

Undergraduate Economics at Harvard

A Guide for Concentrators

Contents

OVERVIEW	1
WHAT ECONOMICS IS	1
WHAT ECONOMICS IS NOT	2
WHY CONCENTRATE IN ECONOMICS?	2
HARVARD'S ECONOMICS DEPARTMENT	2
A BRIEF SKETCH OF THE UNDERGRADUATE PROGRAM	3
WHAT DO ECONOMICS CONCENTRATORS DO AFTER THEY GRADUATE?.....	3
ADVISING AND RESOURCES	5
DEPARTMENT OF ECONOMICS ADVISING	5
<i>Economics Concentration Advisors</i>	
<i>Economics House Tutors</i>	
<i>Undergraduate Program Administrator</i>	
<i>Economics Advising by the Faculty</i>	
<i>Student Feedback</i>	
RESIDENT DEANS	7
OTHER SUPPORT SERVICES.....	7
PEOPLE AND ORGANIZATIONS	8
<i>Harvard Undergraduate Economics Association</i>	
<i>Harvard College Economics Review</i>	
LIBRARY RESOURCES	8
<i>The Library System</i>	
<i>EconLit Database</i>	
CONCENTRATION REQUIREMENTS	10
EXPLANATION OF REQUIREMENTS	10
<i>Requirements for All Concentrators</i>	
<i>Additional Requirements for Honors Eligibility</i>	
THE KEY REQUIREMENTS OF THE CONCENTRATION	12
<i>Mathematics Preparation</i>	
<i>Ec 10 (formerly Social Analysis 10)</i>	
<i>Sophomore Tutorial</i>	
<i>Intermediate Theory Courses</i>	
<i>Statistics and Econometrics</i>	
OTHER INFORMATION	16
<i>Advanced Standing</i>	
<i>Applied Mathematics Option</i>	
<i>Gen Ed/Core Courses</i>	
<i>Study Abroad</i>	
<i>Summer School</i>	
<i>Transfer Credit</i>	
SECONDARY FIELD REQUIREMENTS	19
EXPLANATION OF REQUIREMENTS	19
<i>Secondary Field Requirements</i>	
<i>Ec 10 (formerly Social Analysis 10)</i>	
<i>Half-courses in Economics</i>	
OTHER INFORMATION	20

UPPER-LEVEL COURSES AND OTHER ELECTIVE COURSES	21
THE SUBFIELDS OF ECONOMICS	21
<i>Development</i>	
<i>Economic History</i>	
<i>Environmental Economics</i>	
<i>Finance</i>	
<i>Game Theory/Decision Theory</i>	
<i>Health Economics</i>	
<i>Industrial Organization</i>	
<i>International Economics</i>	
<i>Labor Economics</i>	
<i>Microeconomic Theory</i>	
<i>Macroeconomics - Monetary and Fiscal Policy</i>	
<i>Behavioral Economics (Psychology & Economics)</i>	
<i>Public Sector Economics</i>	
JUNIOR SEMINARS	25
GRADUATE-LEVEL ECONOMICS COURSES	25
INDEPENDENT STUDY COURSES	25
CROSS-REGISTRATION	26
BUSINESS AND ACCOUNTING COURSES	26
THE HONORS PROGRAM	27
ADVANCED COURSE TRACK	27
SENIOR THESIS PROGRAM	27
<i>Thesis Topics</i>	
<i>Thesis Advisors</i>	
<i>Senior Research Seminars</i>	
<i>Thesis "Escape Hatch"</i>	
<i>Thesis Grading</i>	
THE GENERAL EXAMINATION	30
HONORS RECOMMENDATIONS	30
<i>For Thesis Writers</i>	
<i>For Advanced Course Track Students</i>	
DEPARTMENT PRIZES	31
PLANNING YOUR ECONOMICS CONCENTRATION	32
SAMPLE PLANS OF STUDY	32
<i>Advanced Standing Honors Student (graduating in 3 years)</i>	
<i>Late Starting Basic Course Track Concentrator</i>	
<i>Theory-Oriented Concentrator</i>	
<i>The Development Studies Specialist</i>	
<i>The Economic Historian</i>	
<i>The Public Policy Expert</i>	
<i>The Labor Studies Specialist</i>	
<i>The Future Financial Wizard</i>	
<i>The Future Professional Economist</i>	
PREPARING FOR GRADUATE STUDY IN ECONOMICS	37

Overview

This guide is intended to acquaint students with the Economics concentration at Harvard. It should be useful to those who are trying to choose between Economics and other fields of concentration, but its major focus is to help those who have chosen Economics to understand how the program fits together: to appreciate the rationales for requirements, to become familiar with the faculty and courses, and to develop coherent plans of study.

WHAT ECONOMICS IS

Economics is a social science that is at once very broad in its subject matter and unified in its approach to understanding the social world. An economic analysis begins from the premise that individuals have goals and that they pursue those goals as best they can. Economics studies the behavior of social systems - such as markets, corporations, legislatures, and families - as the outcome of interactions through institutions between goal-directed individuals. Ultimately, economists make policy recommendations that they believe will make people better off.

Traditionally, economics has focused on understanding prices, competitive markets, and the interactions between markets. Important topics such as monopolies and antitrust, income inequality, economic growth, and the business cycle continue to be central areas of inquiry in economics. Recently, though, the subject matter of economics has broadened so that economists today address a remarkable variety of social science questions. Will school vouchers improve the quality of education? Do politicians manipulate the business cycle? What sort of legal regime best promotes economic development? Why do cities have ghettos? What can be done about grade inflation? Why do people procrastinate in saving for retirement - or in doing their homework?

In understanding what economics is, it is crucial to keep in mind that economics today is a scientific discipline. Bringing their particular perspective to the questions of social science, economists formulate theories and collect evidence to test these theories against alternative ideas. Doing economic research involves asking questions about the social world and addressing those questions with data and clear-headed logic, employing mathematical and statistical tools whenever appropriate to aid the analysis. An undergraduate education in economics focuses on learning to analyze the world in terms of tradeoffs and incentives - that is, to think like an economist.

WHAT ECONOMICS IS NOT

Economics is not business. Business classes teach professional skills that are useful for starting and operating companies. Business strategy and financial management classes often exploit insights from economics in providing better advice to businesses, much the way clinical psychologists apply the relevant research from academic psychology to help them treat their patients. Economics and business are related, but business is professional training ultimately aimed at making profits, while economics is a science that pursues an improved understanding of our social world.

Economics is also not policy. It is true that policy considerations often motivate economic analyses, that economists often make policy recommendations on the basis of their analyses, and that insights from economics are relevant to almost every policy debate. However, economics must be supplemented by other perspectives for a fully informed policy evaluation.

WHY CONCENTRATE IN ECONOMICS?

There are many good reasons to concentrate in economics. For students interested in international trade, business cycles, or the stock market, economics is the natural choice. Someone who seeks a quantitative, rigorous approach to social science will find economics to be an exciting, vibrant discipline. Many students choose to concentrate in economics because it provides an excellent background for professional work in business, banking, law, and even medicine.

Because Harvard does not offer a business concentration to undergraduates, some students treat economics as a substitute. Unfortunately, student survey responses indicate that undergraduates who concentrate in economics for that reason are significantly less satisfied with their academic experience at Harvard than undergraduates who concentrate in economics for other reasons. Moreover, there is no evidence to suggest that concentrating in economics helps students to get better jobs after graduation. For these reasons, the Economics Department strongly discourages students from concentrating in economics as a substitute for something else. Instead, undergraduates should concentrate in the academic field that most excites them.

HARVARD'S ECONOMICS DEPARTMENT

Harvard's Economics Department is one of the best in the world. In research and real-world experience, the faculty is unsurpassed. The large number of professors and their diverse interests enable a student to study virtually any area of economics. The extraordinary quality of Harvard undergraduates makes the classroom environment stimulating for teacher and student alike. In part because of these many strengths, economics is the largest concentration at Harvard. The large size of the department can make it seem intimidating and impersonal. As an economics concentrator, remember that teaching fellows and especially professors truly enjoy talking with and working with undergraduates. Go to office

hours! (Faculty often complain that no one comes.) Talk to your teachers after class! Because the department is so large, it is up to you to seize the initiative and personalize your academic experience.

A BRIEF SKETCH OF THE UNDERGRADUATE PROGRAM

Economics is the largest concentration at Harvard College, with roughly 750 students. The concentrators are, as far as their geographical distribution and grade point averages are concerned, a random draw from students who take Ec 10. One appeal of the department is that it is large enough to accommodate students with a wide range of interests, both in terms of subject matter and approaches to learning.

Economics is a more heavily quantitative discipline than the other social sciences. Quantitative measures of economic life are omnipresent - prices, quantities, revenues, expenditures, and so forth. As a result, economics courses rely relatively heavily on mathematical tools. All concentrators are expected to have a basic preparation in calculus, and it is required for concentrators to obtain such preparation before they take the intermediate microeconomics courses, Ec 1010a or 1011a. Over three-fifths of concentrators are satisfied with mathematics at the level of Math 1a (or of the BC Advanced Placement exam). The remainder continue with mathematics by taking either Math 20 or 21a and 21b (or equivalent courses) and possibly higher level mathematics. Those considering going on to graduate school in economics should plan to take more mathematics. Some Economics concentrators take computer science courses as well. The more applied and empirical subfields of Economics use computers intensively in statistical and analytical work.

Faculty time (with the possible exception of dissertation supervision) is split about evenly between the undergraduate and the graduate programs. However, calculations of average student/faculty ratios within the Economics Department are bound to be misleading. Undergraduates interested in international economics, for instance, may find themselves in small classes from early in their undergraduate career. Undergraduates interested in capital markets or corporate finance are likely to find themselves in large courses, even in their senior year.

WHAT DO ECONOMICS CONCENTRATORS DO AFTER THEY GRADUATE?

In recent years, about three-quarters of Economics concentrators have sought work immediately after graduation. Economics concentrators go to work in business, politics, social service, teaching, charitable work, and other occupations in proportions not that different from the average Harvard graduate. A somewhat higher percentage of Economics concentrators go to work in business and finance, but it is not clear that this represents the superior job-catching ability of an Economics A.B. as opposed to the interests of concentrators. Certainly Economics concentrators have no clear advantage in the labor market vis-à-vis Government or Social Studies concentrators. Nor do they have a clear advantage vis-à-vis Music or Art History concentrators - and if Economics concentrators do

have such an advantage, they are at a disadvantage relative to Applied Mathematics and Physical Sciences concentrators.

About one-quarter of Economics concentrators proceed straight to further education upon graduation; a significant portion enters law schools. About three-quarters of Economics concentrators will eventually earn some advanced academic or professional degree. Law, business, and public policy degrees (in that order) are the most common. An Economics concentration has obvious intellectual advantages as a foundation for any of these three professional degrees. But once again it appears to confer little if any advantage in gaining entry to such programs.

Advising and Resources

In the course of four years at Harvard, students are likely to need advice and counsel on issues ranging from programs of study, career plans, study habits, and so forth, to leads for summer jobs or advice on personal problems. There are two formal administrative networks in the University for advice and support that are always open to concentrators: the Economics Undergraduate Office and the Resident Dean's Office (or the Freshman Dean's Office for first-year undergraduates).

DEPARTMENT OF ECONOMICS ADVISING

Economics concentration advising is provided by the concentration advisors (and, more informally, by economics house tutors); by the Undergraduate Program Administrator; and by the Director of Undergraduate Studies.

Economics Concentration Advisors

Economics concentration advisors are either full time advisory staff, or graduate students in the Economics Department who have been trained to respond to the questions and concerns of undergraduate concentrators. The concentration advisors can sign your study card, drop/add forms, change of concentration forms, plan of study forms, and so on. More important, advisors will help you understand departmental requirements, discuss your academic interests, and offer advice on course choices. You may also discuss your future plans, such as graduate or professional school.

Each economics concentrator has an assigned advisor. Advisors are assigned by house; for example, all economics concentrators in Adams House have the same advisor. At the beginning of each semester you will hear from your advisor so that you know his or her contact information and office hours. You will hear from your advisor periodically during the year, especially to remind you of deadlines, meetings, requirements, and other important items. You may, at any time, contact your advisor for help or information.

While you have an official advisor, you may seek advice from any of the advisors who staff the walk-in advising office hours at the Undergraduate Office in room 111 of Littauer Center (Mon-Fri 10am-4pm). No appointment is needed. The list of concentration advisors is available at <http://www.economics.harvard.edu/undergrad/advising>.

Economics House Tutors

Economics house tutors are graduate students in the Economics Department who are appointed by the House Masters as resident or nonresident tutors. House tutors contribute to house life by serving on house committees and helping to organize events for residents. Those designated as economics tutors can also give you concentration advice.

Undergraduate Program Administrator

Emily Neill is the Undergraduate Program Administrator. You may stop by her office (Littauer 113), call (495-3247), or email (eneill@fas.harvard.edu) with questions or concerns about the undergraduate program and department policies.

Economics Advising by the Faculty

The Director of Undergraduate Studies (DUS) is a member of the Economics Department faculty charged with oversight of concentration advising and monitoring students' academic progress within the concentration.

While other individual economics professors are not designated as academic advisors, we encourage you to get to know them as you take their courses. The best way to meet professors is to speak with them outside of the classroom. Every professor either holds designated office hours each week or arranges meetings by appointment. When you are taking a course, be sure to take advantage of office hours or make an appointment with your professor; they are expecting you to do that. You can discuss the course in general or a question in particular. If you are enjoying the course, you could begin to ask questions about writing a senior thesis. Don't be shy; you won't meet a professor if you don't make the effort.

Jeff Miron, the DUS, holds several lunches over the course of the fall and spring semesters to which you will receive an invitation. We encourage you to take advantage of this opportunity to speak less formally to a professor in the department regarding your questions and concerns.

Student Feedback

The Undergraduate Office is always eager to have feedback on the way the concentration is working. Changes in the concentration are first considered by the department's Undergraduate Instruction Committee and then are voted on by the faculty, but there are many avenues through which issues arise for discussion. You may talk with the Director of Undergraduate Studies, the Undergraduate Program Administrator, or your advisor to share your views and opinions.

RESIDENT DEANS

Allston Burr Resident Deans serve as concentrators' links to the Administrative Board. Any concerns of an academic or personal nature can be raised through the Resident Dean. Many matters require that undergraduates consult and work through their Resident Deans, including:

- Withdrawals, leaves of absence, and readmission petitions
- Credit for courses done out of residence (also requires approval of one of the department's concentration advisors)
- Make-up exams
- Late study cards
- Changes in courses after normal deadlines
- Language waivers
- Academic probation

Much of a Resident Dean's counseling time, however, is spent on the personal concerns of undergraduates.

OTHER SUPPORT SERVICES

The **Writing Center** is an especially valuable resource. It offers one-on-one conferences designed to improve one's writing. All sessions are confidential. No staff member ever rewrites any part of a student's paper. The Center's private, informal conferences with advisors who have a great deal of experience in assessing and providing feedback on written work can be immensely valuable.

The **Office of Career Services (OCS)** provides services focusing on students' career plans. It assists in the development of job-hunting skills, in graduate school applications, and so forth. They also have many binders that list internships and summer jobs.

The **Bureau of Study Counsel (BSC)** is another source of confidential advice, in this case focusing on how to better approach studying and learning, how to address motivational problems, and how to think about choosing a vocation. Many Economics concentrators have found the BSC's reading strategy course of special value. The BSC also assists in finding capable tutors to help undergraduates in individual courses.

Undergraduate years can be exciting, but at times intense, stressful, and disorienting. It can be a welcome relief to talk to someone with experience with whom you neither have to live nor interact on a regular basis. The **UHS Mental Health Service** provides professional counseling by appointment or, for urgent cases, walk-in service. **Room 13** provides both telephone and on-site confidential conversations with other students.

PEOPLE AND ORGANIZATIONS

Perhaps the most important resource to concentrators is the wealth of experience, expertise, and creativity found in one's potential teachers - including not only the faculty and staff of the Economics Department, but the faculties and staffs of other universities (MIT, Tufts, BU, and so forth) and of other schools within Harvard (the Kennedy School, the Business School, and so forth); the researchers at Harvard institutes (like the Center for European Studies, the Weatherhead Center for International Affairs, and so on) and non-Harvard institutes (like the National Bureau of Economic Research), and the graduate students in Economics who serve as your Teaching Fellows, concentration advisors, and house tutors.

Harvard Undergraduate Economics Association

Another important resource, of course, is fellow students. Many concentrators have found it valuable to supplement studies in the classroom with related activities outside it. For example, the *Harvard Undergraduate Economics Association* (HUEA) is a student-run organization that promotes campus awareness of recent economics research and career opportunities in economics. In the past, HUEA has hosted many events, such as dinner discussions with professors and panel discussions concerning graduate school in economics. Less formally, many houses have occasional Economics tables, often with invited faculty members, where economics issues are discussed over a casual meal.

Harvard College Economics Review

The *Harvard College Economics Review* (HCER) is a biannual periodical addressing issues of national and global importance through economic analyses accessible to economists and common readers alike. Designed particularly with the budding economist in mind, the HCER features interviews with and articles from prominent economists in academia, business, and government. The HCER is a fully student-run organization with opportunities to get involved at all levels of the periodical's production, content, and design. Students are also welcome to submit essays for publication in the Review.

LIBRARY RESOURCES

The Library System

In many courses, economics concentrators supplement their textbook with readings from published research papers as well as occasional newspaper and magazine articles. While some of these readings will be available on a course-specific website, many of these and other articles are also accessible via the library website (<http://lib.harvard.edu>). This website also provides information about the various libraries and access to Hollis, the online catalog.

A large proportion of the University's libraries are relevant for concentrators in Economics. The undergraduate library, Lamont, contains recommended and required readings for undergraduate courses. Since the closure of the Littauer Library in the summer of 2007, Lamont will now serve as the library headquarters for answering any economics or data-related questions from both undergraduate and graduate students.

As one of the services of the Social Sciences Program and in cooperation with the Harvard MIT Data Center (HMDC), Numeric Data Services serves the research and instructional needs of the Harvard community. Their goal is to help users become proficient in locating, accessing, and analyzing numeric data for their research needs. For information about data classes (Finding Sources and Using Stata), see the HMDC website:

<http://www.hmdc.harvard.edu> (helpful tabs are: HMDC Data Collection & Help Finding Data, HMDC Statistical Support) or the IQSS link through their website. For assistance locating data resources for your Economics research or for questions relating to statistical analysis, please email dataclass@help.fas.harvard.edu.

Widener Library is the principal research library for the social sciences. The Government Documents department in Lamont Library (level 1) is an extensive repository for U.S. and foreign government documents and publications.

Many other libraries are important resources for Economics concentrators. Depending on your area of focus and research, all of the below have helpful collections:

- Baker (Business School): business history, labor relations, corporate reports, managerial economics and industrial organization
- Cabot (Science Center): applied mathematics and statistics
- Kennedy School: public policy and regulation
- Pusey: University Archives (including past senior theses)
- Schlesinger: women's studies
- Center for Population Studies: demography
- Gutman (Education School): urban economics, economics of education
- Langdell (Law School): law and economics
- Social Relations/Sociology Library: sociology, psychology
- Psychology Research Library: psychology
- McKay (Applied Sciences): computer science, economics and the environment, applied mathematics
- Loeb (Design School): city and regional planning
- Tozzer (Anthropology): economic anthropology

EconLit Database

The EconLit database, produced by the American Economic Association, is an indexed bibliography, with selected abstracts, of the world's economic literature. It covers articles from over 600 journals, as well as articles in collected volumes, working papers, book reviews, and dissertations. It is an invaluable resource to help find articles and papers relevant for your own work. Reference librarians at Lamont can help you use EconLit, or you can log on to it from the Libraries website (under "Find e-Resources"). There is also an EconLit research guide available on the Harvard College Library website:

<http://hcl.harvard.edu/research/guides/economics/econlit.html>.

Concentration Requirements

EXPLANATION OF REQUIREMENTS

The Economics Department's concentration requirements are, as Harvard departments go, not onerous. They exist neither to make it difficult to be an Economics concentrator nor to turn you into expert interpreters of ambiguous bureaucratic regulations. Instead, they exist to help shape your courses of study into intellectually coherent wholes: to give you 1) an acquaintance with the analytical frameworks and tools that the discipline of economics uses; 2) a demonstration of how the frameworks and tools are applied to understand areas of economic life of central interest to citizens, workers, and consumers; and 3) some of the tools necessary to investigate and analyze these same problems.

The goal is not to train professional economists - although some of you will become such. The goal is not to teach you the correct view of how the world works - how the world actually works is unclear; there are many different perspectives, all of which are sometimes useful. Whatever their particular views, economists agree that it is next to impossible to gain a coherent picture of modern civilization without paying attention to its economic basis. The Economics Department aims to bring its concentrators to a point where they understand and can evaluate what is occurring in the economy.

The outline that follows shows the concentration's requirements. Concentrators may take two courses within the concentration as pass/fail. Concentrators may *not* take Ec 10, Ec 970, Stat 100/104/110 (or equivalent), Ec 1010, Ec 1011, Ec 1123/26 (econometrics), Ec 975, or any of the Ec 980s or Ec985s pass/fail. *Writing courses may NOT be taken pass/fail.* Courses with intermediate theory as a prerequisite may be taken pass/fail with the professor's permission. Additionally, one course may satisfy both a writing and a theory prerequisite requirement; however, you still must take the overall number of economics courses required for your degree track.

Requirements for All Concentrators

- **Math 1a** (or, placement into Math 1b or higher). Students who place out of this course do **not** need to replace it with an additional course. [*Note: This requirement applies to students entering Fall 2010 and after. Students in previous classes before 2014 need only have math preparation equivalent to Math 1a*].
- **Ec 10**
- **Stat 100, Stat 104, Stat 110, Applied Math 101** (formerly Engineering Sciences 101) or **Math 154** (formerly Math 191)
- **Ec 1010a or 1011a**
- **Ec 1010b or 1011b**
- **Ec 970** (Sophomore Tutorial)
- **Ec 1123, 1126, or 1127**

None of the above may be taken pass/fail.

- **3 additional half courses** that include:
 - 1 course with writing requirement
 - 1 course with intermediate theory as prerequisite

Additional Requirements for Honors Eligibility

- A. **Thesis Track** (eligible for summa, magna, or cum degree in Economics)
 - **Math 1b and Math 20, or Math 21a, or AM 21a** (or, placement into Math 21b or higher). Students who place out of these courses do **not** need to replace them with additional courses. [*Note: this requirement applies to students entering Fall 2010 and after. Students in classes before 2014 need only have math preparation equivalent to Math 1a*].
 - **Ec 985** (Senior Research Seminar)
 - Successful completion of senior thesis
 - Honors general examination covering micro, macro, and econometrics
- B. **Advanced Course Track** (eligible for cum degree in Economics)
 - **Math 1b and Math 20, or Math 21a, or AM 21a** (or, placement into Math 21b or higher). Students who place out of these courses do **not** need to replace them with additional courses. [*Note: this requirement applies to students entering Fall 2010 and after. Students in classes before 2014 need only have math preparation equivalent to Math 1a*].
 - **2 additional half courses** that include:
 - 1 course with writing requirement
 - 1 course with intermediate theory as prerequisite
 - Honors general examination covering micro, macro, and econometrics

THE KEY REQUIREMENTS OF THE CONCENTRATION

Mathematics Preparation

Mathematics provides economists with a set of tools that they use for many purposes. First, mathematics enables economists to prove rigorously the logical connection between concepts, which is especially crucial in situations where words alone are imprecise or potentially misleading. Second, mathematics makes it easy to combine several simple models into a larger model, allowing economists to analyze complex economic systems that involve interacting parts. For example, macroeconomists study the interactions between the goods market (involving production and consumption of goods and the setting of prices), the labor market (involving employment and wages), and the money market (involving assets, such as cash and bonds, and interest rates). Third, mathematics allows economists to formulate and test their theories quantitatively. Quantitative testing means that economic theories must satisfy a demanding standard before they become accepted. Finally, because economic theories are quantitative, economists can offer quantitative policy prescriptions.

Because “marginal” conditions hold a central place among economists’ analytical tools, concentrators are required to demonstrate competence in single-variable calculus by taking Math 1a or by placing out of it. Single-variable calculus is the prerequisite for the less math-intensive intermediate economic theory courses, Ec 1010a and 1010b.

Although a student can understand virtually all the basic concepts in economics with single-variable calculus, deeper understanding, and understanding of more difficult concepts, requires more mathematical preparation. And while math beyond the level of first-semester calculus is not required for the concentration, it is highly recommended. The more-math-intensive intermediate economic theory courses, Ec 1011a and 1011b, require multivariable calculus at the level of Math 20 or 21a. Math 20 covers multivariable calculus and linear algebra together, focuses on economic and social science applications, and serves as a last math course for many economics concentrators. Math 21a covers multivariable calculus as part of a sequence leading to higher-level math courses, though it can be taken alone.

Students who want to pursue graduate work in economics should take multivariable calculus (Math 21a), linear algebra (Math 21b), a course that emphasizes writing proofs (Math 101), and real analysis (Math 112). (Students with very strong math backgrounds may substitute Math 23ab for 21ab. A student with an extremely strong math background would be prepared for graduate work in economics after taking Math 25ab or 55ab.)

Ec 10 (formerly Social Analysis 10)

Ideally, students intending to concentrate in Economics spend their first year at Harvard taking Ec 10, the full-year introduction to current economic issues and to basic economic principles and methods. (If you did not take Ec 10 as a freshman, you may still concentrate in economics. You may take all of Ec 10 during the summer at Harvard or take it as a sophomore. Sit down with one of the concentration advisors to help you plan your courses so that you will fulfill your concentration requirements without a problem.)

All concentrators are required to either take Ec 10 or demonstrate proficiency at introductory economics, most typically by a combined score of ten on the Macroeconomics

and Microeconomics Advanced Placement examinations or a score of 7 on the Higher Level examination toward the International Baccalaureate. If you meet these requirements, you may skip Ec 10 and go on to the intermediate theory courses (Ec 1010ab or Ec 1011ab), but you must replace those credit hours with two other half courses. If you received a five on one AP economics exam, you may skip that half of Ec 10, but again, must replace it with one additional half course. Most eligible students who go on to the intermediate theory courses do very well, but you do not have to skip Ec 10; you may take it if you wish. It is a personal choice, and we suggest that you speak with one of the concentration advisors to help you with your decision. (Note that a student who uses macro and/or micro AP exam scores as part of the basis on which to activate Advanced Standing will not get Harvard credit for taking Ec 10, or for the semester of Ec 10 represented by the exam taken.)

Ec 10 is taught in sections of 20 students or so, with course-wide lectures on a variety of topics about 10 times a semester. Unless replaced by course-wide lectures, sections meet for three one-hour classes each week, on Mondays, Wednesdays, and Fridays. The section-based orientation of the courses is very important because sections teach the principal tools of economics in an environment in which students can ask questions freely. All sections cover the same basic course material.

Course-wide lectures are usually given by faculty experts on the specific topic addressed (e.g., Greg Mankiw on macroeconomics, David Laibson on behavioral economics, Andrei Shleifer on finance, Richard Freeman on labor). The lectures focus on current economic problems and policy issues, in coordination with the material being taught in section. Each lecture is discussed at the following section meeting.

Section leaders are graduate students in Economics, as well as law, business, and public policy students with strong economics backgrounds and high teaching ratings. Teacher training sections and videotape reviews of individual sections maintain high pedagogical standards in the course.

Examinations cover both lecture and section material. There are usually two one-hour exams and one final each term. One of the hour exams and both finals are course-wide exams, in which all students taking Ec 10 solve the same problems and write on the same essay questions. Most sections assign roughly five problem sets per term.

There are no prerequisites for Ec 10. It is not a highly mathematical course. However, it uses a lot of graphs and some simple algebra. It does not use calculus. Ec 10 cannot be taken pass/fail by a student intending to concentrate in Economics.

Sophomore Tutorial

Because Economics has so many concentrators, even upper-level courses can be large in size. But much of what one learns about an analytical subject like economics comes ultimately from active discovery, which is often better accomplished in a small group setting. Ec 970, Sophomore Tutorial, is taught in sections of about eight to ten students, and provides a key opportunity for such active learning. Ec 970 is offered in the spring. As the name suggests, almost all concentrators take the tutorial during their sophomore year; however, under certain circumstances (e.g., if you transferred into the department late), it

may be postponed to junior or senior year. To enroll in Ec 970, you must have completed Ec 10, Stat 100 (or its equivalent), and Ec 1010a/1011a. You also must be concurrently enrolled in (or have already completed) Ec 1010b/1011b. If you do not meet those prerequisites, you will need to enroll in tutorial in either your junior or senior year. Ec 970 may not be taken pass/fail.

The goals of Ec 970 are to build on the foundations laid in the principles, statistics, and intermediate theory courses by applying frameworks of economic analysis to specific subject areas, to help students develop an effective style for writing analytical economics papers, and to practice the arts of analysis, communication, argument, and listening.

In a typical year, there are 25 to 30 different tutorials to choose from. The vast majority of students are assigned to one of their top four tutorial choices. Topics vary from year to year. Recent topics have been behavioral finance, experimental methods and psychology in economics, economics of professional sports, and law and economics. An overwhelming majority of tutorials receive high student evaluations, and sophomore tutorial is often one of a student's favorite classes in the department.

Intermediate Theory Courses

The Economics Department offers two intermediate microeconomic and macroeconomic theory course tracks. The Ec 1010 track is intended for students who find mathematical formulations as much of an obstacle as a help to understanding economics; knowledge of Math 1a is expected. But many students with higher levels of mathematical preparation take Ec 1010 courses when they believe that the courses are especially well taught. The Ec 1011 track is intended for students who find mathematical formulations of economic principles a significant aid in understanding and using them. It uses mathematics at approximately the level of Math 20/21a. Students who have taken Ec 1010a and 1010b have sufficient preparation for almost all upper-level undergraduate economics courses. A handful of upper-level undergraduate economics courses have Ec 1011a or 1011b as a prerequisite. Students are free to mix and match courses from the different tracks: combining 1011a with 1010b, or 1010a with 1011b.

Ideally, concentrators should have finished the intermediate micro and macro courses by the end of their sophomore year. Whether or not a particular upper-level economics course has Ec 1010 as a formal prerequisite, students who have taken intermediate micro and macro usually do better and learn more in upper-level courses than students who have not.

Concentrators must demonstrate their command of the basic tools of economic analysis by receiving a B-/C+ average (that is, a 2.5 grade point average) or better in both intermediate theory courses. Students who do not meet this standard are required to reinforce their understanding of macro and micro theory by satisfactorily completing (i.e., receiving at least a C- in) Ec 975: Tutorial—Theory Review. Ec 975 is not intended as a review for students who feel weak in their overall economics courses. It is required of, and limited to, students who receive below a B-/C+ average in the intermediate theory courses. Students who must take the course are notified by the Undergraduate Office. If you are unsure, speak to the Undergraduate Program Administrator. Students do not receive economics course credit for Ec 975.

In the years when 975 is not offered, students who receive below a C+/B- average in the intermediate series must (unofficially) retake the portion/s of the series in which they got below a B- and receive at least a B- the second time around. Since such students will not officially be enrolled in the course, the grade and credit hours *will not* count for Harvard credit towards graduation or fulfilling Ec electives in the concentration, nor will it be factored into your Ec GPA for honors if you choose to pursue them. Students' fulfillment of this requirement will be tracked internally by the Economics' Department and students will not receive a degree in Economics until this requirement is met.

Statistics and Econometrics

The ability to interpret quantitative data and to understand statistical arguments is essential to understanding the economy. Statistical methods help economists to summarize data, to analyze empirical relationships, to test theories, and to make predictions. Because virtually all research in economics involves at least some statistics, economics concentrators must take a course in statistics (Stat 100, 104, or 110) before they may take Ec 970, Sophomore Tutorial. For this reason, most economics concentrators take the course in statistics in their freshman year or in the fall of their sophomore year.

Stat 100 introduces students to statistical tools like hypothesis testing, parameter estimation, and regression analysis. The main intent is to enable students to read contemporary economic literature and to understand how statistical procedures are used to summarize information. Stat 100 is essential for fully understanding much of the reading in upper-level Economics courses.

An alternative to Stat 100 is Stat 104, which covers somewhat more material at a faster pace in a smaller class. Stat 104 is pitched at a slightly higher level and draws on applications from economics and other social sciences.

Students who have completed multivariable calculus (Math 20 or 21a) and who wish to understand statistics at a deeper level can fulfill their statistics requirement by taking (instead of Stat 100 or 104) Stat 110 (often, but not necessarily, followed by Stat 111). Stat 110 covers probability theory, which provides a mathematical foundation for statistics. Stat 111, which requires linear algebra (Math 20 or 21b), builds statistical theory from this foundation. Stat 111 draws more directly from Stat 110 but has fewer economic applications and less emphasis on standard econometric methods than Ec 1126.

Stat 101 is not an option. The Economics Department does not give any credit for high school statistics or the statistics AP exam. Courses taken to meet the Economics Department's statistics and econometrics requirements cannot be taken pass/fail by Economics concentrators.

In addition to a basic course in statistics, the department requires all concentrators to take Ec 1123 or 1126 (Ec 1127 can also be substituted). These courses are designed to introduce concentrators to econometrics - the statistical concepts and quantitative methods that are especially important for economists. Econometrics typically plays a central role in an economics senior thesis, so students who plan to write a thesis fulfill their econometrics requirement before senior year.

Ec 1123 provides students with an understanding of econometric techniques and an ability to apply them using standard software packages. Ec 1123 is less mathematical and more applied than Ec 1126, covering the essential methods for conducting research in economics. Ec 1123 provides students with most of the basic tools to write an empirical honors thesis. Ec 1123 assumes a mathematics preparation at the level of Math 1a.

Ec 1126 goes further into the fundamentals of probability theory and problems of statistical inference. It is more mathematical and more theoretical than Ec 1123, employing both multivariable calculus and linear algebra (Math 20 or both Math 21a and 21b). Ec 1126 emphasizes understanding the general framework of econometric theory and covers several important recent contributions and applications. Like Ec 1123, Ec 1126 provides students with the basic tools to write an empirical honors thesis, while also providing a rigorous introduction to econometric methodology. Preparation at the Math 20 level is a prerequisite for Ec 1126. Students should also have taken, or be taking, the intermediate microeconomics and macroeconomics courses.

OTHER INFORMATION

Advanced Standing

Students with Advanced Standing can complete their undergraduate degree with only three years of coursework. Even if you do not intend to graduate in three years, Advanced Standing can simplify studying abroad or taking time off. Moreover, a few Harvard degree programs offer a one-year Master's degree to undergraduates with Advanced Standing who choose to stay for a fourth year. These students graduate at the same time as their classmates but with both a Bachelor's and a Master's degree. Each year, a few Advanced Standing economics concentrators graduate with a Master's degree in Statistics. Contact Ellen Hart, Administrative Manager and Advanced Standing Advisor (APO Office, Holyoke Center Suite 470, 495.8121, ebhart@fas.harvard.edu) for more information.

Applied Mathematics Option

Students with a strong background and interest in mathematics and statistics - especially those who want to pursue graduate work in economics - may consider concentrating in Applied Mathematics with a specialization in economics rather than concentrating in economics. The Applied Math/Ec concentration involves a few more math, statistics, and/or computer science requirements and a few less economics requirements. Specifically, the concentration requires Math 1a and 1b, and Math or Applied Math 21a and 21b (or placing out of these four); three math or applied math courses in analysis and algebra - generally Math 112, Math 121, and Applied Math 105b; three courses in statistics (not including Stat 100), computer science, and physics - generally Stat 110, Stat 111, and Computer Science 50; as well as Ec 1011a, Ec 1011b, Ec 1126, and three additional economics course (besides Ec 10), chosen from a list of qualifying courses. Applied Math concentrators specializing in economics are welcome to participate in the Economics Sophomore Tutorials (Ec 970), the Economics Junior Seminars (Ec 980), and Senior Research Seminars (Ec 985) if they wish.

More information on the Applied Math/Ec concentration is available from the designated Economics Department concentration advisor who serves as the advisor to Applied Math/Ec

students, and from the School of Engineering and Applied Sciences, which administers the Applied Math programs:

(<http://www.seas.harvard.edu/teaching-learning/undergraduate/applied-mathematics>).

Gen Ed/Core Courses

Individual academic departments know relatively little about General Education requirements. Students should consult the Gen Ed section of the *Handbook for Students*, contact the Gen Ed office by email at gened@fas.harvard.edu, or visit the Gen Ed office in University Hall, First Floor Center. Starting in 2010, all students will have to complete the requirements for Gen Ed (rather than Core) curriculum. The main *technical* difference between the Core and Gen Ed distribution requirement curriculums is that there are no exemptions in the Gen Ed curriculum based on concentration. All students are required to take 1 course from each category, totaling 8 (on average, one per semester). Economics concentrators who entered under the Core from September 2007 and after are exempt from Historical Study A, Literature and Arts A or C, Quantitative Reasoning, and Social Analysis. They must take:

- Literature and Arts B
- Literature and Arts A or C
- Historical Study B
- Moral Reasoning
- Science A
- Science B
- Foreign Cultures

Study Abroad

The Economics Department allows study abroad for a term or an academic year, most especially for students considering thesis research related to the country. It is generally best for students taking study abroad to go during their junior year, although students may postpone Ec 970 (Sophomore Tutorial) if they choose to go during their sophomore spring. After choosing a program and obtaining College approval for planned courses from the Office of International Programs (<http://www.fas.harvard.edu/~oip/>), the student should make an appointment with an Economics Department concentration advisor to discuss study abroad and bring course syllabi to the meeting. The advisor will grant at most **ONE** credit toward fulfilling Economics concentration requirements for appropriate courses per term abroad (although some students choose not to fulfill Economics concentration requirements while abroad). To count for concentration credit, a course must be primarily economic in content and methodology and roughly equivalent in difficulty to a Harvard Economics Department course. Courses with an intermediate theory prerequisite *may* count toward the theory prerequisite requirement. Students who write a paper longer than 15 pages for a course should submit the graded paper to their concentration advisor, who may grant writing requirement credit for the course if the paper has substantial economic content. Again, the department will grant no more than one course for concentration credit per semester abroad. See the undergrad website for further details about this process: <http://www.economics.harvard.edu/undergrad/studyabroad>.

Summer School

Concentrators wishing to take classes during the summer have several courses to choose from. However, that not all summer school economics courses will count towards your concentration requirements. Details can be found on the Department's website: <http://www.economics.harvard.edu/undergrad/summerschool>. Note that summer classes are not factored into your economics concentration GPA.

Transfer Credit

The Registrar's Office gives transfer students to the College a list of all courses previously taken that the College is accepting for credit. Students wishing to concentrate in Economics should bring this list to the Undergraduate Office and speak with their concentration advisor about which of these courses will count for Economics concentration credit.

Secondary Field Requirements

EXPLANATION OF REQUIREMENTS

The Department's requirements for a secondary field are six half-courses in economics, three of which are based in fundamental economic theory. All six courses must be taken for a letter grade.

Secondary Field Requirements

- **Ec 10: Principles of Economics (2 half-courses)**
- **One half-course in intermediate theory from:**
 - Economics 1010a/1011a: Microeconomic Theory
 - Economics 1010b/1011b: Macroeconomic TheoryA minimum grade of B- is required.
- **Three half-courses from the Economics section of *Courses of Instruction*.**

Ec 10 (formerly Social Analysis 10)

All students are required to take Ec 10, the full-year introduction to current economic issues and to basic economic principles and methods. Students who have achieved a score of 5 on both the microeconomics and macroeconomics portions of the AP test or a score of 7 on the Higher Level examination toward the International Baccalaureate are deemed to have met the full Ec 10 requirement, but must replace those credit hours with two half courses to complete the concentration. Students who have achieved a score of 5 only on the microeconomics portion of the AP exam are deemed to have met the first semester of the Ec 10 requirement, but again, must replace it with one additional half course of their choosing to complete the concentration. Students who have achieved a score of 5 only on the macroeconomics portion of the AP exam are deemed to have met the second semester of the Ec 10 requirement, and must replace it with once additional half course.

Half-courses in Economics

All Economics courses and cross-listed courses in the Department are eligible for the three half-courses, except for Economics 910r: Supervised Reading and Research, Economics 970: Sophomore Tutorial, Economics 975: Tutorial-Theory Review, the senior thesis seminars/tutorials (Economics 985 and Economics 990), and graduate-level research seminars and workshops. In particular, taking both 1010a/1011a and 1010b/1011b meets the half-course intermediate theory requirement, as well as one of the three half-course requirements.

OTHER INFORMATION

Only one course may double-count towards both your concentration and your secondary field. This is a Harvard University policy, not a departmental policy.

Courses given in other FAS departments or other Harvard faculties may not be used for economics credit in the secondary field, unless they are explicitly cross-listed or jointly-listed in the Economics chapter of *Courses of Instruction*. The only exception is that one of Statistics 100, 104, 110, or applied Math 101 (formerly Engineering Sciences 101), or Math 154 (formerly Math 191) qualifies as one of the three half-courses. Only one course may double-count towards both your concentration and your secondary field. This is a Harvard University policy, not a departmental policy.

Only the following Harvard Summer School courses may be used for credit in the secondary field: ECON S-10ab: Principles of Economics, ECON S-10a: Principles of Economics - Microeconomics, and ECON S-10b: Principles of Economics - Macroeconomics.

Courses from study abroad *may not* be used for credit in the secondary field.

Freshmen Seminars *may not* be used for credit in the primary or secondary field.

Students pursuing a secondary field in Economics are not given preferential access to limited enrollment courses.

Upper-Level Courses and Other Elective Courses

Beyond the foundational courses discussed in the previous section, all concentrators are required to take at least three additional half-courses in Economics. These additional courses must be chosen to introduce the student to the various fields within economics, to build on the intermediate theory courses, and to further develop the student's writing skills and skills in statistical and quantitative analysis. Students should work with faculty members and advisors to design a program that best helps them fulfill concentration requirements while furthering their own educational goals and interests. A brief glance through *Courses of Instruction* shows the wide range of issues on which economists at Harvard are working; indeed, the opportunity for exposure to a broad variety of approaches and topics is one of the greatest strengths of the concentration relative to that at many other universities.

One of the three additional courses must have intermediate theory - either Ec 1010a or 1010b - as a prerequisite, and one must be a writing-intensive course. (Please see the undergrad economics website for a complete listing of courses that meet these requirements: <http://www.economics.harvard.edu/undergrad/courses>.) Writing-intensive courses are offered on a wide range of topics and are intended to introduce students to the research methods and expository techniques used in economics writing. In addition, some courses offer the option of a long paper, and these courses also meet the writing requirement, with the permission of the instructor. One course may satisfy both a writing and a theory prerequisite requirement; however, you still must take the overall number of economics courses required for your degree track.

Concentrators typically complete intermediate micro and macro, Ec 970, and Stat 104 (or equivalent) before taking upper-level courses. While many upper-level courses do not have intermediate theory as a formal prerequisite, students who have taken intermediate micro and macro usually do better and learn more in upper-level courses than students who have not.

THE SUBFIELDS OF ECONOMICS

Upper-level economics courses are categorized by subfield, although students can mix and match courses from different subfields however they like. Each subfield is a specific area of focus within economics. Honors concentrators usually take several courses within the same subfield to prepare for writing a thesis in that area. The various subfields are described in this section.

Development

Development economics studies the unique aspects of and situations in developing countries, considering social, political, institutional, and cultural aspects. Issues studied in development economics can range from broad, macroeconomic questions such as what factors impact economic growth in poorer countries, to specific questions of what policies best help particular individuals in particular regions of particular countries; from questions about farming decisions and productivity in rural areas to questions about housing, disease, and informal labor in urban areas; from questions regarding corruption and developing countries' governments to questions about the role of assistance from foreign countries.

Economic History

It is hard to gain a coherent grasp of what the economy is today without understanding how it evolved, and what history teaches us about how different economies function. Economic history courses help students learn about which current economic institutions and behavioral relationships have persisted over wide stretches of time and space and which are of relatively recent origin or are unique.

Environmental Economics

Few areas of economics have grown so rapidly in recent years as environmental economics. Since few questions of environmental policy can be cast purely in black and white terms, economists, with their long tradition of analyzing trade-offs, have played important roles in designing environmental regulations. Questions asked include: Does it make the most sense to reduce pollution by setting emission standards or by using tax policy to create incentives for emissions reductions? How should we decide which species have the greatest priority for protection? What is the content of the term "sustainability"?

Finance

Financial economics studies the behavior and structure of financial markets and institutions including commercial banks, insurance companies, investment banks, and mutual funds - players in the stock and bond markets. Some of the Department's offerings focus on corporate finance and the capital structure of firms, offering an introduction to the kinds of analyses that go on inside a corporate finance department of a Wall Street investment bank. Others look at portfolio management and the analysis of risk, arbitrage, and time discounting applied to the valuation of various financial assets.

Game Theory/Decision Theory

Game theory is a field of economics focused on understanding the behavior of agents in strategic situations. A simple game theoretic example is the *Prisoners' Dilemma*, which you learn in intermediate microeconomics. This idea of strategic thinking and decision making can be applied to many fields of economics, such as political decisions in international economics and political economy; farmers' decisions in development economics; pricing strategies between competitors in microeconomics; and much more.

Health Economics

Like all things we study in economics, the resources available for health issues are finite. The field of health economics is concerned with the allocation of health and health care, and the functioning of health care systems.

Research in health economics can cover a variety of topics, ranging from estimating the impact of policies or procedures on health outcomes and the impact of health outcomes on economics outcomes, to analyzing the effect of certain types of health care systems on health and employment outcomes, to studies examining organ donation behavior, pharmaceutical expenditure decisions, and more.

Industrial Organization

Industrial organization studies the behavior of firms and the structure of industries, especially in the (pervasive) case when the assumptions of perfect competition break down. Current research seeks to apply microeconomic theory, in conjunction with the information in data sets, to understand how particular markets work, and to work out how various policy or environmental changes might affect them.

Courses in IO usually combine theoretical analysis with studies of actual firm behavior in individual industries. Topics include horizontal relationships and mergers, vertical integration and control through contractual arrangements, auctions, price discrimination, information and search costs, network externalities, and technological change.

International Economics

Both historically and today, the field of international economics has been and is policy-oriented: What should governments do? How should they regulate the cross-border economic relationships that their citizens enter into? As world trade and finance becomes more salient, international economics threatens to become coterminous with the study of economic policy in general. Today, even in such a large economy as the United States, it is difficult to examine issues in public economics, macroeconomics, industrial organization, or labor economics without paying very close attention to the international context. Ideally, students specializing in international economics take courses in both international trade and international financial and macroeconomic policy.

Labor Economics

Labor economics seeks to understand the functioning and dynamics of the interaction of workers and employers. Labor economics looks at the suppliers of labor services (workers), the demanders of labor services (employers), and attempts to understand the resulting pattern of wages, employment, and income. It is an intensely empirical subfield, in which students are expected to analyze data and requires a good knowledge of price theory and a sound grasp of statistics.

Microeconomic Theory

In the last few decades, theorists have made great advances in characterizing the behavior of households, workers, and firms. Among the most active areas of current research are considerations of the roles of imperfect information, uncertainty, and strategic behavior in shaping the way that economic interactions take place. These lines of research help explain when, for example, involuntary unemployment is persistent or people cannot get loans despite being willing to pay the going interest rate, and how insurance markets function.

Undergraduate microeconomic theory courses seek to show how “real-world” phenomena can be explained by creative extension of the tools taught in Ec 10 and the intermediate theory courses. Because theorists often work on complex problems that are governed by complex realities, the courses here take full advantage of mathematical tools. Students with the necessary preparation might also consider graduate courses in economic theory.

Particularly qualified undergraduates interested in microeconomic theory may wish to consider taking the basic graduate sequence in microeconomics, Ec 2010a and 2010b.

Macroeconomics - Monetary and Fiscal Policy

The two principal ways that public policy affects the course of the economy in the United States are the government's monetary policy - implemented in financial markets by the country's central bank, the Federal Reserve - and fiscal policy, implemented through the taxing and spending decisions that Congress and the President make. Politicians assume, and economists believe, that such monetary and fiscal policies can exert strong influences on the rate of inflation, the rate of the economy's growth, the level of employment, and ultimately the standard of living.

Particularly qualified undergraduates interested in monetary and fiscal policy may wish to consider taking the basic graduate sequence in macroeconomics, Ec 2010c and 2010d.

Behavioral Economics (Psychology & Economics)

Behavioral economics is focused on the influence of psychology on individuals' decisions. Of particular interest among behavioral economists is challenging the assumption that economic agents have unbounded rationality and selfishness, using psychological factors to understand individuals' decisions. Research in behavioral economics is hugely diverse, as it can overlap other fields of economics: How do perceptions of risk influence financial agents' decisions? How does one's mood affect valuation of products? How do social norms among doctors influence medical decisions? How do altruism, willpower, aversion to inequity, and trust affect decisions in a variety of circumstances?

Public Sector Economics

This field examines the efficiency and equity arguments for government “interference” in market economies, what it means for the government to provide a level playing field on which private economic activity can take place, theories advanced to explain actual choices by representative governments, and the effects of government tax and expenditure decisions on the allocation of resources and the distribution of well being. Special attention is given to the fiscal institutions of the United States.

JUNIOR SEMINARS

The Economics Department now offers a program of faculty-led junior seminars. These seminars are designed to introduce students to research in a particular area of economics and to prepare students to undertake their own research projects. All junior seminars require a major research paper; the prerequisites are intermediate microeconomic and macroeconomic theory, statistics, and econometrics (concurrent enrollment in econometrics is sufficient). Junior seminars therefore satisfy both the writing requirement and the theory prerequisite requirement for the Economics concentration. Each seminar is limited to 18 participants with preference given to honors Economics and Applied Math/Economics concentrators in their junior year. Enrollment will be determined by a lottery based on student preferences, although faculty will be given the option to reserve up to two spaces in their seminars to be assigned as they wish (e.g., to non-concentrators, to students in their senior year, to students who have already taken a seminar). You can find the list of junior seminars, along with links to the course syllabi, on the undergraduate website: <http://www.economics.harvard.edu/undergrad/juniorseminars>.

GRADUATE-LEVEL ECONOMICS COURSES

Undergraduates are welcome in graduate courses, and they often do well. In such courses, however, coverage of the professional literature is a primary objective. Such courses are, as a rule, demanding and time-consuming for undergraduates. Most graduate courses require the permission of the professor. A student who wants to go to graduate school or who has a very strong interest and background in a particular area may want to consider taking a graduate class. Keep in mind, however, that graduate courses are very different from undergraduate courses both in depth of analysis and in purpose. Graduate courses train professional academic economists and therefore focus on the latest research, often too new for textbook treatment. Moreover, graduate classes presuppose both a strong background in economics and fluency in multivariable calculus or higher mathematics.

Typically, undergraduates who take graduate courses in economics begin with either Ec 2010a and 2010b (for microeconomics) or Ec 2010c and 2010d (for macroeconomics), each of which is a full-year sequence. These courses serve as prerequisites for most other graduate classes. Sometimes, however, undergraduates begin with higher-level courses that do not rely heavily on the 2010 sequence. Undergraduates should consult the course professor before taking a graduate course and should proceed with caution.

INDEPENDENT STUDY COURSES

There are two forms of unstructured independent study that a student may enroll in: 1) Ec 910r, Supervised Reading and Research, a course offered through the Economics Department, and 2) Independent Study, which is administered by the College. Ec 910r is supervised by an Economics Department professor on an economics topic not substantially covered in a regular course. It is based on a reading list and plan of study agreed upon by

the student and professor and culminates in a long research paper (typically 20 to 25 pages) on the topic surveyed. It involves frequent meetings with the supervising faculty member and is letter-graded only. Students wishing to enroll in Ec 910r must submit an Ec 910r form to the Economics Undergraduate Office and receive approval from both the supervising faculty member and the Director of Undergraduate Studies. Note that Ec 910r counts for College course credit but does *not* count for economics concentration credit. It can only be taken for a letter grade.

Independent Study is administered by the College under the approval of a student's Resident Dean. It is designed to provide credit for field research, academic study not available in regular course work, or practice or performance in the arts. Consult the *Handbook for Students* and your Senior Tutor's office for more information about Independent Study and petitioning to undertake Independent Study. Independent Study is graded pass/fail. It counts for College course credit but does *not* count for Economics concentration credit, even when supervised by an Economics faculty member.

CROSS-REGISTRATION

Students often wish to take courses at Harvard schools outside FAS, such as the Law School and the Kennedy School, and also at MIT. The Business School does not permit undergraduates in their courses, although students may take graduate-level Business Studies courses that are cross-listed with other schools or departments. Students wishing to cross-register can obtain a cross-registration form from either their Senior Tutor or the Office of the Registrar. These must be signed by the instructor of the course, your Resident Dean and the registrar of the other school. If the course is to count toward concentration credit, one of the economics concentration advisors must also sign the petition. Students should be careful to make sure that the courses are given one-eighth of a full-time year credit and that they have regular grading scales. Students should also note the academic calendars for MIT and the other schools; they do not always match the FAS calendar.

BUSINESS AND ACCOUNTING COURSES

The Economics Department does not offer business courses. Students may cross-register for an accounting or business course at MIT, and some Kennedy School courses that relate to business. None of these courses count as economics courses, but you will receive general college credit. If you are unsure about how a course will count, see your advisor before enrolling. As mentioned above, the Business School does not allow undergraduates in their courses, though students may take those Business Studies courses which are cross-listed with other schools or departments.

The Honors Program

Students who wish to graduate with honors must fulfill more requirements and meet higher standards than concentrators who pursue the basic course track. To be considered for high honors or highest honors in Economics, a student must take the Senior Research Seminar (Ec 985), complete a thesis, and receive an honors grade on the thesis. Concentrators who do not write a thesis may be considered for honors in Economics by completing additional courses (the Advanced Course Track). All honors candidates must sit for a three-hour general examination. They are asked to answer questions on microeconomics, macroeconomics, and econometrics, based on material covered in Ec 1010a/b, Ec 1011a/b, and Ec 1123/1126. Honors candidates must complete their requirements with a sufficiently high grade point average and achieve a sufficiently good score on the general examination to graduate with honors.

No one is denied entry into the Advanced Course Track or writing a senior thesis. However, grades are a large percentage of the overall honors average, 40 percent for thesis writers and 70 percent for the Advanced Course Track, so students cannot be guaranteed being recommended for a departmental honors degree. More details on honors calculations can be found here: <http://www.economics.harvard.edu/undergrad/honors>.

ADVANCED COURSE TRACK

Students seeking a more rigorous plan of study in Economics can do additional coursework in lieu of a thesis. To be considered for honors in Economics, a student may take the Advanced Course Track by completing two additional half courses in Economics, including a second course with intermediate theory as a prerequisite and a second writing intensive course. However, only thesis writers will be considered for high or highest honors. *The choice between writing and not writing a thesis should be made on intellectual grounds: on the interest in the thesis topic, and on the desire to carry out a long and difficult project - not in the quest for higher honors.*

SENIOR THESIS PROGRAM

The Economics Department has a strong senior thesis program. About 30 percent of Economics concentrators in recent years have completed senior honors theses. Why should a concentrator write a thesis? One important reason is to investigate some idea, theoretical issue, policy problem, or historical situation of keen interest. But a perhaps equally important reason is for concentrators to stretch their intellectual muscles. By the end of

junior year, most Harvard undergraduates are very good at critical analysis. They are less good at creating constructive arguments of their own, at building up an interpretation of a situation or a problem as opposed to weighing other interpretations. The process of building a sustained, lengthy, creative research argument is very difficult - and very rewarding for its own sake. The Economics Department views the thesis as the high point of an undergraduate's program in the concentration, and urges all students to think seriously about writing a thesis.

The department holds three meetings for students who are interested in writing a thesis. One is in the fall semester to help juniors get a lay of the land for what is involved in the process, and start thinking about how to design a research question. Information will also be presented about how and where to apply for summer research grants if that is in order. Another meeting, also for juniors, is offered in the spring semester. This meeting is more focused on the process of honing a research question and the importance of securing an advisor for the project. There is also a meeting in September for those seniors who have made the decision to write a thesis.

Thesis Topics

What is a legitimate thesis topic? A successful thesis must address an answerable question, define a substantive problem, and demonstrate an appreciation for how the topic fits into a broader research or policy agenda. The two most common approaches are an innovative synthetic examination of a major policy or historical issue, or an empirical analysis that uses available data to assess different theoretical models. The range of issues is almost unlimited. Examining the titles of previously written theses (available on the Economics Department website) gives an idea of the range of topics: <http://www.economics.harvard.edu/files/ArchivedTheses1999-2010.pdf>. These theses are available to peruse in the Pusey Archives onsite and can be searched by title/author as listed in the document above.

The process of deciding on a topic is often a gradual one. It requires many appointments - preferably in the late spring of the junior year - with faculty members to discuss and narrow possible topics. Thesis topics usually spring from questions of interest first raised in an economics course a student found most interesting. (Students are therefore strongly urged to take courses in areas in which they might possibly want to write their theses before the senior year.) Begin by thinking of a course that you really enjoyed and where the readings were of greatest interest. Look through footnotes of articles you read for the course and re-examine the readings from the syllabus. When you find an interesting problem, you are on the right track. It is extremely important that you choose a topic in which you have great interest. This is a project that will be with you for many months.

Thesis Advisors

The Economics Department requires that all theses be advised by professors. A list of people who have advised theses in the recent past can be found on the Department web site: <http://www.economics.harvard.edu/files/ThesisAdvisors10.pdf>. The wide range of potential advisors and teachers accessible to Economics concentrators is perhaps most obvious in the Senior Thesis Program; as many as one quarter of senior theses have been advised by experts outside the Economics Department's regular faculty.

We encourage all students interested in writing a thesis to first write up a brief proposal for the topic. Then use the advisor list to find a professor who works in the area directly related to your subject. Make several appointments with professors to discuss the possibility of one of them agreeing to be the advisor. Choose a professor with whom you will feel comfortable working during the year.

Senior Research Seminars

Ec 985 Senior Research Seminars are full-year seminars with limited enrollments required of seniors writing honors theses. Meetings focus on research topics of interest to their participants, and emphasize research design, methodology, data sources, analysis methods, and the background literature. The course gives students the opportunity to regularly present their work-in-progress.

A major research paper - essentially several key thesis chapters - is due at the end of Reading Period in December. Students have found the Ec 985 seminars to provide invaluable contact with additional advisors and feedback on their theses in progress. In past years, the Department has offered Senior Research Seminars in applied microeconomics, industrial organization, labor economics, development and economic history, macroeconomics, international trade and finance, finance, and public economics.

Thesis "Escape Hatch"

If, at the beginning of second semester, you realize that you do not want to continue with your thesis, you can divide your Ec 985 seminar on your study card. You must have completed the paper requirement as assigned by your 985 instructor. You will be given a letter grade for one semester. This course will count as an economics elective; and it will also count as a writing requirement course, which students who drop back to the honors track often still need to fulfill. You may divide 985 at any time during the drop/add period. However, remember that you will most likely still need to add an additional course so that you will have enough overall courses to graduate from the College. During the drop/add period you may elect to switch to the Advanced Course Track.

Thesis Grading

Each thesis is graded by two readers, who are typically professors in the economics department. Graduate students are not permitted to be readers. The thesis advisor may or may not be one of the readers. Students do not know who their readers are until the theses are handed back in early May. Information about grading guidelines can be found here: <http://www.economics.harvard.edu/files/HonorsCalc2009.pdf>.

THE GENERAL EXAMINATION

Honors concentrators in Economics must take a general examination in microeconomics, macroeconomics, and econometrics. The honors general examination is given only once, in the spring term of the senior year. It is not possible to fail the honors examination, but the examination score does count for 20 percent of the departmental honors recommendation for thesis writers and 30 percent for Advanced Course Track students. Previous years' exam and their solutions can be found on the undergrad website:

<http://www.economics.harvard.edu/undergrad/honors>.

HONORS RECOMMENDATIONS

At graduation, the Economics Department recommends concentrators to Harvard College for what are called English honors (highest honors, high honors, or honors). The College awards Latin honors (summa cum laude, magna cum laude, or cum laude in field), based both on departmental recommendations and on students' overall undergraduate performance. (Students who do not choose one of the department's honors programs may still, with certain qualifications, be awarded a cum laude degree by the College.) To understand the College requirements for honors, refer to the *Handbook for Students*.

Concentration GPA is a large component in the calculation of honors recommendations for both Thesis Track and Advanced Course Track students. Grades for all Economics courses through the first semester of senior year, including Ec 10, are used to calculate concentration GPA. The only course not listed as an Economics course in *Courses of Instruction* that counts in the calculation is Stat 100 (or its equivalent). It is not possible to remove courses from your concentration GPA by taking additional courses.

For Thesis Writers

The Economics Department recommends students who have written theses for highest honors, high honors, and honors in Economics. Highest honors recommendations are very difficult to obtain: they require that a student maintain a very high grade point average (closer to A than to A-), receive two summa readings on his or her thesis, and write a comparably highly graded general examination. In other words, highest honors recommendations require performances at the highest level on all three components of the program that enter into the honors calculation; a performance below the highest level in any area would ordinarily be sufficient to prevent a highest honors recommendation. In addition, all candidates for highest honors will be given an oral exam.

Recommendations for high honors have in recent years gone to about two-thirds of the students writing theses. In general, to receive a high honors recommendation, the student's thesis should receive an overall grade of magna (and, ordinarily, a minimum grade of magna-), and the student should have mostly A- with a few B+ grades in economics courses and must do very well on the general examination. The remainder of students writing theses have, with perhaps a few exceptions per year, been recommended for honors in Economics.

The senior thesis is weighted at 40 percent in the honors calculations, the average of all economics grades through the first semester of senior year is weighted at 40 percent, and the general examination is weighted at 20 percent. If your thesis grade is a magna+ or above, we make an alternative calculation of 50 percent thesis, 30 percent grades, and 20 percent generals. We use the higher of these two calculations. This information is also available on the Department website:

<http://www.economics.harvard.edu/files/HonorsCalc2009.pdf>.

For Advanced Course Track Students

Students pursuing the Advanced Course Track are eligible for departmental recommendations of honors (but not high or highest honors). In order to receive this recommendation the student's overall honors average must be 3.25 or higher. The average of all economics grades through the first semester of senior year is weighted at 70 percent and the general examination is weighted at 30 percent.

DEPARTMENT PRIZES

Every year, the Economics Department recognizes four thesis writers who have outstanding performances in the concentration. The John Williams Prize goes to the student judged to have the best performance in his or her class as judged by grades and performance on the honors general examination and honors thesis. The Morris Kronfeld Prize goes to the student who has shown the most improvement. The Allyn Young Prize is awarded to a student who has written an outstanding senior thesis, and the Seymour Harris Prize is awarded to the student who has written the best thesis of the year. These students receive a monetary award as well as a book of their choice.

Planning Your Economics Concentration

SAMPLE PLANS OF STUDY

Planning one's concentration is not simply a matter of making a wish list of all the courses one would like to take. Timing is everything. Too many Economics courses build on too many others to make the strategy of simply taking the most attractive options each semester a good one. Some courses are only offered every other year. Some courses claim to be offered every other year but are actually given only one year in four (as a result of unscheduled and unexpected faculty departures, arrivals, and leaves). Some courses conflict; some have limited enrollments.

This section provides representative course paths to consider. All of the sample plans of study are coherent and support the students' underlying interests within Economics. These are not "approved" plans and are not the only good plans. They are provided as food for thought. And note that a Harvard A.B. in Economics is a liberal arts degree, not a professional degree. It does not train you to be a professional economist or manager. It is, instead, designed to make you a better analyst, decision-maker, observer, and citizen no matter what path your future career takes.

Certain conventions are followed in the plans of study below. The plans list fewer than the full load of four courses per semester because only economics courses (including statistics and math courses that fulfill economics requirements) are listed - not Expository Writing, Gen Ed, or electives. For the most part, the plans include Ec 1010a and Ec 1010b, rather than Ec 1011a and Ec 1011b, but students should also consider the Ec 1011 sequence (for reasons discussed elsewhere). Honors theses can be completed as part of any of these programs. Finally, sections of Sophomore Tutorial (Ec 970) are often offered on the topics considered here; the offerings vary from year to year, however, so particular tutorial choices have been left unspecified.

Advanced Standing Honors Student (graduating in 3 years)

	Fall	Spring
Freshman/Sophomore	Ec 10 Stat 104/110 Math 1a	Ec 10
Sophomore/Junior	Ec 1010a Ec 1123	Ec 1010b Ec 1530 Ec 970
Junior/Senior	Ec 985 Ec 1535	Ec 985 Ec 1540

This Advanced Standing student is taking a schedule heavy in international economics, but many of the sample programs listed below would also be possible in three years. Note that the student has not learned much economics outside of international economics. This plan of study is also applicable for a “late starting” honors student. Advanced Standing students should make sure that they fulfill the specific Gen Ed requirements as set out by the Gen Ed Office.

Late Starting Basic Course Track Concentrator

	Fall	Spring
Freshman	Math 1a	
Sophomore	Ec 10 Stat 104/110	Ec 10
Junior	Ec 1010a Ec 1123	Ec 1010b Ec elective Ec 970
Senior	Ec elective	Ec elective

Though a later starting basic concentrator is often limited in their choice of electives because requirements take up the bulk of sophomore and junior year, it is still possible to complete the requirements necessary. An Advanced Standing non-honors concentrator would complete a similar plan of study.

Theory-Oriented Concentrator

	Fall	Spring
Freshman	Ec 10 Math 21a Stat 110	Ec 10 Math 21b Stat 111
Sophomore	Ec 1011a	Ec 1011b Ec 1126 Ec 970
Junior		Ec 1051/1052 Ec 1030 Ec 1070
Senior	Ec 985	Ec 985

We have assumed that this Thesis Track student arrived at Harvard with a calculus background. She has chosen to take several courses related to microeconomic theory, and she has room to take more courses in her senior year or junior fall.

The Development Studies Specialist

	Fall	Spring
Freshman	Ec 10	Ec 10
Sophomore	Ec 1010a Stat 104/110	Ec 1010b Ec 1123 Ec 970
Junior	Ec 1339	Ec 1386 Ec 1389
Senior	Ec 985	Ec 985 Ec 1393

This Thesis Track student interested in development economics has taken four electives related to development, and may want to supplement his studies with courses in the Kennedy School or other departments, depending on his particular interests within development.

The Economic Historian

	Fall	Spring
Freshman	Ec 10 Math 1a	Ec 10
Sophomore	Ec 1010a Stat 104/110	Ec 1010b Ec 1123 Ec 970 Ec 1357
Junior	Ec 1340	
Senior	Ec 1339	

This student, who is pursuing the basic course track, may also want to take courses in the History Department.

The Public Policy Expert

	Fall	Spring
Freshman	Ec 10	Ec 10
Sophomore	Ec 1010a Stat 104/110	Ec 1010b Ec 970 Ec 1123
Junior	EMR 20 (formerly QR 24)	Ec 1410
Senior		Ec 1420

This student has chosen not to pursue honors in economics so as to allow room for extra electives (not listed here). He will fulfill the writing requirement with EMR 20, *The Business and Politics of Health*, which is cross-listed in the Economics Department. By taking two more economics courses and fulfilling another writing requirement (which is possible in either Ec 1410 or Ec 1420), he would be a candidate for Advanced Course Track honors. Of course, a thesis is also possible.

The Labor Studies Specialist

	Fall	Spring
Freshman	Ec 10	Ec 10
Sophomore	Ec 1010a Stat 104/110	Ec 1010b Ec 1123 Ec 970
Junior	Ec 1816	Ec 1814
Senior	Ec 985 Ec 1818	Ec 985

This Thesis Track student has taken no extra economics courses and has plenty of room to take other electives.

The Future Financial Wizard

	Fall	Spring
Freshman	Ec 10	Ec 10
Sophomore	Math 21a Ec 1011a Stat 110	Math 21b Ec 1011b Ec 1126 Ec 970
Junior	Ec 1723	Ec 1745
Senior	Ec 1340	Ec 1759 Ec 980e

This student is an honors concentrator doing the Advanced Course Track. The Stat 110/Ec 1126 sequence provides a solid quantitative background for finance courses taken junior and senior years. The student fulfills the two writing requirements for the Advanced Course Track with Ec 980e: Corporate Governance and Ec 1340.

The Future Professional Economist

	Fall	Spring
Freshman	Ec 10 Math 21a	Ec 10 Math 21b
Sophomore	Ec 1011a Stat 110 Math 101	Ec 1011b Stat 111 Ec 970
Junior	Ec 1070 Math 112	Ec 2120 Ec 1051 Ec 1126
Senior	Ec 985 Ec 2010c	Ec 985 Ec 2010d

This plan of study includes more than the minimum required for honors with thesis. The philosophy followed by this student is to mix a strong mathematics/econometrics background with challenging undergraduate economics courses. In the senior year, the student has taken graduate courses in macroeconomic theory as preparation for a graduate program in economics.

PREPARING FOR GRADUATE STUDY IN ECONOMICS

Many students inquire about preparing for graduate study in economics. The first decision concerns whether this is the right choice at all. Graduate study in economics is very different from undergraduate coursework; it is not, as many believe, merely a continuance and deepening of the undergraduate curriculum. Graduate study is also about research. In this sense, the honors thesis, more than anything else, provides a closer look at the enterprise of graduate study. Hence the very best graduate programs in economics will only accept candidates for the Ph.D., as doctoral degrees who are oriented toward research. Similarly, although some doctoral students will eventually choose careers in nonacademic sectors such as finance or government service, most are accepted and trained with the object in mind of producing academic professionals whose research will advance the frontiers of the discipline.

What makes a good researcher and, therefore, a good candidate for graduate study in economics? Most admissions committees gauge potential in three ways: preparation, aptitude, and creativity. A scholar with all three could make important contributions to our understanding of economics. Few applicants, even to the very best graduate schools, will possess all of these attributes to an exceptional degree. To the extent that they do, they become outstanding candidates for admission.

Aptitude is assessed largely through grades, course difficulty, and professor recommendations. To a much smaller extent, scores such as those on the GRE (Graduate Record Exam) are also considered. Creativity is demonstrated primarily through work on the

honors thesis and other research, the quality of which is relayed again through professor recommendations. But of the three components, particular attention is paid to preparation.

The well-prepared candidate has completed coursework in three major areas: mathematics, statistics and econometrics, and economic theory. First, graduate schools appreciate candidates with a well-developed mathematical foundation; these candidates do not struggle with the high level of abstraction at which graduate work progresses. Students should attempt to take some coursework in multivariable calculus, linear algebra, differential equations, and real analysis. Each area deserves a semester of study; however, a year of real analysis is especially impressive.

Econometrics and statistics represents the second component of preparation. The greater a student's training in this area, the greater the scope and depth of empirical research that can be understood and completed. Graduate schools will expect a semester each of statistics and econometrics; however, it is common to see applicants with a great deal more than this. Students considering graduate school are encouraged to enroll additionally in statistics and econometrics courses using stochastic calculus, such as the graduate sequence of Ec 2110 and Ec 2120.

Finally, graduate schools seek a good theoretical background in economics. Although graduate admissions committees value all coursework in economics, they particularly value theoretical courses, which better prepare students for the demands of graduate coursework. Introductory and intermediate microeconomics and macroeconomics is expected of all applicants, and this level of preparation is a requirement of all undergraduate concentrators in economics at Harvard. Beyond this, committees are impressed with further coursework in microeconomics and macroeconomics, especially at the graduate level. They also look for coursework in particular areas of theory, such as game theory.

Graduate school represents a very important and exciting decision in the academic careers of Harvard undergraduates. Graduate study is a vastly different intellectual enterprise than undergraduate study. Although few, if any, students will achieve top marks in all of the three areas of preparation, aptitude, and creativity, starting to develop and demonstrate these components will provide the applicant with an impressive background for graduate study in economics.