

Undergraduate Economics at Harvard

A Guide for Concentrators

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I. 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 appreciate the rationales for requirements, to become familiar with the faculty and courses, and to develop coherent plans of study.

WHAT IS ECONOMICS?

Economics is a social science that is at once 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.

WHY CONCENTRATE IN ECONOMICS?

There are many reasons to study economics. For students interested in international trade, business cycles, or the stock market, economics is the natural choice. Many students choose economics because it provides an excellent background for business, banking, law, and even medicine. But more broadly, anyone seeking a quantitative, rigorous approach to any social science question will find economics exciting and relevant.

Because Harvard does not offer a business concentration to undergraduates, some students treat economics as a substitute. However, economics and business are very different; thus, some undergraduates who concentrate in economics for this reason are less satisfied with their academic experience at Harvard than undergraduates who concentrate in economics because they are truly interested in the economics approach. The Economics Department encourages undergraduates to 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. 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. Because the department is large, students are strongly encouraged to take initiative and personalize their academic experience. Remember that professors and teaching fellows enjoy talking with and working with undergraduates. Go to office hours. Talk with your instructors after class. Meet with concentration advisors during their daily office hours.

A BRIEF SKETCH OF THE UNDERGRADUATE PROGRAM

The Economics Department has roughly 200-250 concentrators per class. One appeal of the department is that it can accommodate students with a wide range of interests: Economics is a way of thinking, and students can apply this way of thinking to nearly any aspect of the world (see Section V for a discussion of various subfields of economics).

The Economics Department requires all students to take courses in introductory and intermediate economic theory in order to have a strong grasp on fundamental economic principles. These key principles rely on mathematical models; thus, all concentrators are required to have a basic preparation in calculus. The Department also requires concentrators to gain the necessary statistical skills to use data from the real world to test economic theories. Putting all of these skills together, the Department's required Sophomore Tutorial helps students apply their knowledge of economic theory, mathematics, and statistics in a course on learning how to read and understand economics research and how to carry out research of their own. The remainder of the

course requirements for an undergraduate degree in economics serve to expose students to various applications of economics tools and theories. Concentrators also have the option to pursue honors in economics, either with or without a thesis. The additional requirements for honors and other details are discussed in Sections III (on concentration requirements) and VI (on the honors program). Students considering graduate school in economics should take more mathematics (see Section VII on graduate study).

Outside of the classroom, concentrators have various opportunities to interact with other concentrators at several events each semester; with faculty members through our faculty-student lunch series and various events; and with alumni at our annual alumni event. Additionally, our Economics Advising Team is available during daily, walk-in office hours (details in Section II).

WHAT DO ECONOMICS CONCENTRATORS DO AFTER THEY GRADUATE?

Economics is a way of thinking and can thus be applied to a huge variety of endeavors. Please see the Department website for thoughts and examples of economics-related post-baccalaureate pursuits: <http://economics.harvard.edu/after-graduation>.

In recent years, about 85 percent of Economics concentrators have sought work immediately after graduation. Economics concentrators go to work in business, government, 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 finance and consulting.

About five percent of Economics concentrators proceed straight to further education upon graduation, pursuing law school, medical school, Ph.D. programs, and various Master's programs. 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.

II. 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, and study habits, to leads for summer jobs, research ideas, or advice on personal problems. There are two formal networks in the University for advice and support for students: the Economics Undergraduate Advising Office and the Resident Dean's Office (or the Freshman Dean's Office for freshmen).

DEPARTMENT OF ECONOMICS UNDERGRADUATE ADVISING OFFICE

Economics concentration advising is provided by concentration advisors (and, informally, by economics house tutors), the Director of Undergraduate Studies, and the Undergraduate Program Coordinator. They can all answer questions or concerns about the undergraduate program, department policies, and students' broader interest in economics.

Economics Concentration Advisors

The Economics Department's five Concentration Advisors are all economists who also serve as lecturers in the Department (called "Lecturer/Advisors"). They are all excited to work with and help undergraduate concentrators. Concentration advisors can sign study cards, drop/add forms, change of concentration forms, plan of study forms, and so on. Advisors can help students understand departmental requirements, discuss academic interests, and offer advice on course choices. Students are also encouraged to talk with their advisors about research interests and their future plans and goals, such as graduate or professional school.

Each economics concentrator has an advisor that is assigned by house; for example, all economics concentrators in Adams House have the same advisor. Advisors will be in touch with their students periodically during the year, especially to offer reminders of deadlines, meetings, requirements, and other important items. Concentrators should feel free to contact their advisor at any time for help or information.

While all concentrators have an official advisor, students may seek advice from any of the advisors who hold walk-in advising office hours in the Undergraduate Advising Wing of Littauer Center (Monday–Friday, 10am–4pm, Littauer 109-116). No appointment is needed. The list of advisors and their office hours schedule is available at <http://economics.harvard.edu/advising>.

Economics House Tutors

Economics house tutors are graduate students in the Economics Department who are appointed by the House Faculty Deans as resident or non-resident 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 concentration advice.

Economics Advising by the Faculty

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

While other economics professors are not designated as academic advisors, we encourage students to get to know them as they 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 or arranges meetings by appointment. When taking a course, take advantage of office hours, make an appointment with the professor, or invite them to House faculty dinner; they are expecting students to do that. When meeting with a professor, students should feel free to discuss the course in general, ask particular questions, inquire about a professor's research interests, or begin to ask questions about potential senior thesis ideas. Students should make an effort to not be shy; you need to take the initiative to meet and get to know your professors.

Student Feedback

The Undergraduate Office is eager to have feedback on the concentration. Students can talk with the Director of Undergraduate Studies, a concentrator advisor, or the Undergraduate Program Coordinator to share their views and opinions.

RESIDENT DEANS

Allston Burr Assistant Deans (ABAD) serve as students' links to the Administrative Board. Any academic or personal concerns can be raised through the ABAD. Many matters require that undergraduates consult and work through their ABAD, 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

UNIVERSITY SUPPORT SERVICES

The **Writing Center** is a 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 students 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 schools within Harvard (the Kennedy School, the Business School, and so forth) and of other universities (MIT, Tufts, BU, 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 is fellow students. Many concentrators find it valuable to supplement studies in the classroom with outside activities. 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 Economics Review

The *Harvard Economics Review* (HER) is a undergraduate-run periodical addressing issues of national and global importance through economic analyses accessible to economists and common readers alike. Designed with the budding economist in mind, the HER features interviews with and articles from prominent economists in academia, business, and government. The HER 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 HER.

OTHER RESOURCES

The Library System

In many courses, economics concentrators supplement their textbooks 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://library.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 and serves as the economics library headquarters for both undergraduate and graduate students.

Widener Library is the principal research library for the social sciences. The Government Documents department in Lamont Library 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

IQSS

The Institute for Quantitative Social Science (IQSS) serves the research and instructional needs of the social science community at Harvard. Their goal is to help users become proficient in locating, accessing, storing, and analyzing numeric data for their research needs. They offer workshops, access to software, consultations, and more. For information, see the IQSS website: <http://projects.iq.harvard.edu> (the Research Technology Group is a good place to start).

EconLit Database

The EconLit database, produced by the American Economic Association, is an indexed bibliography 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 when looking for economics papers, be they for coursework, research, or general interest. Students can log on to EconLit from the Library website (search HOLLIS for "EconLit"), and reference librarians at Lamont are also available to help. The Harvard College Library website also has a guide to EconLit and general economics research: <https://guides.library.harvard.edu/economics>.

III. Concentration Requirements

EXPLANATION OF REQUIREMENTS

The Economics Department's concentration requirements exist to help shape concentrators' courses of study into an intellectually coherent whole by providing 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 teach students 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 difficult 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 can understand and evaluate what is occurring in the economy.

The outline that follows shows the concentration's requirements. Concentrators may take up to two courses within the concentration as pass/fail. Concentrators may **not** take as Pass/Fail: Ec 10ab, Ec 970, Stat 100/104/110 (or equivalent), Ec 1010, Ec 1011, Ec 1123/26, Ec 975ab, any of the Ec 980s or Ec985s, nor any math requirements. **Ec 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, concentrators must still take the overall number of economics courses required for their corresponding degree track. Some Freshmen Seminars can count for economics elective credit, but these will count towards the two pass/fail maximum.

Note: Starting in 2018, Harvard's A.B. program in economics is officially classified by the US Government as STEM, with the Classification of Instructional Program (CIP) code 45.0603: Econometrics and Quantitative Economics.

BASIC REQUIREMENTS FOR ALL CONCENTRATORS

- **Math 1a** (can be satisfied by (i) placing into Math 1b on the Harvard Math Placement Exam or (ii) scoring 5 on the AP AB or BC calculus exam. Students who place out of Math 1a need **not** replace it with another course.) *This requirement applies to the Fall 2010 entering class onwards.*
- **Ec 10a** (can be satisfied by scoring 5 on the microeconomics AP exam. Students who place out of Ec 10a must replace it with an additional economics elective.)
- **Ec 10b** (can be satisfied by scoring 5 on the macroeconomics AP exam. Students who place out of Ec 10b must replace it with an additional economics course.)
- **Stat 100, Stat 104, Stat 109, Stat 110, Applied Math 101, or Math 154** (Statistics)
Only one of Stat 100, 104, 109, 110 may be used to fulfill ec concentration requirements.
- **Ec 1010a or 1011a** (Intermediate Microeconomics)
- **Ec 1010b or 1011b** (Intermediate Macroeconomics)
- **Ec 970** (Sophomore Tutorial)
- **Ec 1123 or 1126** (Econometrics)

None of the above may be taken pass/fail.

- **3 additional economics 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 one of Math 18/Math 21a/AM 21a or higher***
 - Two semesters of **Ec 985** (Senior Thesis Research Seminar)
 - Successful completion of a **senior thesis**
 - **Honors general examination** covering micro, macro, and econometrics
- B. **Advanced Course Track** (eligible for cum degree in Economics)
- **Math 1b and one of Math 18/Math 21a/AM 21a or higher***
 - **2 additional economics half-courses** that include:
 - 1 course with writing requirement
 - 1 course with intermediate theory as prerequisite
 - **Honors general examination** covering micro, macro, and econometrics

None of the Honors math requirements nor Ec 985 may be taken pass/fail.

*Students who place out of Math 1b on the Harvard Math Placement Exam need **not** replace it with another course. There is **no** placing out of Math 18/21a/AM21a. *The Honors math requirements apply to the Fall 2010 entering class onwards.*

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 via the Harvard Math Placement Exam or the Advanced Placement AB or BC calculus exam. 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. Thus, while math beyond first-semester calculus is not required for the concentration, it is highly recommended for all students and is required for concentrators pursuing honors in economics. The more-math-intensive intermediate economic theory courses, Ec 1011a and 1011b, require multivariable calculus at the level of Math 18 or 21a. Math 18 covers multivariable calculus, with a focus 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 strong math backgrounds may substitute Math 22ab or 23ab for 21ab. Students with extremely strong math backgrounds would be prepared for graduate work in economics after taking Math 25ab or 55ab.)

Principles of Economics (Ec 10a and 10b)

Ideally, students intending to concentrate in Economics spend their first year at Harvard taking Ec 10a (principles of microeconomics) and Ec 10b (principles of macroeconomics), a full-year introduction to current economic issues and basic economic principles and methods. (Students who did not take Ec 10ab as a freshman may still concentrate in economics by taking Ec 10a and/or Ec 10b during Harvard summer school or as a sophomore. They should speak with a concentration advisor to discuss options.)

All concentrators are required to take Ec 10ab, unless they can demonstrate proficiency in introductory economics through AP or IB exam scores. A student receiving a score of 5 on the microeconomics and/or macroeconomics Advanced Placement exam may skip the corresponding portion of Ec 10ab. A student receiving a score of 7 on the economics Higher Level examination toward the International Baccalaureate may skip both semesters of Ec 10ab. Please note that students skipping any part of Ec 10ab must replace it with another half-course in economics. Also, while most eligible students who go directly to the intermediate theory courses (Ec 1010ab or Ec 1011ab) do very well, they do not *have* to skip Ec 10ab. It is a personal choice, and we suggest that students discuss this with a concentration advisor. (Note: students using micro and/or macro AP exam scores to activate Advanced Standing may **not** take Ec 10a and/or Ec 10b for course credit.)

Ec 10ab is taught in sections of approximately 20 students, with course-wide lectures on a variety of topics about 10 times each 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, Gita Gopinath on international finance). 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. There are also a handful of PhD economists teaching Ec 10 sections. 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 midterms and one final exam each term. There are roughly seven problem sets per term.

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

Sophomore Tutorial (Ec 970)

Much of what one learns about an analytical subject like economics comes from active discovery, which is often better accomplished in a small group setting. Thus Ec 970, the Sophomore Tutorial, is taught in sections of eight to 10 students. Ec 970 is offered in both the fall and spring. Most concentrators take the tutorial during their sophomore spring semester; however, it may be postponed to junior (or even senior) year for late-starters. To enroll in Ec 970, you must have completed Ec 10ab, Statistics, and Ec 1010a/1011a. Depending on the specific Ec 970 section, a student might also need concurrent enrollment in (or prior completion of) Ec 1010b/1011b. The Department also highly

recommends concurrent enrollment in (or prior completion of) econometrics (Ec 1123 or 1126). Sophomore concentrators who do not meet these prerequisites will need to enroll in tutorial in their junior or senior year. Ec 970 may not be taken pass/fail.

The goals of Ec 970 are to build on the foundations from the principles, statistics, and intermediate theory courses by applying frameworks of economic analysis to specific subject areas. In particular, Ec 970 aims to help students learn to read and think critically about economics research, write analytical economics papers, and hone their skills in communication, argument, and listening.

In a typical year, there are about 25 different tutorials to choose from, on a variety of topics that vary from year to year. The vast majority of students are assigned to one of their top five tutorial choices. Recent topics have been finance, psychology and economics, economics of immigration, development economics, law and economics, economics of innovation, monetary policy, environment economics, and more. An overwhelming majority of tutorials receive high student evaluations, and sophomore tutorials are often one of students' favorite classes in the department.

Intermediate Theory Courses (Ec 1010a/1011a and 1010b/1011b)

The Economics Department offers two intermediate microeconomic and macroeconomic theory course tracks. The Ec 1010 courses are intended for students who find mathematical formulations as much of an obstacle as a help to understanding economics; knowledge of Math 1a is expected. The Ec 1011 courses are 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 18/21a. 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.

Starting in Fall 2014, concentrators must demonstrate their command of the basic tools of economic analysis by receiving a grade of B- or better in **both** Ec 1010a/1011a **and** Ec 1010b/1011b. (Prior to Fall 2014, the requirement was an average grade of B-/C+ or better across the two courses. Please see a Concentration Advisor for questions on Ec 1010/1011ab taken prior to Fall 2014.) Students who receive below a B- in 1010a/1011a must either register for 975a or take an extra economics elective with 1010a/1011a as a prerequisite. Those who receive below a B- in 1010b/1011b must register for 975b or take an extra economics elective with 1010b/1011b as a prerequisite. In all cases, students must receive a grade of B- or higher. The Ec 975ab courses involve (unofficially) retaking the corresponding intermediate theory course and earning at least a B- grade. Concentrators will not receive a degree in Economics until this requirement is met. Ec

975ab does **not** satisfy any Ec electives in the concentration; however, it **will** be factored into the Ec GPA of students pursuing honors.

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. A solid understanding of statistics is also required before students can take the required econometrics course (Ec 1123 or 1126).

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. Stat 101 is not an option.

Students who have completed multivariable calculus (Math 18 or 21a) and who wish to understand statistics at a deeper level can fulfill their statistics requirement by taking Stat 110 (instead of Stat 100 or 104), 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 21b), builds statistical theory from this foundation.

In addition to a basic statistics course, the department requires all concentrators to take Ec 1123 or 1126. 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 planning to write a thesis should fulfill the 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 (Math 18 or 21a) and linear algebra (Math 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. Students should also have taken, or be taking, the intermediate microeconomics and macroeconomics courses.

For students interested in pursuing econometrics beyond the Department's basic requirement of Ec 1123 or Ec 1126, both the Economics and Statistics Department offer a variety of higher-level econometrics courses. Explore the course catalog or talk with a concentration advisor to learn more.

Courses taken to meet the Economics Department's statistics and econometrics requirements cannot be taken pass/fail by Economics concentrators.

Economics Electives

These are discussed in detail in Section V, along with general information on the different fields of specialization in economics.

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 or Applied Math. More information can be found through the Office of Undergraduate Education: <http://oue.fas.harvard.edu>.

Students using microeconomics and/or macroeconomics AP exam scores to activate Advanced Standing may **not** take Ec 10a and/or Ec 10b for course credit.

Applied Mathematics Concentration

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 (AM/Ec) rather than concentrating in economics. The AM/Ec requirements involve more math, statistics, and/or computer science courses and fewer economics courses. Specifically, the concentration requires Math 1a and 1b, and Math or AM 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 AM 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 two additional economics course (besides Ec 10ab), chosen from a list of qualifying courses. AM/Ec concentrators are welcome to participate in the Economics

Sophomore Tutorials (Ec 970) and Junior Seminars (Ec 980), and are highly encouraged to enroll in a Senior Thesis Research Seminar (Ec 985).

More information on the AM/Ec concentration is available from your concentration advisor as well as from the School of Engineering and Applied Sciences, which administers the Applied Math concentration: <http://www.seas.harvard.edu/programs/applied-mathematics>.

General Education/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 Fall 2010, all students will have to complete the requirements for Gen Ed (rather than Core) curriculum.

Study Abroad

The Economics Department allows study abroad for a term or an academic year. It is generally best for students to study abroad during their junior year, although students may postpone Ec 970 (Sophomore Tutorial) if they choose to go abroad during their sophomore spring. After choosing a program and obtaining College approval for planned courses from the Office of International Education (<http://oie.fas.harvard.edu>), the student should make an appointment with their concentration advisor to discuss study abroad and bring course syllabi to the meeting. The advisor will grant credit towards fulfilling at most **one** Economics concentration course for courses taken abroad. Students studying abroad for two semesters may petition the Department for credit for two courses. **Any economics course taken abroad counts towards the maximum of two pass/fail electives allowed in the economics concentration.**

To receive concentration credit, a course must be primarily economic in content and roughly equivalent in difficulty to a Harvard Economics Department course. Courses with an intermediate theory prerequisite *might* count toward the theory prerequisite requirement. Students who write a course paper of 15 pages or more should submit the graded paper to their concentration advisor, who may grant writing requirement credit if the paper has substantial economic content. Details: <http://economics.harvard.edu/study-abroad>.

Ordinarily, only **one** non-Harvard-term-time course can be used towards meeting the economics concentration requirements. This includes study abroad, Harvard summer school, and cross-registered courses at MIT.

Summer School

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

Ordinarily, only **one** non-Harvard-term-time course can be used towards meeting the economics concentration requirements. This includes study abroad, Harvard summer school, and cross-registered courses at MIT.

Transfer Credit

The Registrar's Office gives transfer students to the College a list of all courses previously taken for which that the College will give 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.

IV. 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 (six courses)

- **Ec 10a:** Principles of Economics (Microeconomics)
- **Ec 10b:** Principles of Economics (Macroeconomics)
- **One half-course in intermediate theory** from:
 - Economics 1010a/1011a: Intermediate Microeconomics
 - Economics 1010b/1011b: Intermediate Macroeconomics

A minimum grade of B- is required. Students receiving a grade below B- should speak with a Concentration Advisor to discuss options.

- **Three half-courses in Economics**

Ec 10a and Ec 10b

All students are required to take Ec 10a and Ec 10b, the two-semester introduction to current economic issues and to basic economic principles and methods. Students who have scored 5 on both the microeconomics and macroeconomics portions of the AP exam or 7 on the Higher Level examination toward the International Baccalaureate are deemed to have met the Ec 10ab requirement; however, they must replace Ec 10ab with two half-courses in Economics to complete the secondary requirements. Students who scored 5 on only one portion of the Economics AP exam are deemed to have met the requirement for the corresponding semester of Ec 10a or Ec 10b; similarly, they must replace it with one additional half-course in economics to complete the secondary requirements.

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 975ab: Tutorial-Theory Review, the senior thesis seminars (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 one's concentration and secondary field. This is a Harvard University 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*. Exception: only **one of** Statistics 100, 104, 110, Applied Math 101, or Math 154 qualifies as one of the three half-courses.

Only one non-Harvard-term-time course (study abroad, MIT, Harvard Summer School, ...) may be used for credit in the secondary field.

Freshmen Seminars *may not* be used for credit in the secondary field (since all courses for the secondary field must be taken for a letter-grade).

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

V. 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 elective courses in Economics. These additional courses aim 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.

One of the three additional courses must have an intermediate theory course as a prerequisite (i.e., either Ec 1010a/1011a or 1010b/1011b) and one must be a writing-intensive course. (Please see the undergrad economics website for a complete listing of courses that meet these requirements: <https://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, students must still take the overall number of economics courses required for their 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 prerequisite, students who have taken intermediate micro and macro often feel they 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. Potential thesis writers might want to 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. Research 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 about corruption and governance to questions about the role of assistance from foreign countries; and more.

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 is taught 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 10ab 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 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

Junior seminars are faculty-led course 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 economics concentrators in their junior year. Enrollment is determined by a lottery, although faculty are allowed 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). The list of junior seminars, along with links to course syllabi, is on our website: <https://economics.harvard.edu/undergrad-courses>.

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.

Some 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. Note: Most graduate seminars and workshops are not eligible for ec concentration credit.

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 faculty member 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 Ec 910r Course Head. 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 the Resident Dean'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-LISTED AND JOINTLY OFFERED COURSES

There are several courses across the University for which students can receive economics concentration credit. Such courses in other Departments (cross-listed courses) and Schools (jointly-offered courses) change each year and are posted on the Department website: <https://economics.harvard.edu/undergrad-courses>

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 should carefully read the instructions online: <https://courses.harvard.edu/crossregistration.html>

If the course is to count toward concentration credit, students also need the approval of one of the economics concentration advisors. Students should be careful to verify the amount of credit and the grading scales of cross-registered courses. Students should also note the academic calendars for MIT and the other schools, as 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; some Kennedy School courses also relate to business. None of these courses count as economics courses, but they will count for general college credit. Students who are unsure about how a course will count should see their advisor before enrolling. As mentioned above, the Business School does not allow undergraduates in their courses, though students may take Business Studies courses which are cross-listed with other schools or departments.

VI. 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 on microeconomics, macroeconomics, and econometrics, based on material covered in Ec 1010ab/Ec 1011ab 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://economics.harvard.edu/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, based on 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. Roughly 25 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 two meetings for students who are interested in writing a thesis. The spring semester meeting aims to familiarize juniors with the thesis process, help them hone in on a research question, and provide guidance on choosing an advisor. Juniors interested in starting the thesis process early in junior year should read the Department's "Guide for Juniors Thinking About a Thesis" (<http://economics.harvard.edu/senior-thesis>) and meet with a concentration advisor to discuss any questions. The fall semester meeting during the first week of classes is a mandatory meeting for seniors who have decided 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 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://economics.harvard.edu/senior-thesis>. These theses are available to peruse in the Pusey Archives 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 faculty across the University that have advised theses in the past or who are willing to advise theses can be found on the Department web site, under the "Sortable Thesis Advisor List" link: <http://economics.harvard.edu/senior-thesis>. 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 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. Students can find a wealth of information about thesis guidelines, details, and advice in various documents on the senior thesis website: <http://economics.harvard.edu/senior-thesis>.

Senior Research Seminars

Ec 985 Senior Research Seminars are small, full-year seminars required of seniors writing honors theses. Meetings focus on students' individual projects and assisting them with their research design, methodology, data sources, analysis methods, and understanding background literature. The course gives students regular opportunities to regularly present their works-in-progress.

A major research paper—essentially several key thesis chapters—is due in December. Students have found the Ec 985 seminars to provide invaluable contact with additional advisors and feedback on their theses in progress.

Thesis “Escape Hatch”

If, at the beginning of the Spring 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 only the Fall 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 Spring 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://economics.harvard.edu/honors>.

THE HONORS EXAMINATION

Honors concentrators in Economics must take a general examination in microeconomics, macroeconomics, and econometrics. The honors exam is given only once, in April of the senior year. While it is not possible to “fail” the honors exam, the exam score does count for 20 percent of the departmental honors recommendation for thesis writers and 30 percent for Advanced Course Track students. Previous years’ exams and their solutions can be found on the undergrad website: <http://economics.harvard.edu/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*), 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.) Details of the Department’s and College’s requirements for honors can be found on the Department’s website <http://economics.harvard.edu/honors> and in the College’s *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 concentration courses through the first semester of senior year (including required math and statistics courses) are used to calculate concentration GPA. 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 roughly three-quarters of thesis writers. 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 concentration GPA 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 explained in detail on the Department website:

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

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 concentration GPA is weighted at 70 percent, and the general examination is weighted at 30 percent. This information is explained in detail on the Department website:

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

DEPARTMENT PRIZES

Every year, the Economics Department gives four prizes to 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 senior thesis. The Allyn Young Prize is awarded to a student who has written an outstanding senior thesis, and the Seymour E. and Ruth B. Harris Prize is awarded to the student who has written the best thesis of the year. The Morris Kronfeld Prize goes to the thesis writer who has shown the most improvement. These students receive a monetary award as well as a book of their choice.

VII. 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 also important. Most Economics courses build on many others. Some courses are only offered every other year. Some courses conflict; some have limited enrollments.

This section provides example course paths to consider. All of the sample plans of study support the students' underlying interests within Economics. These are not "approved" plans and are not the only good plans. They are provided simply 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
First Year	Ec 10a Stat 104/110 Math 1a	Ec 10b Math 1b
Second Year	Ec 1010a Ec 1123 Math 21a	Ec 1010b Ec 1530 Ec 970
Third Year	Ec 985 Ec 1535	Ec 985 Ec 1036

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 (where the above schedule represents sophomore through senior years). 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 10a Stat 104/110	Ec 10b
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, but doing more ec electives in junior year.

Theory-Oriented Concentrator

	Fall	Spring
Freshman	Ec 10a Math 21a Stat 110	Ec 10b 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 (or study abroad junior fall).

The Development Studies Specialist

	Fall	Spring
Freshman	Ec 10a Math 1a	Ec 10b Math 1b
Sophomore	Ec 1010a Stat 104/110 Math 21a	Ec 1010b Ec 1123 Ec 970
Junior	Ec 1341	Ec 1393 Ec 1389
Senior	Ec 985	Ec 985

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 10a Math 1a	Ec 10b
Sophomore	Ec 1010a Stat 104/110 Ec 1357	Ec 1010b Ec 1123 Ec 970
Junior	Ec 1340	
Senior	Ec 1341	

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 10a Math 1a	Ec 10b
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 10a	Ec 10b
Sophomore	Ec 1010a Stat 104/110	Ec 1010b Ec 1123 Ec 970
Junior	Ec 1816	Ec 980
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 10a Math 21a	Ec 10b Math 21b
Sophomore	Ec 1011a Stat 110	Ec 1011b Ec 1126 Ec 970
Junior	Ec 1723	Ec 1745
Senior	Ec 1340	Ec 1759 Ec 980

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 an Ec 980 Junior Seminar and Ec 1340.

The Future Professional Economist

	Fall	Spring
Freshman	Ec 10a Math 21a	Ec 10b 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 (e.g., Math 21a), linear algebra (e.g., Math 21b), differential equations, and real analysis (e.g., Math 101, 112). 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.