Economics

The Economics program explores the problems of a modern economy and introduces the methodological tools that economists use. It emphasizes the development of analytical models and their application to important economic, social and political issues, such as inflation, unemployment, taxation, inequality, poverty, pollution, government decision-making and regulation. Our faculty, which is made up of leading teacher-scholars, includes specialists in game theory, microeconomics, macroeconomics, industrial organization, monetary economics, financial economics, 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 after 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 451, Econ 452 and Econ 467. Economics students with business interests typically complete at least one internship to obtain practical business experience, and it is possible to obtain academic credit for that internship. They should also discuss with their advisors the possibility of taking courses such as accounting in the Olin Business School.

In addition to the Economics major, there are two interdisciplinary majors: Economics & Computer Science and Math & Economics. In each major, students complete the core courses in the respective fields, along with a set of electives that are complementary to both fields. Further information is available in the Majors section (p. 3) of this page. As noted previously, students are strongly encouraged to complete at least one internship and to complement their studies with appropriate course work from the Olin Business School.

Contact: Dorothy Petersen, Academic Coordinator
Phone: 314-935-5644
Email: dottie@wustl.edu
Website: http://economics.wustl.edu

Faculty

Chair
Gaetano Antinolfi (https://economics.wustl.edu/people/gaetano-antinolfi/)
Professor
Weidenbaum Center Research Fellow
PhD, Cornell University
Macroeconomics; monetary and international economics

Associate Chair
Yongseok Shin (https://economics.wustl.edu/people/yongseok-shin/)
Douglass C. North Distinguished Professor of Economics
PhD, Stanford University
Macroeconomics; economic growth

Endowed Professors
Costas Azariadis (https://economics.wustl.edu/people/costas-azariadis/)
Edward Mallinckrodt Distinguished Professor in Arts & Sciences
Weidenbaum Center Research Fellow
PhD, Carnegie Mellon University
Macroeconomic dynamics; economic development; monetary and fiscal policy

Michele Boldrin (https://economics.wustl.edu/people/michele-boldrin/)
Joseph Gibson Hoyt Distinguished Professor in Arts & Sciences
Graduate Admissions Officer
PhD, University of Rochester
Economic theory; economic growth; macroeconomics

Francisco (Paco) Buera (https://economics.wustl.edu/people/francisco-buera/)
Sam B. Cook Professor of Economics
PhD, University of Chicago
Macroeconomics; macroeconomic development

Steven Fazzari (https://economics.wustl.edu/people/steven-fazzari/)
Director of the Weidenbaum Center on the Economy, Government, and Public Policy
PhD, Stanford University
Macroeconomics; Keynesian economics; investment and finance

George-Levi Gayle (https://economics.wustl.edu/people/george-levi-gayle/)
John H. Biggs Distinguished Professorship in Economics
PhD, University of Pittsburgh
Econometric theory; contract theory; labor economics; personnel economics; corporate governance
Limor Golan (https://economics.wustl.edu/people/limor-golan/)
Laurence H. Meyer Professor of Economics
PhD, University of Wisconsin–Madison
Labor economics; applied microeconomics; applied econometrics

Rodolfo Manuelli (https://economics.wustl.edu/people/rodolfo-manuelli/)
James S. McDonnell Distinguished University Professor
PhD, University of Minnesota
Economic growth and development economics; macro and monetary economics

Bruce Petersen (https://economics.wustl.edu/people/bruce-petersen/)
Director of Undergraduate Studies
Bert & Jeanette Lynch Distinguished Professor of Economics
Weidenbaum Center Research Fellow
PhD, Harvard University
Financial economics; applied microeconomics

Werner Ploberger (https://economics.wustl.edu/people/werner-ploberger/)
Thomas H. Eliot Distinguished Professor in Arts & Sciences
PhD, Vienna University of Technology
Statistics; econometric methodology; time-series econometrics

Robert Pollak (https://economics.wustl.edu/people/robert-pollak/)
Hernreich Distinguished Professor of Economics
PhD, Massachusetts Institute of Technology
Environmental economics; microeconomics/industrial organization; business and government; political economy

Ping Wang (https://economics.wustl.edu/people/ping-wang/)
Seigle Family Professor
NBER Research Associate
PhD, University of Rochester
Growth/development; money/macro; economic theory; spatial/health economics

Professors

Marcus Berliant (https://economics.wustl.edu/people/marcus-berliant/)
Director of Graduate Studies
PhD, University of California, Berkeley
Public finance; mathematical economics; urban economics

John Nachbar (https://economics.wustl.edu/people/john-nachbar/)
PhD, Harvard University
Economic theory

Brian Rogers (https://economics.wustl.edu/people/brian-rogers/)
PhD, California Institute of Technology
Microeconomic theory, in particular, the fields of network formation, social learning, and applied game theory

Jonathan Weinstein (https://economics.wustl.edu/people/jonathan-weinstein/)
PhD, Massachusetts Institute of Technology
Microeconomic theory, game theory

Associate Professor

Gaurab Aryal (https://economics.wustl.edu/people/gaurab-aryal/)
PhD, Pennsylvania State University
Industrial organization; empirical industrial organization

Sukkoo Kim (https://economics.wustl.edu/people/sukkoo-kim/)
PhD, University of California, Los Angeles
Economic history; urban and regional economics; trade and development

Assistant Professors

Ana Babus (https://economics.wustl.edu/people/ana-babus/)
PhD, Erasmus University Rotterdam
Microeconomic theory; finance

Ian Fillmore (https://economics.wustl.edu/people/ian-fillmore/)
PhD, University of Chicago
Intersection of industrial organization, labor economics, and econometrics; economics of education and education markets

Sanghmitra Gautam (https://economics.wustl.edu/people/sanghmitra-gautam/)
PhD, University College London
Development economics; applied microeconometrics; public economics

Andrew Jordan (https://sites.google.com/view/andrewjordanecon/home/)
PhD, University of Chicago
Labor markets, discrimination, and criminal justice

Teaching Professor

Sudeshna Bandyopadhyay (http://economics.wustl.edu/people/sudeshna-bandyopadhyay/)
PhD, University of Maryland
Senior Lecturer
Maria Canon ([https://economics.wustl.edu/people/maria-canon/]PhD, University of Rochester

Lecturer
Grace J. Yan Johnson ([https://economics.wustl.edu/people/grace-junhui-yan-johnson/]PhD, Oklahoma State University

Postdoctoral Fellow
Chen Wei ([https://chenweipurdue.com/]PhD, Purdue University

Affiliated Faculty
Mariagiovanna Baccara ([https://olin.wustl.edu/EN-US/Faculty-Research/Faculty/Pages/FacultyDetail.aspx?username=mbaccara]PhD, Princeton University
PhD, University of North Carolina at Chapel Hill
James Bullard ([https://economics.wustl.edu/people/james-bullard/]PhD, Indiana University
John Drobak ([https://law.wustl.edu/faculty-staff-directory/profile/john-n-drobak/]JD, Stanford University
Philip H. Dybvig ([http://www.olin.wustl.edu/EN-US/Faculty-Research/Faculty/Pages/FacultyDetail.aspx?username=Dybvig]PhD, Yale University
Leonard Green ([http://economics.wustl.edu/people/leonard-green/]PhD, State University of New York
Barton Hamilton ([https://olin.wustl.edu/EN-US/Faculty-Research/Faculty/Pages/FacultyDetail.aspx?username=hamiltonb]PhD, Stanford University
Oksana Leukhina ([https://sites.google.com/view/oksanaleukhina/]PhD, University of Minnesota
Glenn MacDonald ([https://olin.wustl.edu/EN-US/Faculty-Research/Faculty/Pages/FacultyDetail.aspx?username=macdonald]PhD, University of Rochester

Fernando Martin ([https://research.stlouisfed.org/econ/martin/sel/)PhD, University of Pennsylvania
Alexander Monge-Naranjo ([https://economics.wustl.edu/people/alex-monge-naranjo/)PhD, University of Chicago
Camillo Padoa-Schioppa ([https://neuroscience.wustl.edu/people/camillo-padoa-schioppa-phd/)PhD, Massachusetts Institute of Technology
B. Ravikumar ([http://economics.wustl.edu/people/b-ravikumar/)PhD, University of Iowa
Paulia Restrepo-Echavarria ([https://research.stlouisfed.org/econ/restrepo-echavarria/sel/)PhD, University of California, Los Angeles
Juan Sanchez ([https://economics.wustl.edu/people/juan-sanchez/)PhD, University of Rochester
Guillaume Vandenbroucke ([https://research.stlouisfed.org/econ/vandenbroucke/sel/)PhD, University of Rochester

Professors Emeriti
Lee K. Benham ([https://economics.wustl.edu/people/lee-benham/)PhD, Stanford University
David Levine ([http://www.dklevine.com/)John H. Biggs Distinguished Professor Emeritus
PhD, Massachusetts Institute of Technology
Wilhelm Neuefeind ([https://economics.wustl.edu/people/wilhelm-neuefeind/)PhD, Universität Bonn
Robert Parks ([https://artsci.wustl.edu/faculty-staff/robert-parks/)PhD, Purdue University

Majors
The Major in Economics
Total units required: 37 to 39

Required courses:

<table>
<thead>
<tr>
<th>Code</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 233</td>
<td>Calculus III</td>
<td>1-3</td>
</tr>
</tbody>
</table>
or Econ 493 | Mathematical Economics    |       |
| Math 2200 | Elementary Probability and Statistics | 3   |
or Math 3200  Elementary to Intermediate Statistics and Data Analysis
or Math 3211  Statistics for Data Science I
or ESE 326  Probability and Statistics for Engineering
or DAT 120 & DAT 121  Managerial Statistics I and Managerial Statistics II
Econ 1011  Introduction to Microeconomics 3
Econ 1021  Introduction to Macroeconomics 3
Econ 4011  Intermediate Microeconomic Theory 3
Econ 4021  Intermediate Macroeconomic Theory 3
Econ 413  Introduction to Econometrics 3
or Econ 413W  Introduction to Econometrics with Writing

Math 3200  Elementary to Intermediate Statistics and Data Analysis 3-6
or Math 2200  Elementary Probability and Statistics
or Math 3211  Statistics for Data Science I
or ESE 326  Probability and Statistics for Engineering
or DAT 120 & DAT 121  Managerial Statistics I and Managerial Statistics II
CSE 131  Introduction to Computer Science 3
CSE 240  Logic and Discrete Mathematics 3
or Math 310  Foundations for Higher Mathematics
or Math 310W  Foundations for Higher Mathematics with Writing
CSE 247  Data Structures and Algorithms 3
CSE 347  Analysis of Algorithms 3

*Of these options, Math 3200 is the preferred course.

Elective courses:

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

The Major in Economics and Computer Science

The College of Arts & Sciences and the McKelvey School of Engineering have developed a major that allows students interested in both economics and computer science to combine these two complementary disciplines efficiently, without having to pursue them as two separate majors.

Engineering students who declare this major must fulfill the distribution and all other requirements for the BS in Applied Science degree (http://bulletin.wustl.edu/undergrad/engineering/requirements/) in the McKelvey School of Engineering. Arts & Sciences students who declare this major must fulfill the distribution and all other requirements for an AB degree (http://bulletin.wustl.edu/undergrad/artsci/requirements/) in addition to the specific requirements listed below. It is possible to earn the Certificate in Financial Economics in conjunction with this major (prime or second), and interested students should consult with Academic Coordinator Dorothy Petersen (dottie@wustl.edu) in the Department of Economics.

Total units required: 54

Required courses:

<table>
<thead>
<tr>
<th>Code</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 413</td>
<td>Introduction to Econometrics</td>
<td>3</td>
</tr>
<tr>
<td>or Econ 413W</td>
<td>Introduction to Econometrics with Writing</td>
<td></td>
</tr>
<tr>
<td>Math 131</td>
<td>Calculus I (AP credit may satisfy this requirement)</td>
<td>3</td>
</tr>
<tr>
<td>Math 132</td>
<td>Calculus II (AP credit may satisfy this requirement)</td>
<td>3</td>
</tr>
<tr>
<td>Math 233</td>
<td>Calculus III</td>
<td>3</td>
</tr>
<tr>
<td>CSE 311A</td>
<td>Introduction to Intelligent Agents Using Science Fiction</td>
<td>3</td>
</tr>
<tr>
<td>CSE 330S</td>
<td>Rapid Prototype Development and Creative Programming</td>
<td>3</td>
</tr>
<tr>
<td>CSE 332S</td>
<td>Object-Oriented Software Development Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>CSE 341T</td>
<td>Parallel and Sequential Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CSE 400E</td>
<td>Independent Study</td>
<td>-6</td>
</tr>
<tr>
<td>CSE 411A</td>
<td>AI and Society</td>
<td>3</td>
</tr>
<tr>
<td>CSE 412A</td>
<td>Introduction to Artificial Intelligence</td>
<td>3</td>
</tr>
<tr>
<td>CSE 416A</td>
<td>Analysis of Network Data</td>
<td>3</td>
</tr>
<tr>
<td>CSE 417T</td>
<td>Introduction to Machine Learning (*)</td>
<td>3</td>
</tr>
<tr>
<td>or ESE 417</td>
<td>Introduction to Machine Learning and Pattern Classification</td>
<td></td>
</tr>
<tr>
<td>CSE 425S</td>
<td>Programming Systems and Languages</td>
<td>3</td>
</tr>
<tr>
<td>CSE 427S</td>
<td>Cloud Computing with Big Data Applications</td>
<td>3</td>
</tr>
<tr>
<td>CSE 457A</td>
<td>Introduction to Visualization</td>
<td>3</td>
</tr>
<tr>
<td>CSE 514A</td>
<td>Data Mining</td>
<td>3</td>
</tr>
<tr>
<td>CSE 516A</td>
<td>Multi-Agent Systems</td>
<td>3</td>
</tr>
</tbody>
</table>
The Major in Mathematics and Economics

Total units required: 57

Required courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 131</td>
<td>Introduction to Computer Science</td>
<td>3</td>
</tr>
<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>
<tr>
<td>Econ 413</td>
<td>Introduction to Econometrics</td>
<td>3</td>
</tr>
<tr>
<td>or Econ 413W</td>
<td>Introduction to Econometrics with Writing</td>
<td></td>
</tr>
<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 233</td>
<td>Calculus III</td>
<td>3</td>
</tr>
<tr>
<td>Math 309</td>
<td>Matrix Algebra</td>
<td>3</td>
</tr>
<tr>
<td>Math 310</td>
<td>Foundations for Higher Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>or Math 310W</td>
<td>Foundations for Higher Mathematics with Writing</td>
<td></td>
</tr>
<tr>
<td>Math 3200</td>
<td>Elementary to Intermediate Statistics and Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>or Math 3211</td>
<td>Statistics for Data Science I</td>
<td></td>
</tr>
<tr>
<td>or Math 493</td>
<td>Probability</td>
<td></td>
</tr>
</tbody>
</table>

Elective courses:

Major courses must complete seven electives, with three in each discipline and one from either department.

In Economics:

One of the three electives can be any economics course with Econ 4011 or Econ 4021 as a prerequisite, including from an approved study abroad program. The other two economics electives must come from the following list:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Econ 404</td>
<td>Behavioral Economics and Experimental Economics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 407</td>
<td>Market Design</td>
<td>3</td>
</tr>
<tr>
<td>Econ 410</td>
<td>Macroeconomics of Inequality</td>
<td>3</td>
</tr>
<tr>
<td>Econ 4151</td>
<td>Applied Econometrics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 435</td>
<td>Open Economy Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 437</td>
<td>The Economics of Financial Intermediation</td>
<td>3</td>
</tr>
<tr>
<td>Econ 445</td>
<td>Public Finance</td>
<td>3</td>
</tr>
<tr>
<td>Econ 452</td>
<td>Industrial Organization</td>
<td>3</td>
</tr>
<tr>
<td>Econ 460</td>
<td>Urban Economics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 467</td>
<td>Game Theory</td>
<td>3</td>
</tr>
<tr>
<td>Econ 471</td>
<td>Development Economics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 477</td>
<td>Topics in Financial Economics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 480</td>
<td>Labor Economics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 484</td>
<td>Computational Macroeconomics</td>
<td>3</td>
</tr>
</tbody>
</table>

• With instructor permission, students may use any of the following for economics elective credit: Econ 501, Econ 502, Econ 503, Econ 504, Econ 511, or Econ 513.

• Econ 413 may be taken from an approved study abroad program. Consult with Academic Coordinator Dorothy Petersen in the Department of Economics for more information.

In Mathematics:

For Mathematics, the electives can come from the following list:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 410</td>
<td>Introduction to Fourier Series and Integrals</td>
<td>3</td>
</tr>
<tr>
<td>Math 415</td>
<td>Partial Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>Math 416</td>
<td>Complex Variables</td>
<td>3</td>
</tr>
<tr>
<td>Math 4111</td>
<td>Introduction to Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Math 4121</td>
<td>Introduction to Lebesgue Integration</td>
<td>3</td>
</tr>
<tr>
<td>Math 429</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>Math 439</td>
<td>Linear Statistical Models</td>
<td>3</td>
</tr>
<tr>
<td>Math 4392</td>
<td>Advanced Linear Statistical Models</td>
<td>3</td>
</tr>
<tr>
<td>Math 449</td>
<td>Numerical Applied Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>Math 450</td>
<td>Topics in Applied Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>Math 456</td>
<td>Topics in Financial Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>Math 459</td>
<td>Bayesian Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Math 460</td>
<td>Multivariate Statistical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Math 461</td>
<td>Time Series Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Math 462</td>
<td>Mathematical Foundations of Big Data</td>
<td>3</td>
</tr>
<tr>
<td>Math 475</td>
<td>Statistical Computation</td>
<td>3</td>
</tr>
<tr>
<td>Math 493</td>
<td>Probability (if not completed as a &quot;required&quot; course)</td>
<td>3</td>
</tr>
<tr>
<td>Math 494</td>
<td>Mathematical Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Math 495</td>
<td>Stochastic Processes</td>
<td>3</td>
</tr>
</tbody>
</table>

Advising, Questions, and Further Considerations:

*Students planning to complete CSE 517 should try to complete CSE 417T as the prerequisite course.
• Students may declare a prime or a second major in Math + Economics via L24 (Math) or L11 (Econ), and that will determine their major advisor.

• It is possible to earn the Certificate in Financial Economics in conjunction with this major (prime or second).

• It is possible to graduate with Latin Honors or with “English” honors. Students should refer to the departments’ websites or consult with either Professor Blake Thornton (bthornton@wustl.edu) in the Department of Mathematics and Statistics or Academic Coordinator Dorothy Petersen (dottie@wustl.edu) in the Department of Economics for more information.

• Substitutions for mathematics courses and study abroad approval for mathematics courses will be determined by the Department of Mathematics and Statistics.

• Substitutions for economics courses and study abroad approval will be determined by Academic Coordinator Dorothy Petersen in the Department of Economics.

• Substitutions for CSE 131 are subject to approval by the McKelvey School of Engineering.

The Certificate in Financial Economics

By completing a specialized set of electives, majors (prime or second, including the joint majors) can earn the Certificate in Financial Economics (https://economics.wustl.edu/certificate-financial-economics-0/). More information about the Certificate in Financial Economics can be found on the department website.

Additional Information

Majors must complete Econ 4011, Econ 4021, and the Econ 4011/Econ 4021 prerequisite electives in residence during the fall and spring semesters. 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 concurrently with, enrollment in Econ 4011. The prerequisite courses for Econ 4021 are Econ 1021 and Econ 4011.

An additional approved substitution for the “statistics” requirement of the majors is DAT 120 AND DAT 121. For the Econ+CSE major and the Math+Econ major, Math 3200 is the preferred course choice. Students who are prime in McKelvey (EN) may use ESE 326 for the “statistics” requirement of any of the majors, and no pre-approval is required.

The upper-level units (300- and 400-level courses) required for the major must be independent of other majors or minors (i.e., upper-level coursework required for a major may not be double-counted for another major or a minor in Arts & Sciences).

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

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

Minors

The Minor in General Economics

Economics units required: 15

Required courses:

<table>
<thead>
<tr>
<th>Code</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 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 concurrently 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>Code</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 concurrently 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 IQ: SSC, AN Arch: NSM, SSC Art: NSM, SSC 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 IQ: SSC, AN Arch: NSM, SSC Art: NSM, SSC EN: S

L11 Econ 105 The Endgame of Entrepreneurship: Leveraging Capitalism for Good
Historically, profit has been a key driver of human behavior. In this course, students will learn to take advantage of the profit-seeking motive of capitalism while also learning from the mistakes and unintended consequences capitalism has caused throughout history. Students will apply these learnings toward profit-seeking solutions for the United Nations’ Sustainable Development Goals, which are global challenges that call us to work together with boldness and urgency. We will explore how skills from entrepreneurship and venture creation can be used to improve water, climate, education and gender equally globally and here in St. Louis. In interdisciplinary teams, students will learn how to define a problem; listen to customers, competitors and collaborators; create value; measure impact; and communicate their vision. Bold entrepreneurial spirit and skills learned in this course will guide students in their further studies at Washington University and beyond. This course does not count for Economics major/minor elective credit. This course is for first-year (non-transfer) students only.
Same as I60 BEYOND 105
Credit 3 units. A&S IQ: SSC Arch: SSC Art: SSC BU: BA, ETH EN: S

L11 Econ 208 First-Year Seminar: Economics and Society
Economics and Society is a first-year seminar open to interested students, without prerequisites of any kind. Two to four topics will be chosen for in-depth discussion during the semester. Possible topics include but are not limited to inequality (domestic and international); globalization (pros/cons); "big banks" and their role in financial crises; wars and national security; health and disease; and capitalism and socialism. The seminar seeks to spread economic literacy among tomorrow's opinion leaders, improve their ability to analyze social issues, help them explain their viewpoint to others, and understand different opinions. (The course cannot be used for economics major/minor credit.)
Credit 3 units. A&S: FYS A&S IQ: SSC Arch: SSC Art: SSC BU: BA EN: S

L11 Econ 296 Undergraduate TA
In this course, an advanced undergraduate can assist a faculty member in the teaching of an undergraduate Economics class. Students can enroll after their selection by a supervising faculty member, which occurs after an application (on the department website) is submitted and reviewed, perhaps in conjunction with an interview with the supervising faculty member. Students can enroll in only one section per semester. Students will be expected, at a minimum, to attend lectures and hold office hours. Specific grading duties will be determined by the supervising faculty member, in accord with Arts & Sciences policies. The typical number of units earned is 2, with the possibility of a maximum of 3, per semester. This course can be repeated for P/F credit. Prerequisite: instructor permission.
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 IQ: SSC Arch: SSC Art: SSC BU: BA EN: S

L11 Econ 328 History of Economic Analysis
The purpose of this course is to introduce students to some of the theories and doctrines that constitute the main paradigms from which economists and policy makers approach the world. Rather than focusing on the whole history of economic thinking, we will focus on practical issues, including questions such as the following: What determines the wage of labor? Why is monopoly considered a bad thing? At what level does an interest rate become usury? We will consider how these questions have been framed and answered at different points in time and in different cultures. Important components of this course are participation in in-class discussion and essays submitted on the practical issues discussed throughout the semester. Prerequisites: Econ 1011 and Econ 1021.
Credit 3 units. A&S IQ: SSC EN: S

L11 Econ 331 Financial Markets and Analysis
This course is a rigorous introduction to financial markets, financial institutions, and their purpose and functions in the economy. In financial markets, trade is essentially "money now" for "money in the future." As such, financial decisions must often take into account future events, whether those be related to individual stocks, portfolios, or the market as a whole. This course explores the topics related to the level and structure of interest rates and of stock prices, portfolio choice, basic investment theory, and arbitrage pricing theory, among others. Prerequisites: Econ 1011 and Econ 1021.
Credit 3 units. A&S IQ: SSC Arch: SSC Art: SSC 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 IQ: SSC Art: SSC 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 include sources of economic growth and changing living standards, unemployment, inequality, and the organization of the health industry. The major concern will be the rising cost of health care and appropriate public policy responses. Prerequisite: Econ 1011. Credit 3 units. A&S IQ: SSC: 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 constraints of political actors (e.g., voters and policy makers); the role of institutions in shaping political behavior and policy outcomes. Prerequisite: Econ 1011. Credit 3 units. A&S IQ: SSC: BA: 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 will be the rising cost of health care and appropriate public policy responses. Prerequisite: Econ 1011. Credit 3 units. A&S IQ: SSC: BA: EN: S

L11 Econ 354 The Economics of Criminal Justice
In this course, we study the economic and legal tools of economics to study the criminal justice system. By constructing models of behavior (arrest/prosecution/conviction/sentencing/etc.), decisions are made. We will evaluate these decision for errors and especially for bias. We will also see how economists test hypotheses about the criminal justice system using the same types of "natural experiments" they use to study markets. Prerequisites: Econ 1011 and Math 2200. Credit 3 units. A&S IQ: SSC: BA: EN: S

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 IQ: SSC: BA: 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. 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 IQ: SSC: BA: EN: S

L11 Econ 4021 Intermediate Macroeconomic Theory

L11 Econ 404 Behavioral Economics and Experimental Economics
Behavioral economics is an effort to incorporate ideas from psychology into economic models of behavior. We will focus on popular experimental anomalies, including the Allais and Rabin paradoxes, ultimatum bargaining, the centipede and public goods contribution games. We will examine the extent to which these are consistent with standard economic theory and how they may contradict it. The primary focus will be a critical examination of psychological theories of nonstandard preferences including loss aversion, probability weighting, reciprocity, fairness and present bias. Theories of incorrect beliefs and systematic biases such as money illusion and procrastination will be covered. Applications to the current economic crisis will also be discussed. The class will include an introduction to experimental methods in economics, including hands-on experience in the MISSEL laboratory. A sound grounding in economic theory is essential to the course. You must have successfully completed Econ 4011, and should be acquainted with basic optimization theory, expected utility theory, risk aversion, discounting and basic game theory including dominance, Nash equilibrium and subgame perfection. Credit 3 units. A&S IQ: SSC: BA: EN: S

L11 Econ 407 Market Design
The objective of this course is to study how to design mechanisms to allocate scarce resources and how to create successful marketplaces. We will primarily consider two topics: (1) two-sided matching markets, such as the National Resident Matching Program and the Kidney Exchange for transplants, and (2) auctions used by Google, Facebook, etc. Time permitting, a third topic will be the problem of designing and regulating market "platforms," such as the e-commerce markets run by eBay, Amazon, and Craigslist, and applications marketplaces run by Apple, Google, etc., as well as the electronic financial trading platforms run by the NYSE. Prerequisite: Econ 4011. Credit 3 units. A&S IQ: SSC: BA: EN: S

L11 Econ 410 Macroeconomics of Inequality
In this course, we study the driving forces of inequality across countries, across time, and across individuals within a country. We will define and measure inequality using standard measures of economic well-being, such as income, wealth, and consumption of market goods, and we will also consider
broader measures such as health outcomes. Historical cross-country data, microdata, and specific case studies will be used to evaluate theories of the sources of inequality. Key variables to be evaluated include physical capital investment, education and human capital investment, technological progress, robotization, international trade, and financial markets, among others. Prerequisites: Econ 4011 and Econ 4021.
Credit 3 units. A&S IQ: SSC Arch: SSC Art: SSC EN: S

L11 Econ 411 Optimization and Economic Theory
An introduction to mathematical optimization and its applications within economics. The course is designed for, and should be taken by, all undergraduates considering graduate study in economics, but all interested students are welcome. Prerequisites: Econ 4011 and Math 309 or permission of the instructor. Credit 3 units. A&S IQ: SSC Arch: SSC Art: SSC EN: S

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, preregression analysis bivariate and multiple regression techniques, hypothesis testing, multicollinearity, specification error, autocorrelation, errors in variables, identification, and simultaneous estimation. Sections 1 & 2 prerequisites: Econ 1011 & 1021 and Math 2200 or equivalent. Section 3 prerequisites: Econ 4011 and Math 2200 or equivalent. The Friday subsection "A" is for Section 03 only. This subsection is a help session, and attendance is not required. Please note: Requests for online registration will be wait listed, and students will be enrolled according to Economics major/minor status and student level (e.g., priority to Level 8 Econ majors).
Credit 3 units. A&S IQ: SSC Arch: SSC Art: SSC EN: S

L11 Econ 413W Introduction to Econometrics with Writing
Econometrics is the development and application of statistical techniques for the measurement of economic phenomena. This course is a student’s initial study of econometric theory and practice. Topics include: translation of economic theory into statistical models, statistical foundations of econometrics, preregression analysis bivariate and multiple regression techniques, hypothesis testing, multicollinearity, specification error, autocorrelation, errors in variables, identification, and simultaneous estimation. The three writing assignments and the final paper will provide students an opportunity to formulate an economic model, estimate the model with appropriate data, and interpret the results. This experience will help students understand how econometrics relates to other upper-level economics courses which focus on theoretical models for how the world operates. Econometrics provides a method of testing the validity of these economic models, and the term paper will improve students’ writing skills, giving them a chance to write clearly and concisely about technical material. Prerequisites: Econ 4011 and Math 2200 or equivalent. Please note: Requests for online registration will be wait listed, and students will be enrolled according to economics major/minor status and student level (e.g., priority to Level 8 economics majors). Students should also select the "A" subsection.
Credit 3 units. A&S IQ: SSC, WI Arch: SSC Art: SSC EN: S

L11 Econ 4151 Applied Econometrics
Introduction to econometrics as it is applied in microeconomics. 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. The Friday "A" subsection is an opportunity to get assistance with the STATA-based assignments, via a TA-led help session. Attendance at the subsection is recommended, but not required. Prerequisites: Econ 4011 and Econ 413. Math 309 is recommended. Credit 3 units. A&S IQ: SSC Arch: SSC Art: SSC EN: S

L11 Econ 4301 Understanding the Financial Crisis
The global financial crisis of 2007–2009 was the most severe since the Great Depression. The goal of the course is to provide tools to analyze key elements of this crisis. We will move from a corporate finance perspective — to understand the behavior of firms and financial institutions — to a macroeconomic perspective — to make this behavior in aggregate outcomes and policy responses. Topics covered include: the U.S. crisis in historical and international perspective; corporate finance of firms and banks in closed and open economy; monetary and fiscal policy intervention; the open economy dimension of the financial crisis; the European Sovereign Debt crisis.
Credit 3 units. A&S IQ: SSC Arch: SSC Art: FAAM, SSC EN: S

L11 Econ 432 Economics of Public Policy
This course will cover the logic underlying the economics and politics of public policies concerning issues such as international trade, monetary policy, fiscal policy, market reforms, pollution control, economic inequality and the welfare state more generally. The general question we will address, using specific cases, is that of the role of markets and government in an economy. The course relies heavily on the concepts and methods of microeconomics and macroeconomics. There are many theories of how economic policies work and considerable debate as to what can be done and what should be done. We will examine the facts (past and present) and then examine the theories and their explanatory power. We will also organize the class into research groups that will address specific economic policies issues. Prerequisite: Econ 4011.
Credit 3 units. 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 IQ: SSC Arch: SSC BU: IS EN: S

L11 Econ 437 The Economics of Financial Intermediation
The structure and the role of banks have changed tremendously. The historically-traditional role 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 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 IQ: SSC Arch: SSC Art: 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 IQ: SSC Arch: 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 and 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 wait-listed. Credit 3 units. A&S IQ: SSC WI: Arch: SSC Art: SSC EN: S

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 IQ: SSC Arch: SSC Art: SSC BU: BA, ETH EN: S

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 IQ: SSC Arch: SSC Art: SSC EN: S

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 IQ: SSC Arch: SSC Art: SSC EN: S

L11 Econ 467 Game Theory
This course covers advanced applications of Game Theory in economics. Topics include expected utility, strategic-form and extensive-form games with perfect information, Bayesian games, infinitely repeated games, dominance, Nash equilibrium and its refinements. We apply these tools to study strategic situations in industrial organization, auctions, bargaining, voting, and signaling games. Prerequisites: Econ 4011 and Math 2200. Credit 3 units. A&S IQ: SSC Arch: SSC Art: SSC EN: S

L11 Econ 471 Development Economics
This course investigates issues related to the development of the economics of third-world countries. Topics include economic growth, poverty, corruption, and human capital accumulation, with an emphasis on education and health-related policies. The course provides an in-depth understanding of the role of the state and the impact of specific public policies designed to encourage development. Empirical examples are drawn from Asia, Latin America, and the African subcontinent. Prerequisites: Econ 4011 and Econ 413 or Econ 413W. Credit 3 units. A&S IQ: SSC Arch: SSC Art: 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 IQ: SSC Arch: SSC Art: 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 United States in the late 19th century? The Industrial Revolution? Why are the level and the growth rate of per-capita income so different across countries? What explains the decline of manufacturing, and its growth in the early stages of development? What are the determinants of inequality and risk faced by individuals in different countries? Theories featuring the role of investment in physical and human capital, technology, coordination, financial markets, and environmental variables will be presented. Theories will be evaluated using historical data and detailed case studies. This course is designed to complement Econ 472. Prerequisites: Econ 4011.
Credit 3 units. A&S IQ: SSC Arch: SSC Art: SSC EN: S

L11 Econ 477 Topics in Financial Economics
Financial economics is a field of economics in which economic principles are applied to the study of financial markets, corporations, banks, and monetary and central bank policies. Of particular importance are the roles of risk, uncertainty, and time in the allocation of resources. Currently, there are two courses in "Topics in Financial Economics": Asset Pricing and Investments. The former is generally offered in the fall semester; the latter in the spring. Both may be taken for major or minor credit, and both are elements of the Certificate in Financial Economics. Prerequisites: Econ 4011, Econ 4021, and Econ 413.
Credit 3 units.

L11 Econ 480 Labor Economics
Economic analysis of labor markets. Theory and evidence on supply of and demand for labor, explanation of wage and income differentials; impact of education on human skills and productivity. Prerequisites: Econ 401 and 413.
Credit 3 units. A&S IQ: SSC Arch: SSC Art: 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 IQ: SSC Arch: SSC Art: SSC EN: S

L11 Econ 484 Computational Macroeconomics
This course provides a more in depth look into quantitative methods used in contemporary macroeconomic analysis. We will cover numerical methods used in dynamic optimization. In practice, we will apply these methods to solve two major models used in macroeconomic analysis, using both Excel and Matlab. The Neoclassical Growth Model and its variants are used to study aggregate trends and aggregate effects of government policy. The lifecycle model is used to examine questions involving decision-making over the lifecycle. We will learn how to use empirical observations for the purpose of calibrating model parameters and how to conduct policy evaluation in the context of calibrated models. Our policy evaluation will focus on fiscal policy (taxes) and social security issues. Prerequisites: 4011 and 4021.
Credit 3 units. A&S IQ: SSC Arch: SSC Art: SSC EN: S

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 macro-economic 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, additional topics will be introduced. Economics majors and minors must take this course (or Math 233) prior to, or concurrently with, Econ 4011.
Credit 1 unit. A&S IQ: SSC Arch: SSC Art: SSC EN: S

L11 Econ 4941 Economic Analysis with Excel
This mini course offers students the opportunity to master the advance functionality of Microsoft Excel, and to apply those skills to common economic, statistical, and financial problems. Even those familiar with the basic functioning of Excel may be surprised to learn how little of its full capability most users access. Though basic functions will be covered, our focus will be on leveraging Excel's more advanced functions, analytical tools, reporting templates, and linking features to manage multiple workbooks, manipulate data across files, automate tasks, and produce publication quality charts, tables, and graphs. In addition to providing hands-on experience using Excel's advanced capabilities, the course is designed to serve as a bridge between introductory econometrics and practical work with real-world datasets. The course will be held in the computer classroom so that students can obtain practical experience preparing data, managing workflow, and presenting results. Added emphasis throughout the course will be placed on examples with applications in economics. Prerequisites: prior completion of, or concurrent enrollment in, Econ 413 (or equivalent).
Credit 1.5 units.
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 IQ: SSC Art: SSC EN: S

L11 Econ 498 Honors Seminar
Advanced application of economic theory to policy problems. This is the first part of the two-course sequence for seniors writing an honors thesis, and it is taken in the fall semester of the senior year. This course may not be used to satisfy major requirements. Prerequisite: invitation into the "Honors in Economics with Thesis" track of the department's Honors Program. Credit 3 units. 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. This is the second part of the two-course sequence for seniors writing an honors thesis, and it is taken in the spring semester of the senior year. This course may not be used to satisfy major requirements. Prerequisite: invitation into the "Honors in Economics with Thesis" track of the department's Honors Program. Credit 3 units.