



**EMORY**  
**COLLEGE**  
OF ARTS AND  
SCIENCES

**Department  
of Economics**

# Master of Science in Economics Program Handbook

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**Pending Approval**

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# General Program Information

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.

## Program Leadership and Contact Information

Faculty Program Director:	Sara Markowitz, PhD. Winship Distinguished Research Professor Email: <a href="mailto:sara.markowitz@emory.edu">sara.markowitz@emory.edu</a> Phone: 404-712-8167
Staff Program Coordinator:	Tracie Hinnant Email: <a href="mailto:tlhinna@emory.edu">tlhinna@emory.edu</a> Phone: 404-727-2490

## Program Learning Goals

Our curriculum combines economic theory, quantitative methods, econometrics, and data analytics. We call it “Econolytics.” Your education will prepare you for jobs that combine economic reasoning with cutting-edge empirical methods and data analytics.

## **CIP Classification**

45.0603: Econometrics and Quantitative Economics: A program that focuses on the systematic study of mathematical and statistical analysis of economic phenomena and problems. Includes instruction in economic statistics, optimization theory, cost/benefit analysis, price theory, economic modeling, and economic forecasting and evaluation.

## **Admissions 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 Macroeconomics
- Probability & Statistics or Mathematical Statistics
- Econometrics
- Two upper division economics elective courses

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

## **Application Process**

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

### Degree Requirements

All required and elective Emory courses that satisfy the requirements of the MS program must be taken for a letter grade. Other classes may substitute for required or elective classes with approval from the program director.

#### Required courses:

- Econ 520 or Equivalent (3 credits): Data Sciences for Economics
- 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 525 (3 credits): Data Management and Visualization in Economics
- Econ 526 (3 credits): Quantitative Methods I
- Econ 540 (3 credits): Communicating and Writing Economic Analyses

**Elective courses.** Choose 6 credits of electives among the following courses:

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

#### 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><b>On-line summer session (Typically early July – mid August)</b></p> <p>Students take one required course on-line:</p> <p>Econ 520 Data Sciences for Economics</p>	3 credits
<p><b>In-person Fall semester</b></p> <p>Students take four required courses in-person:</p> <p>Econ 526 Quantitative Methods I</p> <p>Econ 521 Econometrics of Policy Analysis &amp; Causal Inference</p> <p>Econ 524 Big Data Econometrics</p> <p>Econ 540 Communicating and Writing Economics Analyses</p>	<p>3 credits</p> <p>4 credits</p> <p>4 credits</p> <p>3 credits</p>
<p><b>Spring semester:</b></p> <p>Econ 525 Data Visualization in Economics</p> <p>Econ 522 Forecasting and Macroeconomic Analytics</p> <p>Choose two electives (3 credits each)</p>	<p>3 credits</p> <p>4 credits</p> <p>6 credits</p>

## 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 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 econometrics at a more advanced level. The second part of the course emphasizes the construction and application of econometric models such as linear regression models, difference-in-difference models, instrumental variables, as well as randomized control trials. The goal of the course is to prepare students with a fundamental understanding of how causal inference can be established, which students can then utilize to develop more complex models in later courses. Research papers directly relevant to the theory will be discussed weekly, and students will complete a research project using real-world data at the end of the semester.

**Econ 521 Econometrics of Policy Analysis & Causal-Inference:** This is an applied microeconometrics course with a central focus on causal inference and the empirical evaluation of policies and programs. As part of this course, the students will learn and employ econometric methods to questions of causal inference, and analyze research questions relevant to contemporary microeconomic policies. The content of the course is split into two general areas: 1) establishing and understanding the theoretical foundations for asking and answering questions of causal inference, and 2) learning and applying a set of the most common empirical methods for program evaluation and causal inference. Students will replicate the results of existing studies as well as undertake a final project answering a novel research question. The course seeks to build the background and technical capacity to apply methods of causal inference using real-world data, and explain research results in written and presentation-based formats.

**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 with leaders in the field that will come as guests during the semester.

**Econ 524 Big Data Econometrics:** This course provides an introduction to machine learning and its applications to causal inference with big data in economics. It covers both linear machine learning methods, such as LASSO, logistic regression and support vector classifier, and nonlinear machine learning methods, such as decisions trees, random forests, boosted trees, neural networks (deep learning) and support vector machines. These methods serve as building blocks for the introduction of debiased machine learning, which is crucial for delivering reliable statistical results when conducting causal inference with big data. Computation and empirical applications are important components of this course. In the Lab sessions, students learn implementations of the algorithms introduced in class using Python.

**Econ 525 Data Management & Visualization in Economics:** This course equips students with essential programming and computational data science skills tailored for economic analysis. Students will learn to use tools like Python, Git, Docker, and Cloud Computing to create reproducible workflows, analyze data, and present results through dashboards and visualizations. The course also covers machine learning techniques and practical methods for deploying models in real-world scenarios. Additionally, students will develop proficiency in SQL and Tableau for data manipulation and visualization. A key component of the course is its hands-on practice with data analysis challenges, where students apply the tools and techniques learned to manipulate and analyze datasets effectively.

**Econ 526 Quantitative Methods I:** Assuming that students are familiar with differential calculus and integration of a single variable, this course, as a first sequence of quantitative methods, covers matrix algebra, functions of several variables, unconstrained and constrained optimization of multiple variables, and economic dynamics in discrete and/or continuous time – first-order difference and/or differential equations. This course aims to help students build solid quantitative foundations for upper-level applied courses in the master’s program. During each class, theoretical concepts and methods are presented, accompanied by examples in economics.

**Econ 540 Communicating & Writing Analyses:** This course aims to provide opportunities to develop professional writing and communication skills through the experiences of doing actual real-world economic/management consulting. Students will practice how to properly report data analysis outcomes and effectively communicate the information with “clients.” Economic/management consulting requires abilities to: 1) clearly define the right questions to solve the problem; 2) find relevant data and properly extract information; 3) clearly communicate and present the information and findings in non-technical language 4) provide a clear solution to the problem in a timely manner and in an implementable format. By the end of this course, students will be able to produce graphs and tables that summarize and interpret raw/complex quantitative and qualitative data; effectively communicate data, technical, professional information to audiences with diverse backgrounds and varying levels of expertise; produce written reports that interpret, analyze, and evaluate data and professional documents; understand, conduct, and execute research and projects that require effective writing and communication skills.

**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.

**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.

**Econ 543 Cost-Benefit Analysis:** The objective of this course is to introduce students to how the combination of economic theory and data 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 are a foundational tool for selecting policies that maximize economic efficiency or for assessing economic efficiency when it is 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.