hazard and adverse selection problems that raise the cost of funds and constrain firm growth. Empirical tests for the presence of financing constraints on firms. A substantial portion of the course explores the role of venture capital, especially in the high-tech sector of the United States economy where venture capital is important for commercializing cutting-edge science. Prerequisite: Econ 4011. Econ 413 is recommended.
Credit 3 units. A&S: SS A&S IQ: SSC Art: SSC EN: S

L11 Econ 429 Decision Under Risk and Time
This course covers topics on individual decision making, subject to risk and to inter-temporal considerations. The emphasis is on economic modeling, which combines both theory and reality. The course begins by establishing a framework for analyzing preferences about risky outcomes. This framework is applied to practical problems such as portfolio choice, asset pricing and insurance. The remainder of the course considers decision-making in the long run, with focuses on the lifecycle consumption-versus-saving decision, the problem of time inconsistency and other real-world implications. Prerequisites: Econ 4011, Math 2200.
Credit 3 units. A&S: SS A&S IQ: SSC EN: S

L11 Econ 435 Open Economy Macroeconomics
This course begins with a review of international trade theory, of the balance of payment accounts, and their relationship to international borrowing and lending. We then study the asset approach to exchange rates determination, exchange rate behavior in the short and in the long run, and the relationship of exchange rates with prices and output. The course also explores monetary and fiscal policy under both fixed and floating exchange rates, macroeconomic policy coordination and optimum currency areas, international debt problems of developing countries, and their relation to stabilization program. Prerequisite: Econ 4021.
Credit 3 units. A&S: SS A&S IQ: SSC Art: SSC EN: S

L11 Econ 437 The Economics of Financial Intermediation
The structure and the role of banks have changed tremendously. The historically-traditional activity of granting loans and collecting deposits has evolved into a much richer and more complex set of financial contracts. The separation between financial asset trading activity and traditional commercial bank activity that was typical of the financial system in the period after the World War II also disappeared. Coincident with the evolution of financial institutions was the development of the asymmetric information model. The role of banks in the economy can be explained with the tools developed in these models of the economics of information, as a microeconomic theory of banking does not exist when information is symmetric and markets are complete. The economics of information literature is also used to explain the evolution of financial institutions and markets, and to understand the consequences of that evolution for economic outcomes (such as economic development and financial crises) and for monetary policy choices (such as central bank interventions, regulations and changes in the payments system). Prerequisite: Econ 4011; Econ 4021 recommended, but not required.
Credit 3 units. A&S: SS A&S IQ: SSC EN: S

L11 Econ 444 Innovation and Intellectual Property: Theory and Practice
Innovation — figuring out better and cheaper ways of satisfying human desires — is the key to improving our well-being. It is not patient saving and accumulation that makes us so much better off than we used to be: capital accumulation is only the conduit through which the innovation juices flow. The question is: What drives it? How come some societies are apparently much more innovative than others? How come we have the impression that most useful inventions took place in the past three centuries? Are there policies that help fostering innovation and others that hurt? The course tries to address these questions. Economists have many theories of innovation, some better than others. We look at the theories, we examine the facts (past and present), then we go back to the theories and reconsider their explanatory power. With this background, we approach the debate about intellectual property, what it is and what it is not good for, whose interests it serves, and whose well-being it thwarts. Prerequisite: Econ 4011.
Credit 3 units. A&S: SS A&S IQ: SSC EN: S
L11 Econ 445 Public Finance
The study of fundamental forms of market failure that provide the economic rationale for government action. The first third of the class examines market failure when an economy contains externalities and public goods and the general nature of public policies that address these issues. The second third addresses particular public policies, with a focus on their intended and unintended consequences and their costs. The final third addresses taxation. Topics include the measurement and evaluation of tax burdens, the federal personal income tax, tax evasion and proposals for fundamental tax reform. Prerequisite: Econ 4011.
Credit 3 units. A&S: SS A&S IQ: SSC Art: SSC

L11 Econ 448W Current Macroeconomic Issues
Review and extension of macroeconomic models from Econ 4021 from a comparative perspective and use of these models to analyze current macroeconomic policy issues. Topics include recession and recovery; long-term growth; saving and social security; investment; and monetary policy. Multiple writing assignments that emphasize critical analysis of theoretical perspectives and readings applied to current macroeconomic topics. Assignments are revised to improve logical structure, clarity and style. Enrollment limited to 15 students with priority given to senior economics majors. Prerequisite: Econ 4021.
Please note: Requests for online registration are waitlisted.
Credit 3 units. A&S: SS, WI A&S IQ: SSC, WI Art: SSC

L11 Econ 451 Environmental Policy
Course examines the relationship between environmental economics and environmental policy. The course focuses on air pollution, water pollution and hazardous wastes, with some attention given to biodiversity and global climate change. The course examines critically two prescriptions that economics usually endorses: (1) “balancing” of benefits against costs (e.g., benefit-cost analysis) and the use of risk analysis in evaluating policy alternatives; and (2) use of market incentives (e.g., prices, taxes or charges) or “property rights” instead of traditional command-and-control regulations to implement environmental policy. Prerequisite: Econ 1011.
Credit 3 units. A&S: SS A&S IQ: SSC Art: SSC BU: BA, ETH

L11 Econ 452 Industrial Organization
Theoretical and empirical analysis of the presence and value of competitive forces in the United States economy. Theories of industrial organization and development of criteria for performance of noncompetitive industries. Prerequisite: Econ 4011.
Credit 3 units. A&S: SS A&S IQ: SSC

L11 Econ 460 Urban Economics
Economic function of the city and the role of the city in a national economy. Local decision-making; financing of local government expenditures. An analysis of selected urban problems, such as causes and effects of housing market segregation; decay and abandonment; landlord-tenant relations; crime; and urban transport systems. Prerequisite: Econ 4011.
Credit 3 units. A&S: SS A&S IQ: SSC Art: SSC EN: S

L11 Econ 467 Game Theory
Introduction to the mathematical theory of games as applied to the study of economics. Topics include games of complete and incomplete information, noncooperative games with and without time dependency, and cooperative games with and without transferable utilities. Emphasis placed on game theoretic models of industrial organization and political economy. Prerequisites: Econ 4011, Math 233 and Math 2200.
Credit 3 units. A&S: SS A&S IQ: SSC Art: SSC

L11 Econ 469 Great Transformation
This course asks the question, “What brought about the Industrial Revolution and the emergence of the contemporary ‘capitalist, market society’?” In particular, is there a fundamental difference between the values, norms and cultures in “pre-capitalist” societies compared to post-Industrial Revolution societies? The answer to these questions depends on whether the Industrial Revolution represents an historical discontinuity — a “Great Transformation” turning point — or whether, instead, there is more continuity in human history than the “Great Transformation” theory would have us believe. These questions are important as we try to determine whether the current market society is sustainable or whether (and where and when) we should expect a “Great Transformation” to emerge. The course addresses these questions via readings from the best lessons of psychology, economics, anthropology and history, with a particular focus on data and empirical results. Classes consist of a combination of lectures and class discussions, supplemented by individual- and group-based writing assignments. Prerequisites: Econ 4011 and Econ 4021 or permission of instructor.
Credit 3 units. A&S: SS A&S IQ: SSC EN: S

L11 Econ 472 Topics in Growth and Development
This course highlights important empirical facts concerning growth and development in various countries at different development stages. Fundamental growth theory is then provided for explaining these facts systematically and for evaluating the consequences of commonly adopted development policies. Topics vary, but may include population; human capital and labor market development; R&D and innovation; finance and growth; modernization and industrial transformation; world income disparities and poverty problems; institutions and political economy issues; environmental and social factors; and international trade and economic integration. Prerequisites: Econ 4011 and Econ 4021.
Credit 3 units. A&S: SS A&S IQ: SSC EN: S

L11 Econ 4721 Advanced Topics in Modern Economic Growth
This course studies economic theories that explain the observed patterns of economic development across time and space. What explains the growth of the world economy since the Industrial Revolution? Why are the level and the growth rate of per-capita income so different across countries? What are the determinants of inequality and risk faced by individuals in different countries? Theories featuring the role of investment, human capital, technology, coordination, financial markets and environmental variables are presented. Theories are evaluated using historical data and detailed case studies. This course is designed to complement Econ 472. Prerequisite: Econ 4011.
Credit 3 units. A&S: SS A&S IQ: SSC EN: S

L11 Econ 474 The Poverty of Nations
This course focuses on the failures of economic development and the extreme and persistent poverty we find in South Asia, Sub-Saharan Africa and other parts of the developing world, including major urban centers. What exactly is poverty? Who
are the poor? How many of them are there? Why are they poor? What individual or collective actions can they (or we) take to improve their lot? Prerequisites: Econ 4011 and Econ 4021 or permission of instructor.
Credit 3 units. A&S: SS A&S IQ: SSC EN: S

**L11 Econ 483 Economics of Education**
The course involves analysis of the economic and social determinants and consequences of education. Because each person's education is an investment in human capital that allows the individual to contribute to society in a productive way, education becomes a crucial determinant of an economy's ability to achieve high growth with high wages, low unemployment and strong social cohesion. This course addresses three essential topics from the wide-ranging field of the economics of education. The first is demand-side oriented and includes: (1) the measurement of the returns to education in the labor market (human capital theory; the central idea of education as human capital investment); and (2) a characterization of the education production function, which relates the various inputs affecting a student's learning (schools, families, peers, neighborhoods, etc.) to measure outputs including labor market success, graduation rates and standardized test scores. The second important topic involves political economy and the supply side: the financing and provision of education. The third part of the course is devoted to the links between education and economic development, including cross-country differences in schooling, returns to schooling and per-capita income. Prerequisites: Econ 4011, Econ 4021 and Econ 413.
Credit 3 units. A&S: SS A&S IQ: SSC EN: S

**L11 Econ 488 Seminar in Political Economy**
The course aims to provide a rigorous analysis of topics in political economy. The approach is to apply economic theory and concepts to political actors and behavior. The course will address the following questions: How are individual preferences aggregated? How are collective decisions made? What are the relationships among individual preferences, incentives of political actors and policy outcomes? Prerequisite: Econ 4011.
Credit 3 units. A&S: SS

**L11 Econ 490 Independent Work**
Prerequisites: senior standing and permission of the supervising faculty member. Consult Academic Coordinator for further details. Note: This course does not count toward the major or minor in economics.
Credit variable, maximum 6 units.

**L11 Econ 493 Mathematical Economics**
The objective of this course is to develop the mathematical tools necessary for the study of intermediate micro- and macroeconomics theory and the advanced electives in economics. The principal focus will be the calculus of multivariate functions, including total and partial differentiation, unconstrained and constrained optimization of multivariate functions, and implicit and inverse function rules. Time permitting, the application of prior to utility theory and production and cost will be developed. Additional topics will include difference equations and an introduction to matrices. Economics majors and minors must take either this course or Math 233. Either this course or Math 233 must be taken prior to, or concurrently with, Econ 4011. Students who have taken, or are taking, Math 233 are encouraged to take this course as well. Prerequisites: Econ 1011 & Econ 1021, and Math 132.
Credit 1 unit. A&S: SS A&S IQ: SSC

**L11 Econ 496 Teaching Practicum in Economics**
Opportunity for undergraduates to assist in course instruction, tutoring and preparation of problems, readings and exam materials under supervision of faculty. Note: This course does not count toward the major or minor in economics.
Credit variable, maximum 3 units. A&S: SS EN: S

**L11 Econ 497 Research in Economics**
Opportunity to work as part of a research project under faculty supervision. Note: This course does not count toward the major or minor in economics. May be repeated for credit.
Credit variable, maximum 3 units. A&S: SS A&S IQ: SSC Art: SSC

**L11 Econ 4971 Research in Economics: Special Topics**
This is a fall-semester course taught by the Sam B. Cook Visiting Professor in Economics and Arts & Sciences. Focus and prerequisites vary with each offering; but prerequisites always include Econ 4011.
Credit 3 units. A&S: SS A&S IQ: SSC EN: S

**L11 Econ 499 Study for Honors**
Independent reading and research under faculty direction leading to a senior honors thesis. Prerequisites: invitation into the departmental Honors Program and permission of the Director of Undergraduate Studies.
Credit 3 units. A&S: SS