ECONOMICS - MATHEMATICS

Departmental Office: 1022 International Affairs Building; 212-854-3680
http://www.columbia.edu/cu/economics/

Director of Undergraduate Studies: Dr. Susan Elmes, 1006 International Affairs Building; 212-854-9124; se5@columbia.edu

Director of Departmental Honors Program: Dr. Susan Elmes, 1006 International Affairs Building; 212-854-9124; se5@columbia.edu

Economics is the study of the ways in which society allocates its scarce resources among alternative uses and the consequences of these decisions. The areas of inquiry deal with a varied range of topics such as international trade, domestic and international financial systems, labor market analysis, and the study of less developed economies. Broadly speaking, the goal of an economics major is to train students to think analytically about social issues and, as such, provide a solid foundation for not only further study and careers in economics, but also for careers in law, public service, business, and related fields.

The Economics Department offers a general economics major in addition to five interdisciplinary majors structured to suit the interests and professional goals of a heterogeneous student body. All of these programs have different specific requirements but share the common structure of core theoretical courses that provide the foundation for higher-level elective courses culminating in a senior seminar. Students are urged to carefully look through the details of each of these programs and to contact an appropriate departmental adviser to discuss their particular interests.

Advanced Placement
Tests must be taken in both microeconomics and macroeconomics, with a score of 5 on one test and at least a 4 on the other. Provided that this is achieved, the department grants 4 credits for a score of 4 and 5 on the AP Economics exam along with exemption from ECON UN1105 Principles of Economics.

Advising
The Department of Economics offers a variety of advising resources to provide prospective and current undergraduate majors and concentrators with the information and support needed to successfully navigate through the program. These resources are described below.

Frequently Asked Questions
Please see: http://econ.columbia.edu/frequently-asked-questions-0
(http://econ.columbia.edu/frequently-asked-questions-0/)

As a first step, students are encouraged to visit the department’s FAQ page, which provides comprehensive information and answers to the most frequently asked questions about the departmental majors and requirements. This page also includes a section that answers specific questions of first-years, sophomores, and non-majors.

Graduate Student Advisers
For answers to the most common questions that students have about the majors, the department has graduate student advisers, who are available by e-mail at econ-advising@columbia.edu, or during weekly office hours to meet with students.

Students should direct all questions and concerns about their major to the graduate student advisers either in person or via e-mail. The graduate student advisers can discuss major requirements, scheduling, and major course selection, as well as review student checklists and discuss progress in the major. Occasionally, graduate student advisers may refer a student to someone else in the department (such as the director of undergraduate studies) or in the student’s school for additional advising.

Contact information and office hours for the graduate student advisers are posted on the Advisers page of the departmental website (http://www.columbia.edu/cu/economics/) in the week prior to the beginning of the semester. Students considering one of the interdepartmental majors should speak to both a graduate student adviser from the Economics Department and the adviser from the other department early in the sophomore year.

Faculty Advisers
Faculty advisers are available to discuss students’ academic and career goals, both in terms of the undergraduate career and post-graduate degrees and research. Students wishing to discuss these types of substantive topics may request a faculty adviser by completing the form available on the Advisers page of the departmental website (http://www.columbia.edu/cu/economics/) and depositing it in the mailbox of the director of undergraduate studies in the department’s main office, 1022 International Affairs Building.

The department does its best to match students with faculty members that share similar academic interests. While faculty advisers do not discuss major requirements—that is the role of the graduate student advisers—they do provide guidance in course selection as it relates to meeting a student’s intellectual goals and interests, as well as advise on career and research options. It is recommended that students who plan on attending a Ph.D. program in economics or are interested in pursuing economics research after graduation request a faculty adviser.

On-Line Information
Students can access useful information on-line, including: a comprehensive FAQ page; requirement changes to the major and concentration; sample programs and checklists; faculty office hours, contact information and fields of specialization; adviser information; teaching assistant information; research assistant opportunities; list of tutors; and Columbia-Barnard Economics Society information.

Departmental Honors
Economics majors and economics joint majors who wish to be considered for departmental honors in economics must:

1. Have at least a 3.7 GPA in their major courses;
2. Take ECON GU4999 Senior Honors Thesis (a one-year course);
3. Receive at least a grade of A- in ECON GU4999 Senior Honors Thesis.

Students must consult and obtain the approval of the departmental undergraduate director in order to be admitted to the workshop. Please note that ECON GU4999 Senior Honors Thesis may be taken to fulfill the seminar requirement for the economics major and all economics joint majors. Students who wish to write a senior thesis (ECON GU4999 Senior Honors Thesis) must have completed the core major requirements. Normally no more than 10% of graduating majors receive departmental honors in a given academic year. Please see the Honors Prizes page on the department’s website for more information.
Undergraduate Prizes

All prize recipients are announced at the end of the spring semester each academic year.

The Dean’s Prize in Economics

Awarded to General Studies students for excellence in the study of Economics.

Romine Prize

Established in 1997, this prize is awarded annually to two students (Columbia College or General Studies) majoring in economics: one for the best honors thesis paper, and the other for the best economics seminar paper.

Parker Prize for Summer Research

Professors

Douglas Almond (also School of International and Public Affairs)
Jushan Bai
Jagdish N. Bhagwati
Sandra Black
Patrick Bolton (also Business School)
André Burgstaller (Barnard)
Alessandra Casella (also Political Science Department)
Yeon-Koo Che
Pierre-André Chiappori
Graciela Chichilnisky
Richard Clarida (also School of International and Public Affairs)
Donald Davis
Padma Desai (emerita)
Prajit Dutta
Harrison Hong
R. Glenn Hubbard (also Business School)
Navin Kartik
Wojciech Kopczuk (also School of International and Public Affairs)
Sokbae (Simon) Lee
W. Bentley McLeod (also School of International and Public Affairs)
Perry Mehrling (Barnard)
Robert Mundell (emeritus)
Suresh Naidu (also School of International and Public Affairs)
Serena Ng
Brendan O’Flaherty
Edmund S. Phelps
Andrea Prat (also Business School)
Michael Riordan
Jeffrey Sachs (also Earth Institute)
Xavier Sala-i-Martin
Bernard Salanié (Chair)
José A. Scheinkman
Stephanie Schmitt-Grohé
Rajiv Sethi (Barnard)
Joseph Stiglitz (also Business School)
Martin Uribe
Miguel Urquiola (also School of International and Public Affairs)
Eric Verhoogen (also School of International and Public Affairs)
David Weiman (Barnard)
David Weinstein
Michael Woodford

Associate Professors

Mark Dean
Lena Edlund
Jennifer La’O
Qingmin Liu

Assistant Professors

Hassan Afrouzi
Michael Best
Andres Drenik
Matthieu Gomez
Reka Juhasz
Elliot Lipnowski
Jose Luis Montiel Olea
Xiaosheng Mu
Evan Sadler
Jack Willis

Lecturers

Irasema Alonso
Tri Vi Dang
Susan Elmes
Seyhan Erden
Tamrat Gashaw
Sunil Gulati
Ronald Miller
Wouter Vergote

Adjunct Faculty

Tim Goodspeed
Claudia Halbac
Ed Lincoln
Neal Masia
Caterina Musatti
Waseem Noor
Ingmar Nyman
Maxim Pinkovsky

On Leave

Profs. Best, Salanie, Scheinkman (Fall 2019)
Profs. Lee, Montiel Olea, Weinstein (Spring 2020)

Guidelines for all Economics Majors, Concentrators, and Interdepartmental Majors

Economics Core Courses

All of the core courses must be completed no later than the spring semester of the student’s junior year and must be taken at Columbia. Students who take any core course during the fall semester of their senior year must obtain written permission from the department’s director of undergraduate studies. Unless otherwise specified below, all students must complete the following core courses:
### Prerequisites

Course prerequisites are strictly enforced. Prerequisites must be taken before the course, not after or concurrently.

Economics courses taken before the completion of any of its prerequisites, even with instructor approval, are **not** counted toward the major, concentration, or interdepartmental majors. Exemptions from a prerequisite requirement may only be made, in writing, by the department’s director of undergraduate studies. Credits from a course taken **prior** to the completion of its prerequisites are **not** counted towards the major requirements. As a consequence, students are required to complete **additional**, specific courses in economics at the direction of the director of undergraduate studies.

The prerequisites for required courses are as follows:

<table>
<thead>
<tr>
<th>Course</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON UN1105 Principles of Economics</td>
<td>None</td>
</tr>
<tr>
<td>MATH UN1101 Calculus I</td>
<td></td>
</tr>
<tr>
<td>STAT UN1201 Calculus-Based Introduction to Statistics</td>
<td>MATH UN1101 Calculus I</td>
</tr>
<tr>
<td>ECON UN3211 Intermediate Microeconomics</td>
<td>ECON UN1105 Principles of Economics MATH UN1201 Calculus III or UN1205</td>
</tr>
<tr>
<td>ECON UN3213 Intermediate Macroeconomics</td>
<td>ECON UN1105 Principles of Economics Co-requisite: MATH UN1201 Calculus III or UN1205</td>
</tr>
<tr>
<td>ECON UN3412 Introduction To Econometrics</td>
<td>MATH UN1201 Calculus III or UN1205 ECON UN3211 Intermediate Microeconomics or UN3213 STAT UN1201 Calculus-Based Introduction to Statistics</td>
</tr>
<tr>
<td>ECON 2000-level electives</td>
<td>ECON UN1105 Principles of Economics</td>
</tr>
<tr>
<td>ECON GU4211 Advanced Microeconomics</td>
<td>ECON UN3211 Intermediate Microeconomics ECON UN3213 Intermediate Macroeconomics MATH UN2010 Linear Algebra Corequisites: MATH UN2500 Analysis and Optimization or GU4061</td>
</tr>
<tr>
<td>ECON GU4412 Advanced Econometrics</td>
<td>ECON UN3211 Intermediate Microeconomics</td>
</tr>
<tr>
<td>ECON GU4213 Advanced Macroeconomics</td>
<td>ECON UN3213 Intermediate Macroeconomics</td>
</tr>
<tr>
<td>ECON GU4413 Econometrics of Time Series and Forecasting</td>
<td>ECON UN3412 Introduction To Econometrics MATH UN2010 Linear Algebra</td>
</tr>
<tr>
<td>ECON UN3025 Financial Economics</td>
<td>ECON UN3211 Intermediate Microeconomics</td>
</tr>
<tr>
<td>ECON GU4020 Economics of Uncertainty and Information</td>
<td>ECON UN3213 Intermediate Macroeconomics</td>
</tr>
<tr>
<td>ECON GU4230 Economics of New York City</td>
<td>STAT UN1201 Calculus-Based Introduction to Statistics</td>
</tr>
<tr>
<td>ECON GU4260 Market Design</td>
<td></td>
</tr>
<tr>
<td>ECON GU4280 Corporate Finance</td>
<td></td>
</tr>
<tr>
<td>ECON GU4370 Political Economy</td>
<td></td>
</tr>
<tr>
<td>ECON GU4700 Financial Crises</td>
<td></td>
</tr>
<tr>
<td>ECON GU4710 Finance and the Real Economy</td>
<td></td>
</tr>
<tr>
<td>ECON GU4850 Cognitive Mechanisms and Economic Behavior</td>
<td></td>
</tr>
<tr>
<td>ECON GU4860 Behavioral Finance</td>
<td></td>
</tr>
<tr>
<td>All other ECON 3000- and 4000-level electives</td>
<td>ECON UN3211 Intermediate Microeconomics ECON UN3213 Intermediate Macroeconomics</td>
</tr>
<tr>
<td>ECON UN3901 Economics of Education</td>
<td>ECON UN3211 Intermediate Microeconomics</td>
</tr>
<tr>
<td>ECON UN3952 Seminar in Macroeconomics and Formation of Expectations</td>
<td>ECON UN3213 Intermediate Macroeconomics</td>
</tr>
<tr>
<td>ECON UN3981 Applied Econometrics</td>
<td>ECON UN3412 Introduction To Econometrics</td>
</tr>
<tr>
<td>ECON GU4911 Seminar In Microeconomics</td>
<td></td>
</tr>
<tr>
<td>ECON GU4913 Seminar In Macroeconomics</td>
<td></td>
</tr>
<tr>
<td>ECON GU4918 Seminar In Econometrics</td>
<td></td>
</tr>
<tr>
<td>ECPS GU4921 Seminar In Political Economy</td>
<td>ECON UN3211 Intermediate Microeconomics ECON UN3213 Intermediate Macroeconomics</td>
</tr>
<tr>
<td>ECPH GU4950 Economics and Philosophy Seminar</td>
<td>ECON UN3412 Introduction To Econometrics ECON GU4370 Political Economy</td>
</tr>
<tr>
<td>Barnard electives</td>
<td>See Barnard bulletin</td>
</tr>
</tbody>
</table>

It is strongly recommended that students take ECON UN3412 Introduction To Econometrics in the semester immediately following the completion of the statistics course.

### Grading

No course with a grade of D or lower, including calculus and statistics courses, can count toward the major, concentration, or interdepartmental
majors. Economics core courses with a grade of D or F must be retaken and completed with a grade of C- or better.

Students who receive a grade of D or F in a core course are permitted to take a higher-level elective course that has that core course as a prerequisite, so long as it is taken concurrently with the retaking of that core course. For example, if a student fails MATH UN1201 Intermediate Microeconomics, the student must retake it and, in the same semester, may enroll in an elective course for which it is a prerequisite, provided that all other prerequisites for the elective have been completed. The same rule applies to the required math and statistics courses. For example, if a student fails MATH UN1201 Calculus III, the student may retake calculus III concurrently with Intermediate Microeconomics.

Students who must retake any core economics or math course may not retake it concurrently with a senior seminar; the economics core courses ECON UN3211 Intermediate Microeconomics, ECON UN3213 Intermediate Macroeconomics, and ECON UN3412 Introduction To Econometrics must be successfully completed before a student may enroll in a seminar.

A grade of W is not equivalent to a grade of D or F; it does not qualify a student to retake the course concurrently with a higher level course that lists the course as a prerequisite. Students who receive a grade of W in a core course must complete the course with a grade of C- or better before taking a course that lists it as a prerequisite.

Only ECON UN1105 Principles of Economics may be taken for a grade of Pass/D/Fail, and the student must receive a grade of P for it to count towards the requirements for the major, concentration, or interdepartmental majors.

Economics Electives
Only those courses identified in the Economics Department listings in this Bulletin may be taken for elective credit. All 3000-level or higher electives offered by the Economics Department have ECON UN3211 Intermediate Microeconomics and ECON UN3213 Intermediate Macroeconomics as prerequisites. However, some electives have additional prerequisites and students should ensure that all prerequisites have been completed (see the table of prerequisites printed above). Seminars do not count as electives.

Seminars
Seminars can be taken only after all of the required core courses in economics have been completed. ECON UN3412 Introduction To Econometrics may not be taken or retaken concurrently with a senior seminar. Seminars do not count as electives. Each seminar is limited to sixteen students, with priority given to seniors. For ECPS GU4921 Seminar In Political Economy and ECPF GU4950 Economics and Philosophy Seminar, priority is given to economics-political science and economics-philosophy majors, respectively.

For seminar registration details, read the information posted on the department’s Senior Seminar Registration page: http://econ.columbia.edu/senior-seminars-registration (http://econ.columbia.edu/senior-seminars-registration/).

Mathematics
Students must consult with the Mathematics Department for the appropriate placement in the calculus sequence. Students must complete one of the following sequences:

Select one of the following sequences:

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Calculus Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH UN1101</td>
<td>Calculus I</td>
</tr>
<tr>
<td>- MATH UN1201</td>
<td>and Calculus III</td>
</tr>
<tr>
<td>MATH UN1101</td>
<td>Calculus I</td>
</tr>
<tr>
<td>- MATH UN1205</td>
<td>and Accelerated Multivariable Calculus</td>
</tr>
<tr>
<td>MATH UN1207</td>
<td>Honors Mathematics A</td>
</tr>
<tr>
<td>- MATH UN1208</td>
<td>and Honors Mathematics B</td>
</tr>
</tbody>
</table>

In addition:

1. Students who receive a grade of D or F in MATH UN1201 Calculus III or MATH UN1205 must retake the course but may enroll in ECON UN3211 Intermediate Microeconomics.
2. Students who receive a grade of D or F in MATH UN1207 Honors Mathematics A may either retake the course, or take MATH UN1201 Calculus III or MATH UN1205, and enroll in ECON UN3211 Intermediate Microeconomics concurrently.

Statistics
Unless otherwise specified below, all students must take STAT UN1201 Calculus-Based Introduction to Statistics, or a higher level course, such as STAT GU4204 Statistical Inference, or STAT GU4001.

Barnard Courses
A limited number of Barnard economics electives may count toward the major, concentration, and interdepartmental majors. Students should pay careful attention to the limit of Barnard electives indicated in their program requirements. Please see the Transfer Credit section below for information on the number of Barnard electives that may be taken to fulfill major requirements. In addition, students may receive credit for the major, concentration, and interdepartmental majors only for those Barnard economics courses listed in this Bulletin. However, students may not receive credit for two courses whose content overlaps. Barnard and Columbia economics electives with overlapping content include but are not limited to:

<table>
<thead>
<tr>
<th>Barnard Course</th>
<th>Columbia Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON BC3029</td>
<td>Empirical Development Economics and Economic Development</td>
</tr>
<tr>
<td>- ECON GU4321</td>
<td></td>
</tr>
<tr>
<td>ECON BC3038</td>
<td>International Money and Finance and International Macroeconomics</td>
</tr>
<tr>
<td>- ECON GU4505</td>
<td></td>
</tr>
<tr>
<td>ECON BC3019</td>
<td>Labor Economics and Labor Economics</td>
</tr>
<tr>
<td>- ECON GU4400</td>
<td></td>
</tr>
<tr>
<td>ECON BC3047</td>
<td>International Trade and International Trade</td>
</tr>
<tr>
<td>- ECON GU4500</td>
<td></td>
</tr>
<tr>
<td>ECON BC3039</td>
<td>Environmental and Natural Resource Economics and Economics of the Environment</td>
</tr>
<tr>
<td>- ECON GU4625</td>
<td></td>
</tr>
<tr>
<td>ECON BC3041</td>
<td>Theoretical Foundations of Political Economy and HISTORICAL FOUNDATIONS OF MODERN ECONOMICS: Adam Smith to J M Keynes</td>
</tr>
<tr>
<td>- ECON GU4235</td>
<td></td>
</tr>
<tr>
<td>ECON GU4400</td>
<td>Labor Economics</td>
</tr>
<tr>
<td>ECON GU4235</td>
<td>HISTORICAL FOUNDATIONS OF MODERN ECONOMICS: Adam Smith to J M Keynes</td>
</tr>
</tbody>
</table>

Students should always first consult with econ-advising to confirm that the Barnard elective they wish to take does not overlap with a Columbia elective that they have already taken or plan to take. Students may not take the Barnard core economics, math, statistics, or seminar courses for credit towards the completion of major requirements.
School of Professional Studies Courses

The Department of Economics does not accept any of the courses offered through the School of Professional Studies for credit towards the economics major, concentration, or interdepartmental majors with the exception of the courses offered by the Economics Department during the summer session at Columbia.

Other Department and School Courses

Please note that with the exception of the above Barnard courses and the specific courses listed below for the financial economics major, no other courses offered through the different departments and schools at Columbia count toward the economics majors or concentration.

Transfer Credits

Students are required to take a minimum number of courses in the Columbia Economics Department. For all majors and interdepartmental majors, students must complete a minimum of five lecture courses in the Columbia department. Students may fulfill their remaining requirements for economics lecture courses through AP (or IB or GCE) credits, Barnard electives, transfer courses, and study abroad courses (the latter two are subject to the approval of the Economics Department). The following table summarizes the new rules:

<table>
<thead>
<tr>
<th>Program</th>
<th>Number of required economics lecture courses</th>
<th>Minimum number which must be taken in the department</th>
<th>Maximum number of outside allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics major</td>
<td>9</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Financial economics</td>
<td>8</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Economics-mathematics</td>
<td>7</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Economics-political science</td>
<td>7</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Economics-statistics</td>
<td>7</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Economics-philosophy</td>
<td>7</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Economics concentration</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Lecture courses do not include seminars, which must be taken in the Columbia Economics Department. The lecture course counts are counts of economics courses only and do not include math, statistics, or courses in other departments;

2. At least two of the three 3000-level economics core courses must be taken in the department and no corresponding Barnard courses are accepted. ECON UN3025 Financial Economics and ECON UN3265 The Economics of Money and Banking are counted as departmental courses regardless of the instructor;

3. Outside courses include AP (or IB or GCE) credits, transfer credits, Barnard 2000- and 3000-level elective courses and transfer credits from other universities. In the case where two or more courses taken outside of Columbia are used as the equivalent of ECON UN1105 Principles of Economics, those courses are counted as one transfer course.

Approval of transfer credits to fulfill economics requirements must be obtained in writing from the Department of Economics (see the departmental website (http://www.columbia.edu/cu/economics/) or speak with your advising dean for information regarding applications for transfer credit). Approval is granted only for courses that are considered to be comparable to those offered at Columbia.

Summer courses taken at other institutions must be approved in writing by the department’s transfer credit adviser before the course is taken. The department does not accept transfer credits for any 3000 level core courses taken during a summer session outside of Columbia University.

Summer courses taken from the department of economics at Columbia University do not need approval.

Guidelines and instructions on how to request transfer credit approval can be found in the Transfer Credit Information page of the departmental website (http://www.columbia.edu/cu/economics/).

Major in Economics

Please read Guidelines for all for Economics Majors, Concentrators, and Interdepartmental Majors (p. 2) above.

The economics major requires a minimum of 35 points in economics, 6 points in mathematics, and 3 points in statistics, for a total of at least 44 points as follows:

<table>
<thead>
<tr>
<th>Economics Core Courses</th>
<th>All economics core courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>Select a mathematics sequence</td>
</tr>
<tr>
<td>Statistics</td>
<td>Select a statistics course</td>
</tr>
<tr>
<td>Economics Electives</td>
<td>Select at least five electives, of which no more than one may be taken at the 2000-level (including Barnard courses)</td>
</tr>
<tr>
<td>Economics Seminar</td>
<td>Select one economics seminar course</td>
</tr>
</tbody>
</table>

Concentration in Economics

Please read Guidelines for all for Economics Majors, Concentrators, and Interdepartmental Majors (p. 2) above.

The economics concentration requires a minimum of 25 points in economics, 6 points in mathematics, and 3 points in statistics, for a total of at least 34 points as follows:

<table>
<thead>
<tr>
<th>Economics Core Courses</th>
<th>All economics core courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>Select a mathematics sequence</td>
</tr>
<tr>
<td>Statistics</td>
<td>Select a statistics course</td>
</tr>
<tr>
<td>Economics Electives</td>
<td>Select at least three electives, of which no more than one may be taken at the 2000-level (including Barnard courses)</td>
</tr>
</tbody>
</table>

Major in Financial Economics

Please read Guidelines for all for Economics Majors, Concentrators, and Interdepartmental Majors (p. 2) above.
The Department of Economics offers the major in financial economics, which provides an academic framework to explore the role of financial markets and intermediaries in the allocation (and misallocation) of capital. Among the topics studied in financial economics are financial markets, banks and other financial intermediaries, asset valuation, portfolio allocation, regulation and corporate governance.

The financial economics major requires 26 points in economics, 6 points in mathematics, 3 points in statistics, 3 points in business, and 12 points from a list of selected courses for a total minimum of 50 points as follows:

### Economics Core Courses
All economics core courses

### Finance Core Courses
- **ECON UN3025** Financial Economics
- **ECON GU4280** Corporate Finance
- **BUSI UN3013** Financial Accounting

*NOTE: The department considers BUSI UN3013 and IEOR E2261 as overlapping courses. Students who take both courses shall be credited with one course only. Financial economics majors who are also in the Business Management concentration program (CNBUMG) must take an additional elective from either the financial economics prescribed elective list (below) or from the CNBUMG prescribed list.

### Mathematics
Select a mathematics sequence

### Statistics
Select a statistics course

### Electives
Select four of the following, of which two must be from the Columbia or Barnard economics departments, or equivalent economics transfer credits:

- **ECON BC3014** Entrepreneurship
- **ECON BC3017** Economics of Business Organization
- **ECON UN3265** The Economics of Money and Banking
- **ECON UN3952** Seminar in Macroeconomics and Formation of Expectations
- **ECON GU4020** Economics of Uncertainty and Information
- **ECON GU4213** Advanced Macroeconomics
- **ECON GU4251** Industrial Organization
- **ECON GU4260** Market Design
- **ECON GU4412** Advanced Econometrics
- **ECON GU4415** Game Theory
- **ECON GU4465** Public Economics
- **ECON GU4500** International Trade
- **ECON GU4505** International Macroeconomics
- **ECON BC3038** International Money and Finance
- **ECON G4526** Transition Reforms, Globalization and Financial Crisis
- **ECON GU4700** Financial Crises
- **ECON GU4710** Finance and the Real Economy
- **ECON GU4840** Behavioral Economics
- **ECON GU4850** Cognitive Mechanisms and Economic Behavior
- **ECON GU4860** Behavioral Finance
- **BIOT GU4180**
- **BUSI UN3021** Marketing Management
- **BUSI UN3701** Strategy Formulation
- **BUSI UN3702** Venturing to Change the World

### Major in Economics-Mathematics
Please read Guidelines for all for Economics Majors, Concentrators, and Interdepartmental Majors (p. 2) above.

The major in economics and mathematics provides students with a grounding in economic theory comparable to that provided by the general economics major and exposes students to rigorous and extensive training in mathematics. The program is recommended for any student planning to do graduate work in economics.

The Department of Economics has graduate student advisers with whom students may consult on economics requirements. The Department of Mathematics has an assigned adviser with whom students may consult on mathematics requirements. The economics adviser can only advise on economics requirements; the mathematics adviser can only advise on mathematics requirements.

The economics-mathematics major requires a total of 52 or 56 points (depending on mathematics sequence): 29 points in economics and 23-27 points in mathematics and statistics as follows:

### Economics Core Courses
All economics core courses

### Economics Electives
Select three electives at the 3000-level or above

### Mathematics
Select one of the following sequences:

- **MATH UN1101** Calculus I
- **MATH UN1102** and Calculus II
- **MATH UN1201** and Calculus III
- **MATH UN2010** and Linear Algebra

- **MATH UN1101** Calculus I
- **MATH UN1102** and Calculus II
- **MATH UN1205** and Accelerated Multivariable Calculus
- **MATH UN2010** and Linear Algebra
Major in Economics-Philosophy

Please read Guidelines for all for Economics Majors, Concentrators, and Interdepartmental Majors (p. 2) above.

Economics-philosophy is an interdisciplinary major that introduces students to basic methodologies of economics and philosophy and stresses areas of particular concern to both, e.g. rationality and decision making, justice and efficiency, freedom and collective choice, logic of empirical theories and testing. Many issues are dealt with historically. Classic texts of Plato, Kant, Mill, Marx, and Smith are reviewed.

The Department of Economics has graduate student advisers with whom students may consult on economics requirements. The Department of Philosophy has an assigned adviser with whom students may consult on philosophy requirements. The economics adviser can only advise on economics requirements; the philosophy adviser can only advise on philosophy requirements. The Department of Economics has graduate student advisers with whom students to basic methodologies of economics and philosophy and stresses areas of particular concern to both, e.g. rationality and decision making, justice and efficiency, freedom and collective choice, logic of empirical theories and testing. Many issues are dealt with historically. Classic texts of Plato, Kant, Mill, Marx, and Smith are reviewed.

The Department of Economics has graduate student advisers with whom students may consult on economics requirements. The Department of Philosophy has an assigned adviser with whom students may consult on philosophy requirements. The economics adviser can only advise on economics requirements; the philosophy adviser can only advise on philosophy requirements. The Department of Economics has graduate student advisers with whom students may consult on economics requirements. The Department of Philosophy has an assigned adviser with whom students may consult on philosophy requirements. The economics adviser can only advise on economics requirements; the philosophy adviser can only advise on philosophy requirements.

The economics-philosophy major requires a total minimum of 54 points: 25 points in economics, 16 points in philosophy, 6 points in mathematics, 3 points in statistics, and 4 points in the interdisciplinary seminar as follows:

**Economics Core Courses**

- ECON UN1105 Principles of Economics
- ECON UN3211 Intermediate Microeconomics
- ECON UN3213 Intermediate Macroeconomics
- ECON UN3412 Introduction To Econometrics

**Mathematics**

Select a mathematics sequence

**Statistics**

Select a statistics course

**Economics Electives**

Three Electives are required; two must be selected from the below list, and the remaining elective may be any economics elective at the 3000-level or above.

- ECON GU4020 Economics of Uncertainty and Information
- ECON GU4211 Advanced Microeconomics
- ECON GU4213 Advanced Macroeconomics
- ECON GU4228 Urban Economics
- ECON GU4230 Economics of New York City
- ECON GU4235 HISTORICAL FOUNDATIONS OF MODERN ECONOMICS: Adam Smith to J M Keynes
- ECON GU4301 Economic Growth and Development
- ECON GU4370 Political Economy
- ECON GU4400 Labor Economics
- ECON GU4415 Game Theory
- ECON GU4438 Economics of Race in the U.S.
- ECON GU4465 Public Economics
- ECON GU4480 Gender and Applied Economics
- ECON GU4500 International Trade
- ECON W4615 Law and Economics
- ECON GU4625 Economics of the Environment or ECON BC3039 Environmental and Natural Resource Economics
- ECON GU4750 Globalization and Its Risks
- ECON GU4840 Behavioral Economics
- ECON GU4850 Cognitive Mechanisms and Economic Behavior
- ECON BC3011 Inequality and Poverty

**Philosophy Courses**

- PHIL UN1010 Methods and Problems of Philosophical Thought
- PHIL UN3411 Symbolic Logic
- PHIL UN3701 Ethics
- PHIL UN3551 or PHIL UN3960 Philosophy of Science
- PHIL GU4561 Probability and Decision Theory

**Seminar**

- ECPH GU4950 Economics and Philosophy Seminar

Students who declared before Spring 2014: The requirements for this program were modified in 2014. Students who declared this program before Spring 2014 should contact the director of undergraduate studies for the department in order to confirm their options for major requirements.

**Major in Economics–Political Science**

Please read Guidelines for all for Economics Majors, Concentrators, and Interdepartmental Majors (p. 2) above.

Political economy is an interdisciplinary major that introduces students to the methodologies of economics and political science and stresses areas of particular concern to both. This program is particularly beneficial to students planning to do graduate work in schools of public policy and international affairs.
The Department of Economics has graduate student advisers with whom students may consult on economics requirements. The Department of Political Science has an assigned adviser with whom students may consult on political science requirements. The economics adviser can only advise on economics requirements; the political science adviser can only advise on political science requirements.

The economics–political science major requires a total of 59 points: 22 points in economics, 17 points in political science, 6 points in mathematics, 6 points in statistical methods, 4 points in a political science seminar, and 4 points in the interdisciplinary seminar as follows.

The political science courses are grouped into four areas, i.e. subfields: (1) American Politics, (2) Comparative Politics, (3) International Relations, and (4) Political Theory. For the political science part of the major, students are required to select one area as a major subfield and one as a minor subfield. The corresponding introductory courses in both subfields must be taken, plus two electives in the major subfield, and one in the minor subfield.

**Economics Core Courses**
- ECON UN1105 Principles of Economics
- ECON UN3211 Intermediate Microeconomics
- ECON UN3213 Intermediate Macroeconomics
- ECON GU4370 Political Economy

**Mathematics**
Select a mathematics sequence

**Statistical Methods**
- STAT UN1201 Calculus-Based Introduction to Statistics

**Select one of the following:**
- ECON UN3412 Introduction To Econometrics
- POLS GU4712 Principles of Quantitative Political Research II/Applied Econometrics

**Economics Electives**
Select two electives (6 points) at the 3000-level or above

**Political Science Courses**
Students must choose a Primary Subfield and a Secondary Subfield to study. The subfields are as follows: American Politics (AP), Comparative Politics (CP), International Relations (IR), and Political Theory (PT).

**Primary Subfield:** Minimum three courses, one of which must be the subfield’s introductory course.

**Secondary Subfield:** Minimum two courses, one of which must be the subfield’s introductory course.

**Seminars**
Students must take the following two seminars:
- ECPS GU4921 Seminar In Political Economy
- and a Political Science Department seminar, in the student’s Primary Subfield. Please select one of the following: *
  - POLS UN3911 Seminar in Political Theory
  - or POLS UN3912 Seminar in Political Theory
  - POLS UN3921 Seminar in American Politics
  - or POLS UN3922 Seminar in American Politics
  - POLS UN3951 Seminar in Comparative Politics
  - or POLS UN3952 Seminar in Comparative Politics
  - POLS UN3961 International Politics Seminar
  - or POLS UN3962 Seminar in International Politics
  - Students who wish to count toward the political science seminar requirement a course that is not in the above list of approved seminars must obtain permission from the political science Director of Undergraduate studies. Barnard colloquia can count for seminar credit only with the written permission of the Director of Undergraduate Studies. Note that admission to Barnard colloquia is by application to the Barnard political science department only.

**Major in Economics-Statistics**
Please read Guidelines for all for Economics Majors, Concentrators, and Interdepartmental Majors (p. 2) above.

The major in economics-statistics provides students with a grounding in economic theory comparable to that provided by the general economics major, but also exposes students to a significantly more rigorous and extensive statistics training than is provided by the general major. This program is recommended for students with strong quantitative skills and for those contemplating graduate studies in economics.

The Department of Economics has graduate student advisers with whom students may consult on economics requirements. The Department of Statistics has an assigned adviser with whom students may consult on statistics requirements. The economics adviser can only advise on economics requirements; the statistics adviser can only advise on statistics requirements.

The economics-statistics major requires a total of 59 points: 29 in economics, 15 points in statistics, 12 points in mathematics, 3 points in computer science as follows:

**Economics Core Courses**
All economics core courses

**Economics Electives**
Select three electives at the 3000-level or above

**Mathematics**
Select one of the following sequences:

**Statistics**
- STAT UN1201 Calculus-Based Introduction to Statistics
- STAT GU203 PROBABILITY THEORY
- STAT GU204 Statistical Inference
- STAT GU4205 Linear Regression Models

One elective in statistics from among courses numbered STAT GU 4206 through GU 4266.

**Computer Science**
Select one of the following:
- COMS W1004 Introduction to Computer Science and Programming in Java
- COMS W1005 Introduction to Computer Science and Programming in MATLAB
COMS W1007  Honors Introduction to Computer Science

ENGI E1006  Introduction to Computing for Engineers and Applied Scientists

STAT UN2102  Applied Statistical Computing

ECON GU4918  Seminar In Econometrics

**Economics Seminar**

Students who declared before Spring 2014: The requirements for this program were modified in 2014. Students who declared this program before Spring 2014 should contact the director of undergraduate studies for the department in order to confirm their options for major requirements.

**ECON UN1105 Principles of Economics. 4 points.**
Corequisites: ECON UN1155
How a market economy determines the relative prices of goods, factors of production, and the allocation of resources and the circumstances under which it does it efficiently. Why such an economy has fluctuations and how they may be controlled.

**ECON UN1105 Disc Section: Principles of Economics. 0 points.**
Required Discussion section for ECON UN1105 Principles of Economics

**ECON UN2029 FED Challenge Workshop. 1 point.**
Prerequisites: (ECON UN1105)
The workshop prepares students to compete in the annual College Fed Challenge sponsored by the Federal Reserve. Topics covered include macroeconomic and financial conditions, monetary policy, financial stability and the Federal Reserve System.

**ECON UN2105 The American Economy. 3 points.**
Prerequisites: ECON UN1105
The course surveys issues of interest in the American economy, including economic measurement, well-being and income distribution, business cycles and recession, the labor and housing markets, saving and wealth, fiscal policy, banking and finance, and topics in central banking. We study historical issues, institutions, measurement, current performance and recent research.

**ECON UN2257 Global Economy. 3 points.**
Prerequisites: ECON UN1105
Covers five areas within the general field of international economics: (i) microeconomic issues of why countries trade, how the gains from trade are distributed, and protectionism; (ii) macroeconomic issues such as exchange rates, balance of payments and open economy microeconomic adjustment, (iii) the role of international institutions (World Bank, IMF, etc); (iv) economic development and (v) economies in transition.

**ECON UN3025 Financial Economics. 3 points.**
Prerequisites: ECON UN3211 and ECON UN3213 and STAT UN1201
ECON UN3211 Intermediate Microeconomics. 4 points.
Prerequisites: ECON UN1105 and MATH UN1101 and (MATH UN1201 or MATH UN1207)
The determination of the relative prices of goods and factors of production and the allocation of resources.

ECON UN3212 Discussion Section Intermediate Economics. 0 points.
Required Discussion section for ECON UN3211 Intermediate Economics.

ECON UN3213 Intermediate Macroeconomics. 4 points.
Prerequisites: (MATH UN1101 or MATH UN1207) and ECON UN1105 or the equivalent.

ECON UN3214 Intermediate Macroeconomics - Discussion Section. 0 points.
Discussion section for ECON UN3213 Intermediate Macro. Student must register for a section.

ECON UN3265 The Economics of Money and Banking. 3 points.
Prerequisites: ECON BC3033 and ECON BC3035 or the equivalent.
Introduction to the principles of money and banking. The intermediary institutions of the American economy and their historical developments, current issues in monetary and financial reform.

ECON UN3412 Introduction To Econometrics. 4 points.
Prerequisites: (ECON UN3211 or ECON UN3213) and (MATH UN1201 or MATH UN1207) and STAT UN1201
Modern econometric methods; the general linear statistical model and its extensions; simultaneous equations and the identification problem; time series problems; forecasting methods; extensive practice with the analysis of different types of data.
ECON UN3901 Economics of Education. 3 points.
Prerequisites: (econ un3211 and econ un3213 and econ un3412)
Course objective: This course has two objectives: (1) To develop students’ skills in research and writing. Specifically, participants will work on: formulating a research question, placing it in the context of an existing literature and/or policy area, and using economic and econometric tools to address it in writing. Specifically, in the first part of the class, readings, problem sets, and a midterm exam will build skills in these areas. In the second part, students will come up with a research question, and address it in a research proposal/report. While all the applications will be on the economics of education, these skills will be useful in students’ subsequent careers, regardless of the area of economics they focus on. (2) To provide an introduction to key issues in the economics of education. Specifically, education is a significant industry—every person entering this course will have already spent years in this industry as a customer, as a worker, as an input, or all of the above. The course will address questions like: What does economics have to say about how this industry is organized and what determines its output? Why do individuals invest in education? What determines the behavior, productivity, and reputation of firms in the industry? What role should government and public policy (if any) play in its operation?

ECON UN3952 Seminar in Macroeconomics and Formation of Expectations. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213 and ECON UN3412
This course has two main objectives:

To introduce students to the process of writing a research paper. This includes identifying and formulating a research question, reviewing the previous literature and positioning the problem in that context, identifying the proper tools and data to answer the question, and finally writing the findings in the format of a research paper. An immediate goal is to prepare the students to undertake a senior thesis project.

To provide an introduction to selected topics and survey evidence in macroeconomics, with a focus on the expectation formation process of economic agents. We will start by going through some canonical models that are widely used for economic and policy analysis to understand the role of expectations in the decision making of households and firms. We will then go through a series of survey data and relate the empirical evidence to the theoretical predictions of those canonical models

ECON UN3981 Applied Econometrics. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213 and ECON UN3412
The objective of this course is to develop students’ research skills and to learn the process of writing an original research paper. The skills and process include the ability to identify a problem and state in a concise manner, literature review, data collection, model formulation and estimation, evaluation of the problem and writing up the findings in a format of a research paper. An immediate and more specific goal is to prepare students to tackle a senior thesis project.

Towards this goal, this course will review or introduce the most widely used econometric techniques for empirical research. These include multiple regressions, probit and logit models, instrumental variables methods, panel data methods, regression discontinuity designs. This course will also introduce some time series methods such as vector autoregressive process, cointegration analysis, financial time series, and modeling of volatilities. Students will need to practice these methods with a computer software package (R or STATA) and with actual economic data sets.

ECON GU4020 Economics of Uncertainty and Information. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213 and STAT UN1201
Topics include behavior uncertainty, expected utility hypothesis, insurance, portfolio choice, principle agent problems, screening and signaling, and information theories of financial intermediation.

ECON GU4211 Advanced Microeconomics. 4 points.
Prerequisites: ECON UN3211 and ECON UN3213 and MATH UN2010
Students must register for required discussion section.
Corequisites: MATH UN2500, MATH GU4061
The course provides a rigorous introduction to microeconomics. Topics will vary with the instructor but will include consumer theory, producer theory, general equilibrium and welfare, social choice theory, game theory and information economics. This course is strongly recommended for students considering graduate work in economics. Discussion section required.

ECON GU4212 Discussion Section Advanced Microeconomics. 0 points.
Prerequisites: ECON UN3211 and ECON UN3213 and MATH UN2010
Students must register for lecture course ECON GU4211
Corequisites: MATH UN2500, MATH GU4061
Required discussion section for ECON GU4211 Advanced Microeconomics. The course provides a rigorous introduction to microeconomics. Topics will vary with the instructor but will include consumer theory, producer theory, general equilibrium and welfare, social choice theory, game theory and information economics. This course is strongly recommended for students considering graduate work in economics. Discussion section required.

ECON GU4213 Advanced Macroeconomics. 4 points.
Prerequisites: ECON UN3211 and ECON UN3213 and ECON UN3412 and MATH UN2010
Required discussion section ECON GU4214
An introduction to the dynamic models used in the study of modern macroeconomics. Applications of the models will include theoretical issues such as optimal lifetime consumption decisions and policy issues such as inflation targeting. This course is strongly recommended for students considering graduate work in economics.
ECON GU4228 Urban Economics. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213

ECON GU4230 Economics of New York City. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213 and STAT UN1201
This course takes New York as our laboratory. Economics is about individual choice subject to constraints and the ways that choices sum up to something often much more than the parts. The fundamental feature of any city is the combination of those forces that bring people together and those that push them apart. Thus both physical and social space will be central to our discussions. The underlying theoretical and empirical analysis will touch on spatial aspects of urban economics, regional, and even international economics. We will aim to see these features in New York City taken as a whole, as well as in specific neighborhoods of the city. We will match these theoretical and empirical analyses with readings that reflect close observation of specific subjects. The close observation is meant to inspire you to probe deeply into a topic in order that the tools and approaches of economics may illuminate these issues in a fresh way.

Spring 2019: ECON GU4230
Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment
--- | --- | --- | --- | --- | ---
ECON 4230 | 001/19448 | T Th 10:10am - 11:25am | Donald Davis | 3 | 43/86

ECON GU4235 HISTORICAL FOUNDATIONS OF MODERN ECONOMICS:
Adam Smith to J M Keynes. 3 points.
Not offered during 2019-20 academic year.

Prerequisites: ECON UN3211 and ECON UN3213
A survey of some of the major intellectual developments that have created the discipline of economics. Particular attention to the works of Adam Smith, Alfred Marshall, Irving Fisher, and J. M. Keynes.

ECON GU4251 Industrial Organization. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
The study of industrial behavior based on game-theoretic oligopoly models. Topics include pricing models, strategic aspects of business practice, vertical integration, and technological innovation.

Spring 2019: ECON GU4251
Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment
--- | --- | --- | --- | --- | ---
ECON 4251 | 001/13260 | M W 11:40am - 12:55pm | John Asker | 3 | 55/86

Fall 2019: ECON GU4251
Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment
--- | --- | --- | --- | --- | ---
ECON 4251 | 001/47405 | M W 11:40am - 12:55pm | Ingmar Nyman | 3 | 55/86

ECON GU4257 Technology and Industry. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
The use of technology in creating, delivering, marketing, and valuing goods and services. Models of technical change and innovation, their role in the process of economic growth, and the social and institutional environment in which they occur.

Spring 2019: ECON GU4257
Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment
--- | --- | --- | --- | --- | ---
ECON 4257 | 001/17448 | M W 11:40am - 12:55pm | Tyler O'Brien | 3 | 66/86

ECON GU4260 Market Design. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213 and STAT UN1201
This course uses modern microeconomic tools for understanding markets for indivisible resources and exploring ways to improve their design in terms of stability, efficiency and incentives. Lessons of market design will be applied to developing internet platforms for intermediating exchanges, for auctions to allocate sponsored search advertising, to allocate property rights such as public lands, radio spectrums, fishing rights, for assigning students to public schools, and for developing efficient kidney exchanges for transplantation.

Spring 2019: ECON GU4260
Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment
--- | --- | --- | --- | --- | ---
ECON 4260 | 001/28598 | M W 10:10am - 11:25am | Guillaume Haeringer | 3 | 76/86

ECON GU4280 Corporate Finance. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213 and STAT UN1201
An introduction to the economics principles underlying the financial decisions of firms. The topics covered include bond and stock valuations, capital budgeting, dividend policy, market efficiency, risk valuation, and risk management. For information regarding REGISTRATION for this course, go to: http://econ.columbia.edu/registration-information/.

Spring 2019: ECON GU4280
Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment
--- | --- | --- | --- | --- | ---
ECON 4280 | 001/63915 | T Th 1:10pm - 2:25pm | Yiming Ma | 3 | 73/80

ECON GU4301 Economic Growth and Development. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
Empirical findings on economic development, theoretical development of economic growth, the role of capital accumulation and innovation in economic growth.

Spring 2019: ECON GU4301
Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment
--- | --- | --- | --- | --- | ---
ECON 4301 | 001/47410 | M W 8:40am - 9:55am | Xavier Sala-i-Martin | 3 | 98/100

ECON GU4303 Economic Development. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
Empirical findings on economic development, theoretical development of economic growth.
ECON 4412 Advanced Econometrics. 4 points.
Prerequisites: ECON UN3211 and ECON UN3213 and ECON UN3412 and MATH UN2010
Students must register for required discussion section. The linear regression model will be presented in matrix form and basic asymptotic theory will be introduced. The course will also introduce students to basic time series methods for forecasting and analyzing economic data. Students will be expected to apply the tools to real data.

ECON 4413 Econometrics of Time Series and Forecasting. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213 and ECON UN3412
Corequisites: MATH UN2010
This course focuses on the application of econometric methods to time series data; such data is common in the testing of macro and financial economics models. It will focus on the application of these methods to data problems in macro and finance.

ECON 4415 Game Theory. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
Introduction to the systematic treatment of game theory and its applications in economic analysis.

ECON 4438 Economics of Race in the U.S.. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
ECON GU4400 is strongly recommended.
What differences does race make in the U.S. economy? Why does it make these differences? Are these differences things we should be concerned about? If so, what should be done? The course examines labor markets, housing markets, capital markets, crime, education, and the links among these markets. Both empirical and theoretical contributions are studied.

ECON 4465 Public Economics. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213

ECON 4440 Labor Economics. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
The labor force and labor markets, educational and man power training, unions and collective bargaining, mobility and immobility, sex and race discrimination, unemployment.

ECON 4437 Political Economy. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213 and STAT UN1201 or POLS 4710 for those who declared prior to Spring 2014.
The course studies the interaction between government and markets. The first part discusses market failures and the scope and limits of government intervention, including the use of modified market-type tools (for example, cap-and-trade regulations for pollution). The second part discusses collective decision-making, in particular voting and its properties and pathologies. The final part discusses economic inequality and government's role in addressing it.

ECON 4425 Economic Organization and Development of Japan. 3 points.
CC/GS/SEAS: Partial Fulfillment of Global Core Requirement
Prerequisites: ECON UN3211 and ECON UN3213
The growth and structural changes of the post-World War II economy; its historical roots; interactions with cultural, social, and political institutions; economic relations with the rest of the world.

ECON 4370 Economic Development. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
Historical comparative examination of the economic development problems of the less developed countries; the roles of social institutions and human resource development; the functions of urbanization, rural development, and international trade.

ECON 4465 Public Economics. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
The course studies the interaction between government and markets.

Fall 2019: ECON GU4412
Course Number Section/Call Times/Location Instructor Points Enrollment
ECON 4412 001/47413 T Th 10:10am - 11:25am 503 Hamilton Hall Serena Ng 4 24/54

Fall 2019: ECON GU4415
Course Number Section/Call Times/Location Instructor Points Enrollment
ECON 4415 001/47415 T Th 2:40pm - 3:55pm 402 Chandler Prajit Dutta 3 76/110

Fall 2019: ECON GU4438
Course Number Section/Call Times/Location Instructor Points Enrollment
ECON 4438 001/47415 T Th 2:40pm - 3:55pm 717 Hamilton Hall Brendan O'Flaherty 3 44/86

Spring 2019: ECON GU4465
Course Number Section/Call Times/Location Instructor Points Enrollment
ECON 4465 001/47416 M W 5:40pm - 6:55pm 420 Pupin Laboratories Timothy Goodspeed 3 30/50

Spring 2019: ECON GU4413
Course Number Section/Call Times/Location Instructor Points Enrollment
ECON 4413 001/47416 T Th 2:40pm - 3:55pm 633 Seeley W. Mudd Building Jack Willis 3 33/67

Fall 2019: ECON GU4415
Course Number Section/Call Times/Location Instructor Points Enrollment
ECON 4415 001/47415 M W 8:40am - 9:55am 402 Chandler Prajit Dutta 3 76/110

Fall 2019: ECON GU4438
Course Number Section/Call Times/Location Instructor Points Enrollment
ECON 4438 001/47415 T Th 2:40pm - 3:55pm 717 Hamilton Hall Brendan O'Flaherty 3 44/86

Fall 2019: ECON GU4465
Course Number Section/Call Times/Location Instructor Points Enrollment
ECON 4465 001/47416 M W 5:40pm - 6:55pm 420 Pupin Laboratories Timothy Goodspeed 3 30/50

ECON 4415 Game Theory. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
Introduction to the systematic treatment of game theory and its applications in economic analysis.

ECON 4413 Econometrics of Time Series and Forecasting. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213 and ECON UN3412
Corequisites: MATH UN2010
This course focuses on the application of econometric methods to time series data; such data is common in the testing of macro and financial economics models. It will focus on the application of these methods to data problems in macro and finance.

ECON 4415 Game Theory. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
Introduction to the systematic treatment of game theory and its applications in economic analysis.

ECON 4438 Economics of Race in the U.S.. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
ECON GU4400 is strongly recommended.
What differences does race make in the U.S. economy? Why does it make these differences? Are these differences things we should be concerned about? If so, what should be done? The course examines labor markets, housing markets, capital markets, crime, education, and the links among these markets. Both empirical and theoretical contributions are studied.

ECON 4465 Public Economics. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213

ECON 4438 Economics of Race in the U.S.. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
ECON GU4400 is strongly recommended.
What differences does race make in the U.S. economy? Why does it make these differences? Are these differences things we should be concerned about? If so, what should be done? The course examines labor markets, housing markets, capital markets, crime, education, and the links among these markets. Both empirical and theoretical contributions are studied.
ECON GU4480 Gender and Applied Economics. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
This course studies gender gaps, their extent, determinants and consequences. The focus will be on the allocation of rights in different cultures and over time, why women’s rights have typically been more limited and why most societies have traditionally favored males in the allocation of resources.

Fall 2019: ECON GU4480

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<th>Course Number</th>
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<th>Times/Location</th>
<th>Instructor</th>
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<th>Enrollment</th>
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<tr>
<td>ECON 4480</td>
<td>001/47417</td>
<td>M W 6:40pm - 6:55pm</td>
<td>Lena Edlund</td>
<td>3</td>
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</tr>
</tbody>
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ECON GU4500 International Trade. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
The theory of international trade, comparative advantage and the factor endowments explanation of trade, analysis of the theory and practice of commercial policy, economic integration. International mobility of capital and labor; the North-South debate.

Spring 2019: ECON GU4500

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<th>Course Number</th>
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<tbody>
<tr>
<td>ECON 4500</td>
<td>001/19239</td>
<td>T Th 1:10pm - 2:25pm</td>
<td>Reka Juhasz</td>
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Fall 2019: ECON GU4500

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<th>Section/Call Number</th>
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<th>Instructor</th>
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<tr>
<td>ECON 4500</td>
<td>001/47418</td>
<td>T Th 8:40am - 9:55am</td>
<td>Reka Juhasz</td>
<td>3</td>
<td>68/86</td>
</tr>
</tbody>
</table>

ECON GU4505 International Macroeconomics. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
Introduction to monetary problems in international trade. Topics include macroeconomics of the open economy under fixed and flexible exchange rates, international adjustment under the gold standard, monetary problems of the interwar period, the Breton Woods agreement, transition to flexible exchange rates, planned reforms of the international monetary system and the Eurocurrency markets.

Spring 2019: ECON GU4505

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<th>Course Number</th>
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<th>Times/Location</th>
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<td>ECON 4505</td>
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<td>M W 8:40am - 9:55am</td>
<td>Stephanie Schmitt-Grohe</td>
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ECON GU4526 Transition Reforms, Globalization and Financial Crisis. 3 points.
Not offered during 2019-20 academic year.

Prerequisites: ECON UN3211 and UN3213.
Covers reform issues in transition economies such as price liberalization, currency reform, asset privatization, macroeconomic stabilization, trade liberalization and exchange rate policies, and foreign resource flows with suitable examples from the experience of the transition economies of Russia, the post-Soviet states, East-central Europe, China and Vietnam.

ECON GU4615 Law and Economics. 3 points.
Not offered during 2019-20 academic year.

Prerequisites: ECON UN3211 and UN3213.
The course is intended to provide an economic framework for understanding the law and legal institutions. Topics covered include property law, contract theory and torts.
ECON GU4840 Behavioral Economics. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213
Within economics, the standard model of behavior is that of a perfectly rational, self interested utility maximizer with unlimited cognitive resources. In many cases, this provides a good approximation to the types of behavior that economists are interested in. However, over the past 30 years, experimental and behavioral economists have documented ways in which the standard model is not just wrong, but is wrong in ways that are important for economic outcomes. Understanding these behaviors, and their implications, is one of the most exciting areas of current economic inquiry. The aim of this course is to provide a grounding in the main areas of study within behavioral economics, including temptation and self control, fairness and reciprocity, reference dependence, bounded rationality and choice under risk and uncertainty. For each area we will study three things: 1. The evidence that indicates that the standard economic model is missing some important behavior 2. The models that have been developed to capture these behaviors 3. Applications of these models to (for example) finance, labor and development economics As well as the standard lectures, homework assignments, exams and so on, you will be asked to participate in economic experiments, the data from which will be used to illustrate some of the principals in the course. There will also be a certain small degree of classroom ‘flipping’, with a portion of many lectures given over to group problem solving. Finally, an integral part of the course will be a research proposal that you must complete by the end of the course, outlining a novel piece of research that you would be interested in doing.

ECON GU4850 Cognitive Mechanisms and Economic Behavior. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213 and STAT UN1201
Standard economic theory seeks to explain human behavior (especially in "economic" settings, such as markets) in terms of rational choice, which means that the choices that are made can be predicted on the basis of what would best serve some coherent objective, under an objectively correct understanding of the predictable consequences of alternative actions. Observed behavior often seems difficult to reconcile with a strong form of this theory, even if incentives clearly have some influence on behavior; and the course will discuss empirical evidence (both from laboratory experiments and observations "in the field") for some well-established "anomalies." But beyond simply cataloguing anomalies for the standard theory, the course will consider the extent to which departures from a strong version of rational choice theory can be understood as reflecting cognitive processes that are also evident in other domains such as sensory perception; examples from visual perception will receive particular attention. And in addition to describing what is known about how the underlying mechanisms work (something that is understood in more detail in sensory contexts than in the case of value-based decision making), the course will consider the extent to which such mechanisms — while "suboptimal" from a normative standpoint that treats perfect knowledge of one's situation as costless and automatic — might actually represent efficient uses of the limited information and bounded information-processing resources available to actual people (or other organisms). Thus the course will consider both ways in which the realism of economic analysis may be improved by taking into account cognitive processes, and ways in which understanding of cognitive processes might be advanced by considering the "economic" problem of efficient use of limited (cognitive) resources.

Fall 2019: ECON GU4850
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<td>ECON 4850</td>
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<td>M W 10:10am - 11:25am</td>
<td>Michael Woodford</td>
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ECON 4860 Behavioral Finance. 3 points.
Prerequisites: ECON UN3211 and ECON UN3213 and ECON UN3412
Neoclassical finance theory seeks to explain financial market valuations and fluctuations in terms of investors having rational expectations and being able to trade without costs. Under these assumptions, markets are efficient in that stocks and other assets are always priced just right. The efficient markets hypothesis (EMH) has had an enormous influence over the past 50 years on the financial industry, from pricing to financial innovations, and on policy makers, from how markets are regulated to how monetary policy is set. But there was very little in prevailing EMH models to suggest the instabilities associated with the Financial Crisis of 2008 and indeed with earlier crises in financial market history. This course seeks to develop a set of tools to build a more robust model of financial markets that can account for a wider range of outcomes. It is based on an ongoing research agenda loosely dubbed “Behavioral Finance”, which seeks to incorporate more realistic assumptions concerning human rationality and market imperfections into finance models. Broadly, we show in this course that limitations of human rationality can lead to bubbles and busts such as the Internet Bubble of the mid-1990s and the Housing Bubble of the mid-2000s; that imperfections of markets — such as the difficulty of short-selling assets — can cause financial markets to undergo sudden and unpredictable crashes; and that agency problems or the problems of institutions can create instabilities in the financial system as recently occurred during the 2008 Financial Crisis. These instabilities in turn can have feedback effects to the performance of the real economy in the form of corporate investments.

Spring 2019: ECON 4860
Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment
--- | --- | --- | --- | --- | ---
ECON 4860 | 001/68963 | M W 2:40pm - 3:55pm 209 Havemeyer Hall | Harrison Hong | 3 | 40/86

ECON GU4911 Seminar In Microeconomics. 4 points.
Prerequisites: ECON UN3211 and ECON UN3213 and ECON UN3412
Registration information is posted on the department’s Seminar Sign-up webpage.
Selected topics in microeconomics. Selected topics will be posted on the department’s webpage.

Spring 2019: ECON GU4911
Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment
--- | --- | --- | --- | --- | ---
ECON 4911 | 000/64865 | T 8:10am - 10:00am 1027 International Affairs Bldg | Susan Elmes | 4 | 0/800
ECON 4911 | 001/12394 | T 10:10am - 12:00pm 1027 International Affairs Bldg | Sunil Gulati | 4 | 13/16
ECON 4911 | 002/23237 | W 4:10pm - 6:00pm 1027 International Affairs Bldg | Francois Gerard | 4 | 16/16
ECON 4911 | 003/70525 | T 10:10am - 12:00pm 1027 International Affairs Bldg | Waseem Noor | 4 | 16/16
ECON 4911 | 004/75700 | Th 6:10pm - 8:00pm 1027 International Affairs Bldg | Samim Ghamami | 4 | 15/16
ECON 4911 | 005/75696 | W 2:10pm - 4:00pm 1027 International Affairs Bldg | Graciela Chichilnisky | 4 | 16/16
ECON 4911 | 006/16041 | M 4:10pm - 6:00pm 1027 International Affairs Bldg | Ingmar Nyman | 4 | 16/16

Fall 2019: ECON GU4911
Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment
--- | --- | --- | --- | --- | ---
ECON 4911 | 000/47421 | | Susan Elmes | 4 | 0/800
ECON 4911 | 001/47422 | W 4:10pm - 6:00pm 1027 International Affairs Bldg | Sunil Gulati | 4 | 16/16
ECON 4911 | 002/47423 | T 12:10pm - 2:00pm 1027 International Affairs Bldg | Neal Masia | 4 | 16/16
ECON 4911 | 003/47424 | Th 2:10pm - 4:00pm 1027 International Affairs Bldg | Lena Edlund | 4 | 16/16
ECON 4911 | 004/47425 | T 10:10am - 12:00pm 1027 International Affairs Bldg | Tri Vi Dang | 4 | 16/16
ECON 4911 | 005/47426 | M 4:10pm - 6:00pm 1027 International Affairs Bldg | Prajit Dutta | 4 | 16/16
ECON 4911 | 006/47427 | M 12:10pm - 2:00pm 1027 International Affairs Bldg | Guillaume Haeringer | 4 | 16/16
ECON GU4913 Seminar In Macroeconomics. **4 points.**
Prerequisites: ECON UN3211 and ECON UN3213 and ECON UN3412
Registration information is posted on the department’s Seminar Sign-up webpage.
Selected topics in macroeconomics. Selected topics will be posted on the department's webpage.

<table>
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<th>Course</th>
<th>Section/Call Number</th>
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<th>Points</th>
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<td>ECON 4913</td>
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<td>T 10:10pm - 12:00pm</td>
<td>1027 International Affairs Bldg</td>
<td>Miles Leahey</td>
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<td>ECON 4913</td>
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<td>ECON 4913</td>
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<td>ECON 4913</td>
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<td>1027 International Affairs Bldg</td>
<td>Tamrat Gashaw</td>
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Spring 2019: ECON GU4913
Course | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
ECON 4913 | 001/47428 | W 6:10pm - 8:00pm | 1027 International Affairs Bldg | Mathieu Gomez | 4 | 15/16 |
ECON 4913 | 002/47429 | T 2:10pm - 4:00pm | 1027 International Affairs Bldg | Jennifer La'O | 4 | 12/16 |
ECON 4913 | 003/47430 | T 6:10pm - 8:00pm | 1027 International Affairs Bldg | Maxim Pinkovsky | 4 | 13/16 |

ECON GU4918 Seminar In Econometrics. **4 points.**
Prerequisites: ECON UN3211 and ECON UN3213 and ECON UN3412 and sign-up in the department’s office. Registration information is posted on the department’s Seminar Sign-up webpage.
Analyzing data in a more in-depth fashion than in ECON UN3412.
Additional estimation techniques include limited dependent variable and simultaneous equation models. Go to the department's undergraduate Seminar Description webpage for a detailed description.

<table>
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<th>Spring 2019: ECON GU4918</th>
<th>Course</th>
<th>Section/Call Number</th>
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<td>ECON 4918</td>
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<td>T 2:10pm - 4:00pm</td>
<td>1027 International Affairs Bldg</td>
<td>Seyhan Erden</td>
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ECON GU4996 Research Course. **1-2 points.**
May NOT be used as an elective.
Prerequisites: the director of undergraduate studies' permission.
Provides students with the experience of participating in the research process by matching them to a faculty mentor who will put them to work on one of his or her current research projects. A list of available research positions is distributed each semester on the major listserv.

<table>
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<th>Spring 2019: ECON GU4996</th>
<th>Course</th>
<th>Section/Call Number</th>
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<td>ECON 4996</td>
<td>001/76256</td>
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<td>Fall 2019: ECON GU4996</td>
<td>Course</td>
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<td>Times/Location</td>
<td>Instructor</td>
<td>Points</td>
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<td>ECON 4996</td>
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<td>T 10:10am - 12:00pm</td>
<td>1027 International Affairs Bldg</td>
<td>Susan Elmes</td>
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</table>

ECON GU4998 Independent Study. **1-4 points.**
May NOT be used as an elective.
Prerequisites: the director of undergraduate studies’ permission.

<table>
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<tr>
<th>Spring 2019: ECON GU4998</th>
<th>Course</th>
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<td>ECON 4998</td>
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<td>T 10:10am - 12:00pm</td>
<td>1027 International Affairs Bldg</td>
<td>Susan Elmes</td>
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</table>

ECON GU4999 Senior Honors Thesis. **6 points.**
3 points per semester.
Prerequisites: ECON UN3211 and ECON UN3213 and ECON UN3412 and the director of the departmental honors program's permission. Students must have a minimum GPA of 3.7 in all required major courses, including calculus and statistics, prior to enrollment.
The honors thesis seminar is a year-long course, beginning in the fall semester and ending in the spring semester. Students who have been approved to enter the workshop will be registered for both semesters by the department during the first two weeks of classes; 3 points are earned per semester. This workshop may only be taken by students applying for departmental honors, and it also fulfills the economics seminar requirement for the economics major and all joint majors. Students must see the director during mid-semester registration in the spring to discuss their proposed thesis topic, at which time they will be matched with appropriate faculty who will act as their thesis adviser. Students will meet their adviser over the course of the year at mutually agreed upon times. A rough draft of the thesis will be due during the first week of February in the spring semester, and the final draft will be due three weeks before the last day of classes. Please note that for those joint majors that require two seminars, one in economics and one in the other discipline (i.e., Political Science), the economics senior honors thesis seminar only fulfills the economics seminar requirement.

<table>
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<th>Spring 2019: ECON GU4999</th>
<th>Course</th>
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<td>Michael Best</td>
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<td>Fall 2019: ECON GU4999</td>
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<td>Michael Best</td>
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**Of Related Interest**
Note: Barnard economic core courses (ECON BC1003, ECON BC1007, ECON BC2411, ECON BC3018, ECON BC3033, ECON BC3501, and seminars) do not count towards the Columbia economics major and concentration.

**Economics (Barnard)**
- ECON BC2010: The Economics of Gender
- ECON BC2012: Economic History of Western Europe
- ECON BC2017: Introduction to Health Economics
- ECON BC2020: Introduction to Development Economics
- ECON BC2224: Coding Markets
- ECON BC2075: Logic and Limits of Economic Justice
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<td>ECON BC3027</td>
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<td>ECON BC3010</td>
<td>American Wellbeing</td>
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<td>ECON BC3011</td>
<td>Inequality and Poverty</td>
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<td>ECON BC3012</td>
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<td>ECON BC3017</td>
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<td>ECON BC3019</td>
<td>Labor Economics</td>
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<td>ECON BC3022</td>
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<td>ECON UN3265</td>
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