



WILLIAM & MARY
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DEPARTMENT OF ECONOMICS

The first college in America to offer courses in Political Economy (1784)

A Handbook for
Economics
Majors and Minors

2017-18 edition

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**

Excellence in teaching and research

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I. Introduction

Although the discipline of economics as we know it today is a post-1870 development, William & Mary arguably has the oldest economics department in the nation—since 1784, to be precise. The Department of Economics seeks to introduce students to the ways that economists comprehend and explain the world around us—locally, nationally, and globally. In doing this, the Department provides students with the skills to pursue fulfilling careers and to enjoy a lifetime of learning. Successful students master a set of tools and a mindset of critical thinking that will enable them to think creatively and contribute to debates on a wide array of challenging problems and issues of economic policy. The tools include analytical reasoning, quantitative and computing skills, and the ability to present ideas effectively in writing and through presentations. The Economics Department offers a wide variety of courses, beginning at the introductory level, progressing through required courses at the intermediate level, and culminating in field courses, classes in modeling and empirical methods, advanced seminars, and independent studies.

This Handbook provides students with information about our economics program and about the wider economics profession. Our goal in collecting this information in one place is to help students make informed decisions and expectations about majoring in economics at William & Mary. The handbook also will be useful for economics minors, as well as students in other disciplines that use economics in their curriculum. These would include concentrations such as global studies, international relations, environmental studies, and public policy. The handbook expands on information found in the undergraduate Catalog and provides a convenient source of detailed information on other aspects of the program, the economics discipline, and the members of the economics department faculty.

Additional information about the department and its activities is available on the Economics Department Web Page <http://www.wm.edu/economics>. Several portions of the handbook are taken from the American Economic Association (AEA) website. For more information about the economics profession, go to the AEA website at (<http://www.vanderbilt.edu/AEA/students/index.htm>) which also offers excellent tips on writing and research in economics. AEA's Resources for Students are available from: <https://www.aeaweb.org/resources/students>.

The Faculty

Economics is one of the most popular undergraduate majors with some 400 declared Majors and 50 declared Minors in 2016-17. The faculty consists of 24 tenured or tenure-eligible, 6 full-time lecturers or visitors, and 4 adjuncts who teach one or two courses. So, at any given time, you may run into over thirty PhD-holding economists in Tyler Hall who excel in both research and teaching.

What is Economics?

Economics is the study of how people as individuals or through their organizations make decisions about the use scarce resources to enhance today's and tomorrow's economic

wellbeing—for both the individual, the group, and society. Resources include the time and the human skills and aptitudes, the land and other natural endowments, structures and equipment, and the knowledge of how to combine them to create useful products and services.

Important choices involve how much time to devote to work, to school, and to leisure, how many dollars to spend and how many to save, how to combine resources to produce goods and services, and how to vote and shape the level of taxes and the role of government in the provision of public goods and services.

Economics posits that people as economics actors are predisposed to rationally use their limited resources to improve their well-being in a self-interested way or in an altruistic way. Well-being is much more than about income. It also encompasses the satisfaction people gain from the products and services they choose to consume, from their time spent in leisure and with family and community as well as in jobs, and the security and services provided by effective governments. Sometimes, however, people appear to use their resources in ways that don't improve their well-being. Economic is, therefore, a social (or a moral) science where its constructed 'objects' of study (such as employment, money, demand, supply, or price) are pervaded human intentionality and adaptability. In short, economics is a study of systematic behavior pertaining to such things as labor, land, and investments, money, income and production, and of taxes and government expenditures¹.

More generally, economists study *how people make decisions* under uncertainty (tradeoffs, opportunity cost, incentives), *how people interact* (international trade, markets, governments), and *how the whole economy works* (productivity, inflation, unemployment, growth) over time. Economists seek to measure wellbeing, to learn how well-being may increase over time, and to evaluate the well-being of the rich and the poor—nations as well as families. Perhaps the most famous early book in economics is the *Inquiry into the Nature and Causes of the Wealth of Nations* written by [Adam Smith](#), and published in 1776 in Scotland. William & Mary was the first college in the nation to use this textbook, at the dawn of the Industrial Revolution, to teach courses in political economy.

Although the behavior of individuals is important at the micro level, economics also addresses the collective behavior of businesses and industries, governments and countries, and the globe at the macro level. Microeconomics starts by thinking about how individuals make decisions. Macroeconomics considers aggregate outcomes. The two points of view are essential in understanding most economic phenomena, including efficiency, growth, and inequality.

Good economics is theoretical, empirical, innovative, and creatively applied to real-world problems and challenges. As the Economist (2016) puts it: “Economic papers are far too formulaic; models should be a means, not an end. But the symbols do matter. The job of economists is to impose mathematical rigour on intuitions about markets, economies and people... Behavioural economics has broken down one silo by incorporating insights from psychology.

¹ The Bank of Sweden annually awards the Prize for Economic Science. Economics is “scientific” in its method—reliance on well-developed theory to derive explanations and use of rigorous econometric methods to put theory to the data. But the objects of study are rather different. Unlike the natural sciences, the objects of study of economic behavior are not entirely independent of the economist and they (people, firms, etc.) are also capable of modifying their behavior by internalizing new economic knowledge. To complicate matters, economic activities are embedded in social and political systems.

More need to disappear: like anthropologists, economists should think more about how individuals' decision-making relates to social mores; like physicists, they should study instability instead of assuming that economies naturally self-correct."

Despite the significant accumulation of economic knowledge about how economic systems work, there are few "laws" of economics. What we have are a number of robust theoretical propositions and empirical regularities. The boxes below encapsulate the core ideas of the discipline.

The Ten Principles of Economics

1. People face trade-offs
2. The cost of something is what you give up to get it
3. Rational people think at the margin
4. People respond to incentives
5. Trade can make everyone better off
6. Markets are usually a good way to organize economic activity
7. Governments can sometimes improve market outcomes
8. A country's standard of living depends on its ability to produce goods and services
9. Prices rise when the government prints too much money
10. Society faces a short-run tradeoff between Inflation and unemployment.

Source: Gregory Mankiw.

Six Big Economic Ideas

1. The Fiscal Multiplier (Keynes)
2. Comparative Advantage (Ricardo, Samuelson, and Stolper)
3. Information Asymmetry (Akerlof)
4. The Financial-instability Hypothesis (Minsky)
5. Nash Equilibrium (Nash)
6. The Mundell-Fleming Trilemma (Mundell and Fleming)

Source: <http://www.economist.com/sites/default/files/econbriefs.pdf>

The remainder of this handbook focuses on curriculum and course planning for students, and career planning following graduation. One of the most important questions of concern to students in deciding on an undergraduate major is “what will I be able to do after I graduate?” With this handbook, students will know more about the contents of individual courses, the job market for economics majors, and the best way to prepare for graduate and professional school. Since economics provides a useful and powerful framework for analyzing a wide range of problems, economics graduates have successfully pursued diverse educational and employment paths.

The Goals of the Economics Major

In the broadest sense, the educational goal of the economics major is to enable the student to “think like an economist.” The following points elaborate on what thinking like an economist means.

- As a student progresses through the concentration, they will learn to apply the fundamental theoretical propositions of economics in a wide variety of circumstances and situations.
- They will understand how to formulate hypotheses and how to empirically test and modify them. Mastering this analytical skill set requires that students comprehend how data are collected and analyzed.
- They will appreciate the strengths and weaknesses of economic models and the diversity of economic thinking about economic processes and policies.
- They will understand how norms and incentives embedded in economic institutions shape individual and group behavior, and they will be able to put these institutions in their social, political, and historical context.

We hope to meet these goals for the quite diverse group of students who are attracted to the economics major. This diversity is important. We recognize that the economic way of thinking is very valuable in many fields of interest to our students. Economics majors pursue various paths following graduation. This is clear to the faculty as we talk with students and is confirmed when we see them when they are back on campus as alumni. Historically, over 55 percent of our students eventually pursue some form of graduate work. Graduate work in Business (15.7 percent) and Law (11.8 percent) are the most common.

While only 3.3 percent of our graduates have obtained a Ph.D. in Economics, this is about twice the national average for schools such as William & Mary. The College is one of the leading institutions in the nation at producing undergraduate concentrators who go forward with graduate training leading to a Ph.D. in economics. An article by John Siegfried and Wendy Stock in the *Journal of Economic Education* (2007) places W&M twelfth in the nation in total economics majors who subsequently complete a Ph.D. in economics. Many of our students who pursue graduate work do so after experience working in the private sector or for government agencies and non-profit think tanks.

The economics concentration is designed to prepare students for a variety of work experiences. A survey of 445 graduates majoring in economics indicates that 33.8 percent of these

individuals took their first jobs in Management/Consulting, and 17.8 percent took their first jobs in Banking/Finance. Only 13.0 percent of these individuals listed their job as Economist. Behind Economist, but with significant numbers were Marketing/ Sales (9.4 percent) and Insurance (5.7 percent). In addition, many students have worked for various agencies of the federal government, state governments, and local governments. These results, both about the type of formal education pursued by our graduates and their job experiences, reinforce our notion that economics majors graduate with strong preparation for a variety of fields.

One strategy we pursue to meet the goals for students with various reasons for concentrating in economics is to maintain flexibility in the curriculum. A look at our list of courses from the catalogue, which is included in this handbook, shows that our offerings are quite diverse. We have a relatively small number of required courses, and students may then choose among various electives. We cover all of the standard subfields of economics, as well as several that are more unusual.

[The following is taken directly from the AEA website.]

What skills are needed for success in an undergraduate program in economics?

The undergraduate major in economics develops three skills: logical thought used in solving problems, observation and inference from data, and presenting ideas in compelling writing and speech.

Logical analysis underlies an economist's ability to understand economic phenomena. Many courses use algebra and some use calculus as tools for understanding economic events. Some courses in economics ask students to complete a series of problem sets that consist of elaborate algebra word problems. Developing skill in translating between mathematical models and observed economic phenomena is usually essential.

Logical analysis and use of mathematics often involves radical simplification to allow focus on a logical cause-and-effect relationship, much as physics often imagines a world without friction to describe basic relationships. The mathematics then provides models that reveal significant connections while ignoring other features of the phenomenon. The models are often applied in many settings rather than having to be reinvented for each new situation.

The ability to create and interpret a **chart** is a skill developed in any economics program.

It is essential for students majoring in economics to be able to **write** clearly. Being able to write thoughtfully and clearly is the best way to show an understanding of economic theory and concepts. The ability to build an argument in the form of an essay is a valuable skill developed in many economics programs and in several of our courses. Effective oral communication and presentation skills also play a role in some courses. Allyn & Bacon publishers offer a website on **public speaking**.

What are the fields in economics?

Economics covers a variety of fields. The following is the list of standard fields in economics as provided in the AEA's *Journal of Economic Literature* (JEL).

Economists organize their discipline in fields from agricultural economics to urban economics. Many economists specialize in a field by publishing original essays on topics and teaching courses in a specific field.

The fields are in two sets: Those that develop core skills and those that emphasize application of the skills in specific settings. The core itself involves two modes of analysis. The [Skills](#) section below gives simple examples. First, mathematical description of economic phenomena allows derivation of relationships. This mode of thought is called [economic theory](#). Mathematics allows arguing by [deductive reasoning](#) from stated premises to a conclusion. It offers the internal consistency of mathematical proofs but requires no evidence of applicability.

The second core method looks for evidence based on observing economic phenomena. It draws inference from persistent patterns. A consistent pattern that is distinct from the complexity and randomness in nature is likely to have meaning. This mode of thought is called [inductive reasoning](#). It is the mode of analysis of economic historians, statisticians, and experimenters. The study of formal methods for drawing inferences from statistical evidence in economics is called [econometrics](#) which also requires basic computer literacy.

Many advances in economic understanding come from the interaction between deduction and induction. When mathematical analysis yields new insights, the historians, statisticians, and experimenters look for ways to judge whether available evidence is consistent with the theory. When observation shows phenomena that are inconsistent with available theories, economic theorists look for new theories.

Most economists concentrate their work and teaching in an applied field, that is, in the other categories shown below. They study the history of the phenomena and adapt the core theoretical ideas of economics to offer explanations. They develop a variety of methods to observe and measure events and apply econometric methods to test hypotheses. For example, international economists study the history of trade, balance of payments, and exchange rates. They will understand both the economic theories and the econometric findings that explain international economic phenomena.

The fields of economics, however, have fuzzy boundaries because economic events are interconnected. Every transaction has a buyer and a seller; each economic event has extended consequences. A change in a wage rate will affect the cost of the goods the workers produce as well as change the income and consumption patterns of the workers' households. An economist working in one field will be aware of connections to the rest of the economy.

The fields of economics, then, are more signposts than fences. They include the core areas of mathematical and statistical methods as well as the many arenas in which the core methods are applied. Most undergraduate programs include study in the core fields and in a selection of applied

fields. The standard classification of economic fields given below appears in the *Journal of Economic Literature*. These field labels provide enduring markers on the terrain of economic thought.

Journal of Economic Literature (JEL) Classification of Fields

A. General Economics and Teaching -- The principles course in the economics curriculum develops core ideas. The course also provides the big picture of how individual economic events fit together to shape aggregate outcomes. Mastering basic ideas and getting a sense of how the parts fit into the whole is an essential entry point to the study of other fields and more advanced ideas in economics. This “A” category also includes discussion of the teaching of economics.

B. Schools of Economic Thought and Methodology -- Economists who study the history of economic thought investigate how the core ideas in economics have developed.

C. Mathematical and Quantitative Methods -- [Econometricians](#) develop methods to measure economic phenomena. They apply the scientific method by formulating hypotheses, gathering evidence, and judging whether the evidence is consistent with the hypotheses. [Mathematical economists](#) develop tools for finding optimal solutions to economic problems and advance ideas in [game theory](#). Game theory is the method for analyzing how one player chooses strategies in light of knowledge of the possible strategies a rival might choose. Game theory is used to analyze many economic phenomena including the interaction between firms. In recent decades, [experimental economists](#) have tested economic theories in laboratories and in the field.

D. Microeconomics -- Studying how markets function and the role of prices is of central concern in understanding economics. Investigation of the behavior of individual households, firms, and prices and quantities of specific products like automobiles is called microeconomics.

E. Macroeconomics and Monetary Economics -- The actions of individuals sum to the total activity in a whole economy. In the aggregate, the total amount of products consumed by households and firms must equal the total amount produced. The total amount firms pay to workers and investors must equal the amount households receive in income. Study of the aggregate relationships in an economy is called macroeconomics. [Economic growth](#), the role of money and interest rates, and changes in the overall level of prices and the aggregate level of unemployment are central concerns of macroeconomics.

F. International Economics -- International economists study [trade](#) among nations and the flow of [finance](#) across international borders. Globalization and the deficit in the U.S. [balance of payments](#) with other countries are current concerns.

G. Financial Economics -- Financial economists study the process of saving and investing with a specific concern for how individuals and firms deal with risk.

H. Public Economics -- Public finance economists consider the role of government in the economy. Some focus on evaluating government programs and others focus on the design of [tax](#) systems. Public finance economists are also interested in how the political process makes

decisions. Issues of national security and defense appear here as well the study of state and local governments.

I. Health, Education, and Welfare -- Some economists focus on the markets and government policies that directly shape access to health care. Others focus on schools and educational policies. Still others consider the economic circumstances of the poor and evaluate alternative government programs to improve the well-being of the poor.

J. Labor and Demographic Economics -- Labor economists study employers' decisions to hire workers and employees' decisions to work. They study how wages are set, the nature of incentives workers face, and the role of minimum wage laws, unions, pension plans, and training programs. They are also interested in the formation of families, determinants of birth rates, migration, population change, and aging.

K. Law and Economics -- Some economists use the tools of economics to study the incentives for human behavior that are defined by the legal system. Property rights, for example, are essential for markets to work well but they can be defined in a variety of ways that have different effects on the well-being of people.

L. Industrial Organization -- IO is the study of individual markets, the nature of competition, and the role of prices. Some economists study issues in anti-trust policy. Others study the role of advertising, pricing policies, and how costs vary with the scale of operations. Some IO economists investigate particular industries such as appliances, software, and electricity. In the last decade a number of economists have studied economic issues in sports, recreation, and tourism.

M. Business Administration and Business Economics, Marketing, Accounting -- Business economists study decisions made by firms. How do firms maximize profit? What prices should they set and how much should they produce? What is the role of incentives within the firm, of entrepreneurship, and leadership?

N. Economic History -- Economic historians explore changes in economic well-being and how economic institutions have developed. The emergence of markets, the forces shaping the industrial revolution, the sources of improvements in agricultural productivity, the influence of railroads and other new technologies provide perspective on current economic issues.

O. Economic Development, Technical Change, and Growth -- Economists who are interested in the development of economies often focus on third world countries. Why have some countries developed while others have not? How might the industrialized countries improve the prospects for development around the world? Who gains and who loses with industrialization?

P. Economic Systems -- Analysts compare the capital market system to the various forms of socialism and the transition from centrally planned to more market-based economic systems. Economists sometimes address issues in specific countries like China, Cuba, and Poland.

Q. Agricultural and Natural Resource Economics, Environmental and Ecological Economics -- Economists study farming, fishery, and forests with a focus on prices, markets, and changing

technologies. Natural resource economists study markets for [energy](#) (oil, coal, and electricity) and mineral resources. Economists have played an important role in the evolution of policies to promote clean air, water, and land.

R. Urban, Rural, and Regional Economics -- Economists analyze the location decisions of households and firms and the associated issues in housing, [transportation](#), and local government.

S. Miscellaneous Categories -- Data, dissertations, and book reviews are classified here.

T. Other Special Topics -- Other special topics include the economics of the arts, religion, and culture.

II. The Major in Economics

A B.A. in Economics requires a minimum of **30** semester hours of courses in Economics beyond the introductory (100) level. Declaration of Economics as a Major involves filling out the form, have it signed by an advisor (any member of the Economics Department), and submitting it to the Registrar.

A. Gateway Courses

There are three gateway courses: Calculus, Economics 101 (Micro), and Economics 102 (Macro). Students must complete a basic calculus course prior to declaring the Economics major. Approved calculus courses include: Math 108, 111, or 131.

B. Foundational Courses

The core of foundational courses for the Major comprise the following required courses:

- ECON 303. Intermediate Microeconomic Theory (3 credits)
- ECON 304. Intermediate Macroeconomic Theory (3 credits)
- ECON 308. Econometrics (3 credits; ECON 307 is prerequisite)

C. Field Courses

Four electives or at least 12 semester credit hours are required at the 300 level or the 400 level.

D. Advanced Courses

Three courses or 9 semester hours must be taken in courses numbered 400 or above. *[The Department is currently preparing to institute a capstone/COLL 400 requirement culminating in a senior essay].*

E. Major Computing Requirement

- Econ 308. Econometrics (3 credits)

F. Major Writing Requirement

Check the latest version of the online Catalog on the Registrar's website for the list of economics courses that fulfill this requirement.

III. The Minor in Economics

A minor in Economics requires 15 semester hours of courses in Economics beyond the introductory (100) level. The 15 semester hours must include at least one Intermediate Economic Theory course (303 or 304) and at least 3 semester hours from the list of courses numbered 400 or above.

IV. An Explanation of the Curriculum

The Economics curriculum just outlined in terms of requirements and prerequisites was designed to give students both depth and breadth in economics. Students first see economics in Principles. This course is a broad survey and caters to a wide audience. It introduces students to the basic topics in economics. It will be the only economics course a majority of students will take. The level of analytical rigor is therefore designed to be one which challenges but does not overwhelm the average William & Mary student. The tools are provided by ECON 307 (or its equivalents) and ECON 308.

There are many 300 level courses that require only Principles as a prerequisite. These courses use the tools introduced in Principles while focusing on a particular sector of the economy or method of analysis. They include, among others, Money and Banking, the Economics of the Public Sector, Environmental Economics, Mathematical Economics, Economic History, Government Regulation of Business, Comparative Economics, and occasional courses taught by visiting faculty on a variety of special topics. These courses are designed to be accessible to students who have succeeded in Principles and who want to study a particular aspect of the economy in more depth, and for those students who would like more insight into the nature of the discipline in determining a major or minor.

Three of the 300-level courses – 303 (Intermediate Microeconomic Theory), 304 (Intermediate Macroeconomic Theory), and 307 (Principles and Methods of Statistics) – are different. The two Intermediate Economic Theory courses cover the same basic topics introduced in the corresponding Principles courses. The difference in these courses is the rigor of the analysis. The Intermediate Economic Theory courses are the place where the distinction between economics majors and students who have taken some economics is most obvious. In these courses we teach the kind of thinking that is required to do rigorous economic analysis. The Statistics course

introduces students to the process by which economic data are collected and analyzed and how these data are used to test hypotheses generated by economic models. These three courses, 303, 304 and 307, are essential to understanding economics in depth and are therefore required.

The 400 level courses in economics are designed to give students opportunities to apply the tools learned in the Intermediate Theory courses to specific areas or topics (Advanced Microeconomics and Macroeconomics, Advanced Econometrics, Labor Market Analysis, Law and Economics, Industrial Organization, International Trade and Finance, and Economic Development, among others). These courses differ from the 300 level courses, essentially in the analytical level of the discussion.

To summarize, a student who majors in Economics is exposed to the basic overview of economics in Principles, sees it again in a more rigorous and analytical way in the Intermediate Theory courses, and then, depending on the student's particular interests, will see many of the same concepts in greater detail in specialized 300 or 400 level courses. This repetition is by design. Most economics topics (e.g., inflation, discrimination in labor markets, pollution, and barriers to free trade) are very complex and can be discussed at several levels. It is important for citizens, i.e., Principles students who will not major, to understand economic thinking behind these topics. This gets us through the topics once.

Economics majors need to understand more completely the structure and rationale for models that can be used to analyze economic phenomena. This process will take us through several topics again in more depth. Somewhere along the way the economics major should have developed an interest in particular topics. In the specialized courses students will see some topics for the third time. Finally, we hope that a particular aspect of some problem will fascinate a student enough that she or he will choose to pursue an honors project or independent study project.

Recommended Timing of Courses

The requirement that at least nine semester hours must be taken in courses numbered 400 or above, combined with the fact that all 400 level courses have a prerequisite of at least one course in Intermediate Economic Theory (ECON 303 and/or 304), means that the Intermediate Economic Theory courses cannot be put off until the final semester. Putting these courses off until the fall of the senior year is also strongly discouraged. Here is the recommended timing of courses includes:

- (1) Principles of Economics in the freshman or sophomore years,
- (2) One of the two Intermediate Economic Theory courses in each of the next two semesters,
- (3) Statistics and econometrics during the sophomore year or no later than the first semester of the junior year.

The rationale for these recommendations is that the Intermediate Theory courses and the Statistics course provide students with the tools required to perform economic analysis. Students who delay taking the Intermediate Theory courses will not only find the 400 level courses unavailable but they will find any other economics classes more difficult. The Intermediate Theory courses provide the foundations of economic analysis that are used in all the other courses.

Economics 308 (Econometrics) is one of the most important courses that a student majoring in economics is required to take. This course is essential for those intending to pursue graduate work in economics, business, or any public policy related program, and is strongly recommended for students who intend to use their undergraduate economics degree in their first job. The course provides the background for empirical work with useful tools for independent research and Honors projects. In addition, it is helpful in reading the literature for many courses. For these reasons we believe that it is important that students take Statistics (a prerequisite for 308) during the sophomore year or no later than first semester of the junior year.

In general we recommend that students attempt to spread their economics training throughout their undergraduate years in such a way that they have no more than three economics courses in any given semester. Students who are late converts to economics may find this difficult, and exceptions to this guideline have been common in the past.

Concentrations within Economics

The Department does not have formally identified clusters of coherent courses that define a concentration. We leave this course planning to advisors and students to discuss at the time of declaration and subsequently. However, there are fairly well-established areas of concentrations that students may consider: international economics, econometrics, financial economics, institutional economics, public economics, labor and human resources economics, industrial economics, and health and industrial economics.

Mathematics and Economics

Economic theories can often be expressed most effectively using formal mathematics, and graduate school in Economics requires a considerable investment in formal mathematics training. Undergraduate Economics training can be presented with varying amounts of mathematical sophistication. The undergraduate curriculum at William & Mary is designed to accommodate both students who are comfortable with formal mathematics and those who are not. It is impossible to teach economics without using algebra, and we will assume that all students at William & Mary know basic algebra. Beyond that, exposure to formal mathematics, particularly calculus, is at the discretion of the student.

We do strongly encourage students, particularly those potentially interested in graduate training in economics, but including those who might want to go on to graduate programs in Public Policy, Business, or Urban Planning, to consider taking more mathematics as undergraduates. For graduate school in economics, Mathematics 111 and 112 (Calculus), Mathematics 211 (Linear Algebra), and Mathematics 212 (Multivariate Calculus) are essential background. Students who seek graduate training at the best schools should include more than this in their mathematics training. Mathematics is essentially a very precise language, and many advanced economic theories are best expressed using this language.

The final thing we should say about mathematics is that Economics 307 (Statistics) is essentially an applied mathematics course designed specifically for the economics major. Understanding the way data are used to test economic theories requires one to understand basic probability theory and to know the details of some commonly encountered probability

distributions. Some of the topics are covered in courses in the mathematics department, but they are not covered with a view toward their application to economics. As taught by the economics department, the statistics course only uses algebra as the common requirement, but more mathematics generally aids the understanding of the material.

In sum, we strongly recommend, but do not require, economics majors to take mathematics at least through basic calculus.

Internships

Economics majors occasionally pursue internships during the school year, but it is much more common during the summer. The Office of Career Services can help you find an internship. Academic credit is granted for internships only if such credit is a requirement for the internship. If the employer requires you to get academic credit, bring documentation of this requirement to the Chair of the Economics Department. The Chair will then give you permission to enroll in ECON 398, a one-credit, pass-fail course either during the semester you participate in the internship (for academic year internships) or the semester immediately following your internship (for summer internship). You may also want to complete an independent study project related to your internship. The requirements to do an independent study (ECON 490) are explained below.

Independent Study

Economics majors may want to study topics in economics that are not offered by the department or to conduct independent research on an economic topic. Students who have completed ECON 303 and ECON 304 may design an independent study course to accommodate these interests. Independent studies are normally 3-credit courses, but can be designed from 1 to 4 credits, depending on the workload associated with the course. In general, a 3 credit independent study should include significant written output, i.e., one paper in the 15 to 20-page range, or a series of shorter papers. Courses with lower requirements, e.g., a single 10-page paper, should receive fewer credits.

All independent study courses must have a faculty advisor. Prior to providing permission for a student to register for an independent study, the student must submit a brief proposal to the advisor that delineates the purpose of the course (area of study), the general format of the course (e.g., weekly email exchanges, biweekly meetings in person, etc.), the final output of the course (e.g., 15 page research paper, 20 page literature review, oral presentation, etc.), dates for any interim outputs (drafts, etc.), and the number of credits. The faculty advisor must sign this proposal and submit it to the department chair. In addition, the student and the faculty member should have a clear understanding of the grading policy, although this does not need to be included in the written proposal.

No more than one independent study course may be taken in any one semester and no more than 6 independent study credits may be counted toward the economics major.

Guidelines for Honors in Economics

A. The Program and Eligibility Requirements

The Honors Program provides a special opportunity through independent study for the intellectual stimulation and development of superior students. Students are encouraged to explore possible topics in the junior year. The best way to do this is to discuss potential areas of interest or specific topics with individual faculty members. We strongly recommend that the student and supervising faculty member agree on a topic before the student leaves for the summer. The student should develop the proposal and do much of the basic reading within that time frame.

Eligibility for the economics honors program is contingent upon: 1) a minimum 3.2 cumulative grade point average, or a minimum 3.2 grade point average for the junior year; 2) a 3.5 cumulative grade point average in economics or special permission of the Economics Honors Committee. (All averages are computed at the end of the junior year.) A student will be accepted to candidacy when the following two conditions are met: 1) his/her eligibility is certified by the Dean of the Faculty of Arts and Sciences and the Registrar's Office; 2) his/her written thesis or project proposal is accepted by the Economics Honors Committee. **The written project description must be submitted to the Committee no later than the end of the first week of the first semester of the senior year.** This is the reason that we strongly recommend using the junior year to map out the thesis proposal and to coordinate the work proposal with the faculty advisor. The proposal should include specific and detailed discussion of the project's purpose, references to related studies, and the expected methodology. Proposals are normally three to five pages in length.

B. Grading

Honors projects (usually honors theses) are judged by an examining committee of not less than three faculty members, including the student's thesis adviser, one other member of the Economics Department, and one faculty member from another department. The designation Honors indicates excellent work that fully-meets departmental expectations (and carries the grade "A" for Economics 495 and 496). Honors projects that do not merit the designation Honors, but which represent substantial work on the part of the student will be awarded credit for an independent study (Economics 490).

C. Technical Specifications

After acceptance into the departmental honors program, the honors student should receive a memorandum from the College Archivist that contains specifications for the thesis (margins, title page, print and illustration standards, etc.). If the student does not receive this by the end of the first semester, he or she should request a copy from the College Archivist. One copy of the Honors thesis is deposited with the Economics department.

V. Other Matters

Ties to the Public Policy Program

The Thomas Jefferson Program in Public Policy has various opportunities for majors in economics.

Enrollment in Graduate Public Policy Courses

First, undergraduate Economics majors may take some graduate field courses offered by the Public Policy Program. While the Economics Department generally does not allow graduate students to take undergraduate courses for graduate credit, it encourages selected undergraduates to take advantage of the existence of the graduate program. Included in this handbook is a description of the courses in which undergraduates might have some interest. All of them require that the student speak to the instructor before enrolling. Enrollment in these courses will count as 400-level economics courses toward satisfying the undergraduate concentration in Economics.

Five-Year Accelerated Master of Public Policy Degree Path

Students may apply to participate in the Five-Year Accelerated Master of Public Policy Degree Path in the spring of their junior year. This Accelerated Path allows students to earn both a Bachelor's degree and a Master of Public Policy degree in a total of five years of coursework. Students who are accepted into this program undertake a collaborative research project with a faculty supervisor in the summer following the junior year. During their fourth (senior) year, students take a combination of undergraduate classes to complete their Economics degree and graduate classes in Public Policy. In their fifth year, students complete their Master's coursework. More information on this program is available from the Public Policy Department's website.

Contests, Honor Societies, Awards, and Scholarships

Seniors who pursue graduate school are encouraged to apply for a National Science Foundation Graduate Research Fellowship. The NSF awards Graduate Fellowships and has special programs for minorities and women. The NSF provides three-year graduate fellowships for study and research leading to masters or doctoral degrees in science (including social sciences), mathematics, and engineering. For information and application materials please use the NSF website at <http://www.nsf.gov/home/grant.htm>.

The Carnegie Endowment for International Peace is an educational organization in Washington, D.C. that conducts programs of research, discussion, publication, and education in international relations and U.S. foreign policy. Each year the Endowment offers up to ten one-year fellowships to uniquely qualified graduating seniors. They are selected from a pool of nominees from close to 200 colleges. Carnegie Junior Fellows work as research assistants to the Endowment's senior associates. No one who has started graduate studies will be considered. For additional information contact the Charles Center in Tucker Hall, 221-2460.

Other scholarship opportunities are available to Economics majors from Economics Department itself. These merit-based, need-based, or research-based will be advertised in the student listervs and the winners are available from our website.

VI. Careers that Follow the Economics Baccalaureate

Economics majors are successful in a wide variety of careers. Although various roles in businesses are most common, economics majors are successful in law, medicine, government, non-profits, and international relations, as well as in academic roles.

Career Earnings

One way to think about career opportunities is to consider the level of earnings typically found with different levels and kinds of education in different careers.

The Corporate World & the MBA

Most economics majors pursue employment in the private sector. Graduates in economics succeed in many occupations. Some students plan to earn a Master of Business Administration (MBA) degree in time. Others find employment with the BA is sufficient to fulfill their aspirations.

Economic Consulting

Some economists with BA degrees find employment as research associates with economic consulting firms. Consultants advise firms on business strategies, prepare economic evidence for court cases, and develop analyses to influence public policy.

Law and Other Professions

Law school is also a common destination for recent graduates in economics. The careful reasoning in economics is a good fit for law and many careers in the law influence significant economic decisions for firms.

Government and Not-for-profits

Some students enter government service or choose jobs with non-profit entities. Governments at every level hire economists for their facility with statistics and analysis.

Professors, Teachers and Researchers of Economics

Some graduates in economics are interested in academic careers. They are drawn by the love of the study of economics and the prospect of teaching and writing about economics as a career.

The Department of Economics at the University of Wisconsin provides a [list of websites](#) for searching for jobs and internships.

Career Earnings

The statistics on employment and earnings vary by year and source. In 2010, the average starting salaries of new college graduates with economics majors were somewhat below that of engineers, compared well with business graduates, and exceeded that of other social sciences.

Table 1: Average Starting Salary Offers to Inexperienced Bachelor's Degree Recipients by Curriculum, Summer 2010

Baccalaureate Curriculum	Salary
Chemical Engineering	\$64,889
Computer Science	\$60,473
Electrical Engineering	\$59,512
Information Sciences	\$52,530
Civil Engineering	\$51,321
Economics	\$51,698
Finance	\$49,160
Accounting	\$48,378
Business Administration/Management	\$43,991
Chemistry	\$43,961
Marketing	\$41,670
English	\$35,946
History	\$38,731
Sociology	\$35,357
Psychology	\$32,260

Source: Nathan E. Bell, Nicole M. Di Fabio, and Lisa M. Frehill, "Salaries of Scientists, Engineers and Technicians: A Summary of Salary Surveys." The Commission on Professionals in Science and Technology (CPST: Washington, DC 2007) selected curricula from page 8.

Table 2: Median earnings of economists by highest level of degree for persons of all ages observed in 2010 are given in the table below by gender.

Highest Degree	Men	Women
BA	\$42,000	\$38,000
MA	\$38,000	\$45,000
PhD	\$100,500	\$90,000

Source: National Survey of Recent College Graduates

Information about lifetime earnings associated with different education programs comes from surveys that follow the same people over many years. A first wave of questions might come in college to gather details about major and background. A second wave might come a few years after college to collect information about post baccalaureate studies and first jobs. Third and fourth waves come a decade and more later to track earnings later in life. The Bureau of Labor Statistics and other groups conduct national surveys of this kind every decade or so. Although the most recent survey is a decade old, it shows that economics majors with the BA continue to compare well with other majors at mid-career. [Daniel E. Hecker, "Earnings of College Graduates: Women Compared with Men," *Monthly Labor Review*, 121 #3, March 1998, pp. 62-71].

Mid-Career Earnings

The PayScale, Inc. College Salary Report shows that selecting your major can have an even bigger impact on future earnings than choice of school. Graduates with the economics major show median starting salaries less than engineers but have a higher growth rate to mid-career. Evidently, students who are attracted to the economics major and the skills learned are associated with significant earnings potentials.

Table 3: Starting and Mid-career Salaries by Major, 2016-17

Undergraduate Major	Starting Median Salary	Mid-Career Median Salary
Accounting	\$48,300	\$77,200
Business Management	\$45,800	\$72,300
Economics	\$53,900	\$100,000
Finance	\$53,300	\$89,600
History	\$42,200	\$73,600
Industrial Engineering	\$63,800	\$104,000
Information Technology (IT)	\$52,800	\$87,100
International Relations	\$46,500	\$86,400
Management Information Systems (MIS)	\$58,100	\$97,400
Marketing	\$45,300	\$82,500
Math	\$54,000	\$95,700
Mechanical Engineering	\$63,500	\$103,000
Political Science	\$44,300	\$79,900
Psychology	\$38,300	\$62,100
	\$40,400	\$62,300
Sociology		

Source: PayScale Salary Report,
2016-17.

Career Earnings

The U.S. Bureau of Labor Statistics, Occupational Outlook Handbook (online in 2014) reports annual wages for economists can expect to earn in different fields in 2012 in the course of their career.

Table 4: Median Annual Wages for Economists in May 2012 in the Top Five Industries Employing Economists

Industry	Annual Wage
Finance and insurance	\$110,580
Federal government, excluding postal service	\$106,850
Scientific research and development services	\$94,630
Management, scientific, and technical consulting services	\$91,570
State and local government, excluding education and hospitals	\$63,880

Source: Bureau of Labor Statistics, U.S. Department of Labor, [Occupational Outlook Handbook, 2013-14 Edition](#), Economists. (Visited July 8, 2014).

Corporate World & the MBA

Although the economics major does not provide training for specific occupations, it provides the logical structure that pays off in understanding the big picture, the context for entering several fields in the corporate world. Its emphasis on logical thought and problem solving skills has universal value. Many employers seek to hire graduates with these skills.

Some students aspire to earn Master of Business Administration (MBA) degrees, typically expecting to complete a two-year program in a graduate business school. Leading MBA programs expect applicants to have had several years of significant business experience before enrolling. The average age of students entering top MBA programs is 27 years. [Business Week](#) provides an online guide to MBA programs as does [Peterson's](#) and a number of others.

The better MBA programs give some preference in admission to applicants with technical backgrounds including engineering, physics & math, and economics. Some areas of study in business like finance use a significant amount of mathematics. Undergraduate study in business then is not a primary or even necessarily a desirable path to an MBA. Of course, people who have developed their own successful businesses or enjoyed considerable success in other ways also tend to be attractive to MBA recruiters. The schools value success in many forms.

Students intent on careers as managers often seek a strong, general education. They want to learn effective communication skills, to develop habits of logical thought, and to practice their problem solving skills. Many undergraduate programs do this well; economics is often particularly effective.

In addition to careers as general managers and entrepreneurs, economics majors often pursue careers in specific occupations common to the corporate world. Economics majors with the BA degree find jobs in the financial world, in marketing, and consulting. Some pursue one-year post baccalaureate programs for entry into a target career. The Master of Accountancy (MAc), for example, will launch an accounting career and go a long way toward completion of requirements for the Certified Public Accountant title.

Students who have a specific occupational goal will often do well in enrolling in a training program specific for that occupation. For example, accounting majors readily get jobs as accountants on completing a BA. Finance majors have a good chance of being employed as financial analysts or budget officers. The broader horizons of the economics major are certainly not for everyone.

Economic Consulting

Economics graduates with good analytic and communication skills find employment with consulting firms. McKinsey & Company, BCG, Booz Allen Hamilton, Deloitte, KPMG, Boston Consulting Group, Bain & Company, Accenture, Charles Rivers Associates, Mathematica Policy Research, and NERA Economic Consulting are examples. Analysts with consulting firms often work with data, develop models of specific markets, and provide testimony in public hearings and in lawsuits. Many graduates find that a few years of experience with a consulting firm is a good lead into an MBA, law program, or graduate study in economics. Many consulting firms invite application for employment through their websites.

Law and Other Professions

The economics major is one of many common paths to law school. The [Law School Admission Council](#) provides the official guide to law schools for the American Bar Association. The Guide emphasizes extensive reading and library research, skill in synthesizing large amounts of information, and logical thinking. In addition to general skills, the Guide points to breadth of knowledge of history, politics, finance, human behavior, and diverse cultures.

Many careers in law involve shaping economic decisions. Writing and interpreting contracts, supporting mergers and acquisitions, dealing with the tax system, addressing disputes of workers, landlords, and vendors; all involve decisions with significant economic content and implications. A recent analysis of scores on the LSAT test for law school admission reported for students who apply to at least one ABA accredited law school shows economic majors earned relatively high mean LSAT scores.

Government and Not-for-profits

Governments at every level hire economists to manage and evaluate their operations. The [Office of Personnel Management](#) (OPM) of the Federal government provides information about Federal employment opportunities. Their [USAJobs site](#) lists thousands of openings of all kinds in many locations across the country. Search on "economist" to find information about specific current opportunities. There are often openings for economists with BA, MA, and PhD degrees.

The OPM website also gives general information about [Federal pay scales](#). BA economists with little experience are (to simplify a bit) at grade GS-7, with MAs at GS-9, and PhDs at GS-15. Although pay does differ with the cost of living in different locations, BA economists started at \$33,979 or above in 2010.

The [Federal Reserve Board](#) and its affiliated regional Federal Reserve Banks also hire economists and research assistants at various levels of education. Skill with statistics and in managing data will be helpful for many entry jobs.

Economists are valued in the Foreign Service and civil service in the [State Department](#), and as analysts with the [Central Intelligence Agency](#).

State governments have similar websites that list public service jobs with pay scales and application procedures. Searching the Internet for "state employment" will usually yield an appropriate link.

International agencies of many kinds hire economists for a variety of roles. Additional languages, strong communication skills, experience with diverse cultures, and statistical skills are often important. The [World Bank](#), for example, offers jobs for economists. The Bank has an internship program as well.

One way to learn about employment with non-profits is to go to the [Idealist website](#) and look for roles in economic development or other areas of interest.

Professors, Teachers and Researchers of Economics

The Doctor of Philosophy degree (PhD) in economics is necessary for a faculty position in economics at most four-year colleges in the US. An M.A. degree is the typical credential for faculty at two-year colleges. Although some students complete masters programs before entering PhD programs, many go directly from BA programs into PhD programs. Completion of a PhD requires about six years of full-time study. See the AEA website for information about [graduate study](#). Holders of the PhD. often choose research careers outside of academics, including roles at the Federal Reserve, international agencies, and government policy and evaluation departments as well as in private banks, investment houses, and other for-profit ventures

There are about 100 universities in the US who together produce about 1,000 new PhDs each year. About half of the graduates are US citizens and the other half come from abroad. [John J. Siegfried and Wendy A. Stock, "The Undergraduate Origins of Ph. D. Economists," *Working Paper*, May 2006] Although the number of economics majors has grown significantly over the decades, the number of new PhDs who intend to pursue careers in the US has declined. As a consequence, employment opportunities for PhD economists in academia should be excellent in the decades ahead.

According to a Survey of the Labor Market for New Ph.D. Hires in Economics by the Center for Business and Economic Research and the Department of Economics at the University of Arkansas, the following market conditions exist in Economics in 2016. Starting salary in typical research universities in Economics: Assistant Professor = \$114,000, Associate Professor = \$160,000, and Full Professor = \$235,000.

A number of for-profit and not-for-profit enterprises hire research economists as do many government and international agencies. [The National Association of Business Economics](#) provides information about business careers for economists. The career sites for government and not-for-profits mentioned above also point to opportunities for researchers.

Current job openings for economists in academia and with some other employers appear in [JOE, Job Openings in Economics](#). Most of the jobs listed in JOE require [graduate study](#) in economics. <http://www.vanderbilt.edu/AEA/students/Careers.htm>.

===== END =====