



EMORY
COLLEGE
OF ARTS AND
SCIENCES

**Department
of Economics**

Department of Economics

Master of Science in Economics Program Handbook

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Pending Approval

Table of Contents

Introduction	1
Admission Requirements	2
Curriculum	3
1. Foundation courses to be taken in summer:	3
2. Four required courses to be taken in Fall/Spring semesters:	3
3. Two elective courses to be taken in Fall/Spring semesters:	3
Summary of program pathway	4
Academic Progress, Conduct, Honor Code, Grievance	4
Course descriptions	5

Introduction

The Master of Science (MS) program in economics is designed to equip the students with highly sought-after quantitative skills and analysis-based knowledge of economics. The goal of the program is to train students in (i) critical thinking, (ii) quantitative skills relevant for economics, and (iii) a deep understanding of important economic issues and the corresponding policy solutions. These in-demand skills equip the students with a good grasp of techniques to examine contemporary social, business, and policy issues.

Economists have been advancing the frontiers of statistical analytics, econometrics analysis, and quantitative modeling of all sorts of social phenomenon. This long-held empirical tradition has persuaded many data-driven high-tech companies to hire large numbers of economists to tackle their big-data issues. The convergence of large data and the statistical/econometric skills that economists bring to the table allows exploration of important policy questions with a fundamentally analytical approach. Our program will train students to understand such work and to implement its tools to examine other important policy issues.

This handbook serves as the official guide to the Master of Science program in economics at Emory University. It complements the Laney Graduate School (LGS) Handbook, which contains graduate degree requirements and graduate school policies. The handbooks are modified occasionally to account for policy changes. Before consulting this manual, students should be certain that they have the latest version (dated by academic year). If unsure about some policy or rule, students should consult with the MS Program Coordinator or the MS Program Director.

Admission Requirements

Applicants to the Master of Science in Economics degree program must have earned an undergraduate Bachelor's degree at an accredited institution by the time they enroll in the MS program. Students currently enrolled in undergraduate coursework who anticipate graduating by the time the MS program begins may apply.

Applicants must have achieved a minimum cumulative grade point average of at least 3.0 on a 4.0 scale. A GPA of at least 3.5 is preferred. An undergraduate major in economics is not required, however, we require applicants to have completed the following foundational courses:

- Calculus (derivatives and integrals)
- Principles of Microeconomics
- Intermediate Microeconomics
- Principles of Macroeconomics
- Intermediate Microeconomics
- Probability & Statistics or Mathematical Statistics
- Econometrics
- Two upper division economics elective courses

Competitive applicants will also have some experience in Python, R, or Stata

The application materials will consist of a transcript, resume, personal statement, and 2 letters of recommendation. Submission of GRE scores is optional.

International students' applications must include one of the three proofs of English language proficiency:

- IELTS exam score (minimum of 7)
- TOEFL exam score (minimum of 100)
- Undergraduate degree from a school where English is the official language of instruction.

Curriculum

All required and elective courses that satisfy the requirements of the MS program must be taken for a letter grade.

1. Foundation courses to be taken in summer:

- Econ 725 (3 credits): Computer Programming & Data Management in Economics
- Econ 520 (3 credits): Data Sciences for Economics
- Econ 526 (3 credits): Quantitative Methods I

2. Four required courses to be taken in Fall/Spring semesters:

- Econ 521 (4 credits): Econometrics of Policy-Analysis & Causal Inference
- Econ 522 (4 credits): Forecasting and Macroeconomic Analytics
- Econ 524 (4 credits): Big Data Econometrics
- Econ 540 (3 credits): Empirical Writing and Communication

3. Two elective courses to be taken in Fall/Spring semesters:

- Econ 541 (3 credits): Pricing and Revenue Management
- Econ 542 (3 credits): Transfer Pricing
- Econ 543 (3 credits): Cost-Benefit Analysis
- Econ 544 (3 credits): Internet Economics

Courses currently not offered but anticipated to be offered in the future:

- *Econ 570 (3 credits): Health Economics I*
- *Econ 571 (3 credits): Health Economics II*
- *Econ 511 (3 hours), Macro, Business Cycles, and Monetary Economics*
- *Econ 523 (3 credits): Financial Econometrics*
- *Econ 533 (3 credits): Financial Markets*

Graduation requirements:

1. Successful completion of the 7 required courses and 2 electives (30 credits)
2. Minimum cumulative 2.7 GPA.

Summary of program pathway

<p>On-line summer session 1 (Typically mid-May to end of June):</p> <p>Students take one required course on-line:</p> <p>Econ 725 Computer Programming & Data Management in Economics</p>	3 credits
<p>In-person summer session 2 (Typically early July – mid August):</p> <p>Students take two required courses in-person:</p> <p>Econ 520 Data Sciences for Economics</p> <p>Econ 526 Quantitative Methods</p>	3 credits 3 credits
<p>Fall semester:</p> <p>Students take three of the four required courses:</p> <p>Econ 521 Econometrics of Policy-Analysis & Causal Inference</p> <p>Econ 522 Forecasting and Macroeconomic Analytics</p> <p>Econ 524 Big Data Econometrics</p> <p>Econ 540 Empirical Writing & Communication</p>	4 credits 4 credits 4 credits 3 credits
<p>Spring semester:</p> <p>Students take remaining required course</p> <p>Students choose two electives:</p> <p>Econ 541 Pricing and Revenue Management</p> <p>Econ 542 Transfer Pricing</p> <p>Econ 543 Cost-Benefit Analysis</p> <p>Econ 544 Internet Economics</p>	3/4 credits 3 credits 3 credits 3 credits

Academic Progress, Conduct, Honor Code, Grievance

The LGS sets standards for academic progress for all students in graduate programs at Emory, as outlined in the LGS handbook at <https://www.gs.emory.edu/academics/policies-progress/index.html>. We refer students to the LGS handbook for details.

Course descriptions

Econ 526 Quantitative Methods I: The objective of the course is to cover the mathematical methods and tools that are used in modern economic analyses. These include the methods used in static as well as dynamic analyses. The materials covered include multivariate and integral calculus, matrix algebra, and difference and differential equations, with applications. Pre-requisite(s): Permission of the MS Program Director.

Econ 725 Computer Programming & Data Management in Economics: This is a programming and data management course with a central focus on data manipulation for economic analysis. In this course students will learn how to access and manipulate data from IPUMS and the World Bank. Previous knowledge of Python is used to conduct basic data manipulations, exploratory data analysis, and formal statistical inference. These tasks will be performed using more advanced tools and then replicated in other widely used data analysis software: Python and STATA. Students will also learn the basics of SQL and Tableau for data manipulation and visualization. As part of this course, students will have a data analysis challenge manipulating and analyzing data using at least two of the software programs used in the course. The final work is presented to class. Pre-requisite(s): Permission of the MS Program Director.

Econ 520 Data Sciences for Economics: The first part of the course focuses on the necessary background material such as statistics, probability, linear algebra and some calculus to understand machine learning. This part is not a traditional 'paper-and-pencil' type of introductory statistics courses you can take elsewhere that covers theoretical concepts and techniques, but fails to include much programming and data analysis, which are at the heart of data science. Therefore, the emphasis of this course will be placed on combining programming techniques (such as parallelization) and statistical concepts simultaneously through the analysis of real-life data sets taken from various sources. The second part of the course uses knowledge of the first part to explain the two major approaches of machine learning techniques; generative methods and discriminative methods. Pre-requisite(s): Econ 526 and Econ 725.

Econ 521 Econometrics of Policy-Analysis & Causal-Inference: This is an applied microeconometrics course with a central focus on causal inference and empirical analysis of policy impact. As part of this course, the students will complete an empirical research project using raw data and employ econometric methods to analyze a research question relevant to contemporary microeconomic policies and present the results in class. The content of the course is split into two general areas: 1) acquisition, compilation, and management of real-world panel data; and 2) empirical methods in program evaluation and causal inference. Each area of the course will be covered by way of posing a research question. At the end, the students will be able to organize project files, clean and manage real-world datasets in Python, implement selected methods for causal inference using real-world data, explain research results with a written report and presentation. Pre-requisite(s): Econ 520, 526, and 725 or permission of the MS Program Director.

Econ 522 Forecasting and Macroeconomic Analytics: The course is intended to fulfill two needs: (1) introduce students to the tools to analyze time series data in an univariate and multivariate framework (2) to provide students with applied interests with the most sophisticated and up to date techniques used in empirical time series analysis and forecasting. The empirical relevance of every model will be emphasized while also maintaining a theoretical rigor. Computer exercises will help in keeping the class relevant. The importance of forecasting in macroeconomics research conducted at private and public sectors will be discussed. Pre-requisite(s): Econ 520, 526, and 725 or permission of the MS Program Director.

Econ 524 Big Data Econometrics: This course is intended for students who have completed Econ 520 or approved equivalent. It aims to provide modern skills in analyzing data and discover potential relations and associations. Modern methods of data sciences and computing techniques are introduced. Data analysis is placed on a sound basis with understanding of the algorithms and their meaning. This course will cover the key concepts of machine learning, including classification, regression analysis, clustering, and dimensionality reduction. These topics are intended to provide the students with modern skills for robust model discovery and latest advances in prediction with examples from economics, predictive text searches, market research, algorithmic financial decision making, and health sciences. Pre-requisite(s): Econ 520, 526, and 725 or permission of the MS Program Director.

Econ 540 Empirical Writing and Communication: This course is designed to teach students methods for effective communication of empirical results. Students will become proficient in interpreting, organizing, displaying, and writing results of quantitative research. Students will learn techniques for writing an academic paper. Students will also learn how to summarize and present empirical results for different audiences. We will explore methods for communication to academics, policy makers, industry leaders, and the mass media. As part of this course, students will also learn some professionalization skills including resume writing and interview skills. Pre-requisite(s): Permission of the MS Program Director.

Econ 541 Pricing and Revenue Management: This course covers many pricing tools as well as techniques for selling goods and services under capacity constraints with advance booking, refunds, and overbooking. Applications will be drawn from a variety of industries, including soft drink manufacturing, grocery stores, Internet content providers, cable TV operators, airlines, hotels, phone operators, concert halls, movie theaters, and electricity and gas companies. A part of the assessment will be based on case study analyses. The main objective of the course is to equip students with the knowledge in pricing and revenue management strategy necessary for working as a business or academic economist, operations researcher, marketing scientist, pricing manager, or an economic consultant. Pre-requisite(s): Econ 521, 522, and 724 or permission of the MS Program Director.

Econ 542 Transfer Pricing: This course will introduce students to the economics of transfer pricing. Transfer pricing involves finding reliable intercompany pricing in situations where free markets do not exist and accounts for over half of all international trade. Given the extent of globalization in the current business environment, multinational enterprises must address

transfer pricing issues on a day-to-day basis. Taxing authorities throughout the world have instituted transfer pricing legislation to claim their “fair share” of profits from the multinational enterprises’ global income. As a result, this field has attracted significant attention from policy makers and businesses. Pre-requisite(s): Econ 521, 522, and 724 or permission of the MS Program Director.

Econ 543 Cost-Benefit Analysis: The objective of this course is to introduce students to how economic theory can be used to make cost-benefit analysis for business planning by firms, for decision making by consumers, for regulatory practices by agencies, and for policy formulation by the legislature. Such analyses serve as decision rule for selecting policies for maximizing economic efficiency or assessing economic efficiency when it is used as only one of the goals relevant to policy choice. The richness of the methodology for both public and private sector decision making is demonstrated with many examples and case studies, emphasizing practical applications and correct use of analytical tools. Pre-requisite(s): Econ 521, 522, and 724 or permission of the MS Program Director.

Econ 544 Internet Economics: There is no doubt that the Internet will play an increasingly bigger role in society and the economy. This course introduces various fundamental ideas and theories in economics that can help us understand online businesses better and more deeply. We will mainly cover several foundational theories, including search, two-sided markets, matching, and auctions. We will also discuss some contemporaneous topics, such as recommendation and ratings systems, net neutrality, and cryptocurrencies. Pre-requisite(s): Econ 521, 522, and 724 or permission of the MS Program Director.

Future courses (not currently offered):

Econ 570 Health Economics I: (The Economics of Health Behaviors and Policy). This course is designed to introduce master's level students in economics to the field of Health Economics. The provision of health care and the production of health have different institutional properties and incentives than other consumer goods, making health-related markets unique topics for study. This course will focus on the demand-side of health, emphasizing the difference between health as an outcome and medical care as one of many inputs into the production of health. Health economics concepts will be linked to current policy debates at the state and federal levels. Students will apply empirical techniques to research questions in health economics, with a focus on policy analysis. Discussion of the relevance and limits of the economics approach to analyzing public health issues will be encouraged. Pre-requisite(s): Econ 521, 522, and 724 or permission of the MS Program Director.

Econ 571 Health Economics II: (The Economics of Health Care Markets). This course explores the industrial organization of health care markets in the U.S. We will focus on the following areas: hospital production and competition, information asymmetries, vertical integration between physicians and hospitals, insurance markets (including adverse selection and managed competition), and finally issues of insurer and hospital bargaining. The class is effectively designed as an empirical IO course with applications to health care. As such, we will also examine several econometric tools used in the literature, including production function estimation and demand estimation, as well as common empirical methods of causal inference. Pre-requisite(s): Econ 521, 522, and 724 or permission of the MS Program Director.

Econ 511 (3 hours), Macro, Business Cycles, and Monetary Economics: The objective of the course is to introduce several basic modeling frameworks for analyzing monetary economics and to apply those frameworks to analyze real-world events related to monetary policy. We will focus on not only the economics of monetary theory but also the institutional details of central banks and monetary policy implementation. Students should develop habits of following economic news about central bank policy directions. The course presumes knowledge of computer programming, econometrics, and forecasting. Pre-requisite(s): Econ 521, 522, and 724 or permission of the MS Director.

Econ 523 (3 hours), Financial Econometrics: The objective of the course is to provide a comprehensive and systematic account of financial econometric models and their application to modeling and prediction of financial time series data. The goals are to learn basic characteristics of financial data, understand the application of financial econometric models, and gain experience in analyzing financial time series. The course begins with some basic characteristics of financial time series data. The main part focuses on analysis and application of univariate financial time series. The final part of the course introduces Bayesian inference in finance via MCMC methods. Pre-requisite(s): Econ 521, 522, and 724 or permission of the MS Director.

Econ 533 (3 hours), Financial Markets: *The objective of the course is to learn all you want to know about trading mechanisms in financial markets. We will explore the economic principles underlying such trading, and we will learn about the financial institutions that have arisen in various places around the world (with an emphasis on U.S. markets and regulations). Traders and market makers face a range of costs: bid-ask spreads, commissions, quotas, time delays, inventory holding, information asymmetries, collusion, and so on. We will investigate these frictions and costs and how they are affected by the mechanisms by which securities trade and by the regulations implemented by governments and exchanges. We will examine various measures of market liquidity and trading costs and study the strategic interaction among traders. Pre-requisite(s): Econ 521, 522, and 724 or permission of the MS Director.*