MATHEMATICAL ECONOMIC ANALYSIS

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Economics
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Mathematical Economic Analysis (MTEC) is a major offered by the Economics Department. The MTEC major provides a specialized 16-course program that includes most of the courses required for the regular (ECON) major, but also requires additional preparation in mathematics and statistics, several relatively technical economics electives, and a capstone course.

The MTEC major is recommended for students who intend to pursue graduate work in economics or plan to obtain a position in business or government that requires extensive analytical and quantitative skills.

Bachelor's Program

• Bachelor of Arts (BA) Degree with a Major in Mathematical Economic Analysis. (https://ga.rice.edu/programs-study/departments-programs/social-sciences/mathematical-economic-analysis/mathematical-economic-analysis-ba/)

Mathematical Economic Analysis does not currently offer an academic program at the graduate level.

Chair, Department of Economics
George Zodrow

Director of Undergraduate Studies
Mahmoud A. El-Gamal

Professors
Kerry E. Back
Richard Thomas Boylan
Bryan W. Brown
James N. Brown
Flávio Cunha
Mahmoud A. El-Gamal
Hülya Eraslan
Jeremy Fox
Peter Reginald Hartley
Vivian Ho
Ted Loch-Temzelides
Isabelle Perrigne
Robin Sickles
Xun Tang
George Zodrow

Associate Professors
Marc Peter Dudey
Mallesh Pai

Assistant Professors
Rossella Calvi
Yinghua He
Yunni Kong

Professors Emeriti
Dagobert Brito
John B. Bryant
Donald L. Huddle
Peter Mieszkowski
Ronald Soligo

Lecturers
Maria Bejan
Michele Biavati
Amelie Carlton
James P. DeNicco

Adjunct Professors
David R. Lairson
John Michael Swint

Adjunct Associate Professors
Charles E. Begley
Russell Green

Adjunct Assistant Professors
John Diamond
Kenneth Medlock

For Rice University degree-granting programs:
To view the list of official course offerings, please see Rice's Course Catalog (https://courses.rice.edu/admweb/!SWKSCAT.cat? p_action=cata)
To view the most recent semester’s course schedule, please see Rice’s Course Schedule (https://courses.rice.edu/admweb/!SWKSCAT.cat)
Economics (ECON)

ECON 100 - PRINCIPLES OF ECONOMICS
Short Title: PRINCIPLES OF ECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group II
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: Introduction to the basic concepts of microeconomics and macroeconomics. Microeconomics component includes analysis of supply and demand, consumer and producer behavior, and competitive and noncompetitive market equilibria, with applications to current policy issues. Macroeconomics component provides an overview of the determination of national output, employment, interest rates, and inflation, and analyzes monetary fiscal policies and international trade. Designed for both non-majors and majors. Mutually Exclusive: Cannot register for ECON 100 if student has credit for ECON 101.

ECON 101 - INTRODUCTION TO MICROECONOMICS
Short Title: INTRODUCTION TO MICROECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group II
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: Introduction to microeconomic analysis at a level suitable for non-majors. Applies only for transfer credit and requires departmental approval. Approved credit counts toward total credit hours required for graduation and for distribution, but does not count toward the ECON or MTEC majors. Students may not receive credit for ECON 101 if credit for ECON 201/211 has already been awarded. Mutually Exclusive: Cannot register for ECON 101 if student has credit for ECON 100/ECON 201/211.

ECON 200 - MICROECONOMICS
Short Title: MICROECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Distribution Group: Distribution Group II
Credit Hours: 4
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Prerequisite(s): ECON 100 and (MATH 102 (may be taken concurrently) or MATH 106)
Description: Intermediate level analysis of theories of household behavior, including demand for consumer goods, labor supply, and savings/ investment decisions, and producer behavior including the supply of output and demands for labor, capital and other production inputs. Emphasizes individual and interactive decision making under resource constraints and discusses equilibria in competitive markets. MATH 102 may be taken concurrently with ECON 200. As much of the analysis in ECON 200 involves partial differentiation, MATH 212 is strongly recommended. Recommended Prerequisite(s): MATH 212 Mutually Exclusive: Cannot register for ECON 200 if student has credit for ECON 301.
ECON 203 - MACROECONOMICS
Short Title: MACROECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group II
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Prerequisite(s): ECON 100
Description: Analyzes aggregate performance of the national economy including output, inflation, interest rates, employment, the business cycle, monetary and fiscal policy, and more generally the role of government in influencing aggregate economic performance. Introduces both the traditional aggregative only approach to Macroeconomics and the more recent New Classical and New Keynesian micro-foundations approaches. Mutually Exclusive: Cannot register for ECON 203 if student has credit for ECON 303.

ECON 205 - INTRODUCTION TO GAME THEORY
Short Title: INTRODUCTION TO GAME THEORY
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group II
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: This course provides an introduction to game theory, a branch of mathematics that studies decision-making by agents in situations where the outcome for each depends on the actions taken by all. Students will develop a familiarity with analytical tools that have found applications in, for example, economics and other social sciences, biology, computer science, and philosophy. Designed for students who do not wish to major in ECON or MTEC and does not apply to ECON or MTEC major requirements. Mutually Exclusive: Cannot register for ECON 205 if student has credit for ECON 300.

ECON 209 - APPLIED ECONOMETRICS
Short Title: APPLIED ECONOMETRICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Distribution Group: Distribution Group II
Credit Hours: 4
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Prerequisite(s): (ECON 100 or ECON 200) and (ECON 307 or STAT 310 or STAT 315 or DSCI 301)
Description: Applied econometric methods: econometric theory with practical emphasis on modeling, estimation, and hypothesis testing. A computer lab one day a week focuses on empirical implementation of econometric methods using STATA software. Mutually Exclusive: Cannot register for ECON 209 if student has credit for ECON 309/ECON 446.

ECON 210 - BEHAVIORAL ECONOMICS
Short Title: BEHAVIORAL ECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group II
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Prerequisite(s): ECON 100 or ECON 200
Description: Examines behavioral economics, which seeks to insert more behavioral realism into economic theory by incorporating into economic models insights based on empirical observations from psychology, sociology, and neuroscience. Emphasizes attempts by behavioral economists to explain anomalies that depart from the predictions of standard economic theory. Topics include temptation and self-control, fairness and reciprocity, reference dependence, bounded rationality and choice under risk and uncertainty.

ECON 238 - SPECIAL TOPICS
Short Title: SPECIAL TOPICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Internship/Practicum, Laboratory, Lecture, Seminar, Lecture/Laboratory
Credit Hours: 1-4
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: Topics and credit hours vary each semester. Contact department for current semester’s topic(s). Repeatable for Credit.

ECON 239 - LAW AND ECONOMICS
Short Title: LAW AND ECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group II
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Prerequisite(s): ECON 100 or ECON 200
Description: Examines the law using economic tools based on microeconomic theory. Focuses on legal issues most applicable to business. Mutually Exclusive: Cannot register for ECON 239 if student has credit for ECON 438.
ECON 260 - MICROECONOMICS AND PUBLIC POLICY  
**Short Title:** MICROECONOMICS & PUBLIC POLICY  
**Department:** Economics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Distribution Group:** Distribution Group II  
**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
**Prerequisite(s):** ECON 100 or ECON 200  
**Description:** Applies insights learned from the microeconomic component of ECON 100 to the analysis of public policy issues, stressing economic intuition rather than mathematical formulations. Designed for students who do not wish to major in ECON or MTEC, and does not apply toward ECON or MTEC major requirements.

ECON 270 - MACROECONOMICS AND PUBLIC POLICY  
**Short Title:** MACROECONOMICS & PUBLIC POLICY  
**Department:** Economics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Distribution Group:** Distribution Group II  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
**Prerequisite(s):** ECON 100 or ECON 200  
**Description:** Applies insights learned from the macroeconomic component of ECON 100 to the analysis of public policy issues, stressing economic intuition rather than mathematical formulations. Designed for students who do not wish to major in ECON or MTEC, and does not apply toward ECON or MTEC major requirements.

ECON 275 - INTERNATIONAL MACROECONOMICS AND PUBLIC POLICY  
**Short Title:** INT MACRO & PUBLIC POLICY  
**Department:** Economics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Distribution Group:** Distribution Group II  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
**Prerequisite(s):** ECON 100 or ECON 200  
**Description:** Applies insights learned from the macroeconomic component of ECON 100 to the analysis of public policy issues, stressing economic intuition rather than mathematical formulations. Designed for students who do not wish to major in ECON or MTEC, and does not apply toward ECON or MTEC major requirements.

ECON 280 - TRANSPORTATION, INFRASTRUCTURE AND LOGISTICS  
**Short Title:** TRANSPORT, INFRASTRU & LOGISTS  
**Department:** Economics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
**Prerequisite(s):** ECON 100 or ECON 200  
**Description:** The health of an economy depends critically on the efficient flow of goods and products. This course will analyze the economic impacts of transportation, infrastructure and logistics from a policy perspective. Topics will include technological change, regulation versus deregulation, the impact of globalzation, and the roles of government and agencies at various levels. Readings will include specific case studies as well as one or two books giving a broad overview of the importance of transportation policy. It is open to majors and non-majors, has a pre-requisite of ECON 100 or ECON 200, and provides three hours of university credit but does not count toward the ECON or MTEC majors.

ECON 299 - EXPERIENTIAL EDUCATION IN ECONOMICS  
**Short Title:** EXPERIENTIAL EDUC IN ECONOMICS  
**Department:** Economics  
**Grade Mode:** Satisfactory/Unsatisfactory  
**Course Type:** Internship/Practicum  
**Credit Hour:** 1  
**Restrictions:** Enrollment is limited to students with a major in Economics or Mathematical Economic Analysis. Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
**Prerequisite(s):** ECON 200  
**Description:** Provides one hour of university credit for faculty-approved internship. Students must obtain approval from a member of the department’s undergraduate committee and must submit an offer letter from the internship provider as well as a letter indicating completion and satisfactory performance. Instructor Permission Required. Repeatable for Credit.

ECON 300 - GAME THEORY AND OTHER MICRO TOPICS FOR ECON MAJORS  
**Short Title:** GAME THEORY, MICRO TOPICS/ECON  
**Department:** Economics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
**Prerequisite(s):** ECON 200 and (ECON 307 or STAT 310 or STAT 315 or DSCI 301)  
**Description:** Advanced applied analysis of topics in microeconomics designed for students in the ECON major. Topics include the foundations and applications of game theory, the economics of choice under uncertainty, and information economics including issues of asymmetric information. Additional topics may include auction theory and mechanism design. Open to all majors other than MTEC. Mutually Exclusive: Cannot register for ECON 300 if student has credit for ECON 205.
ECON 305 - GAME THEORY AND OTHER MICRO TOPICS FOR MTEC MAJORS
Short Title: GAME THEORY, MICRO TOPICS/MTEC
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): (ECON 307 or STAT 310 or STAT 315 or DSCI 301) and ECON 308
Description: Advanced theoretical analysis of topics in microeconomics, focusing on mathematical modeling. Topics include the foundations and applications of game theory, general equilibrium theory and applications, the economics of choice under uncertainty, and information economics including issues of asymmetric information. Additional topics may include auction theory and mechanism design. Open to all majors but designed for students in the MTEC major. Mutually Exclusive: Cannot register for ECON 305 if student has credit for ECON 405.

ECON 307 - PROBABILITY AND STATISTICS
Short Title: PROBABILITY & STATISTICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): MATH 102 or MATH 106
Description: Probability and the central concepts and methods of statistics including probability, random variables, distributions of random variables, expectation, sampling distributions, estimation, confidence intervals, and hypothesis testing. Cross-list: STAT 310. Recommended Prerequisite(s): MATH 212. Mutually Exclusive: Cannot register for ECON 307 if student has credit for DSCI 301/STAT 315.

ECON 308 - MATHEMATICAL ECONOMICS
Short Title: MATHEMATICAL ECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 4
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200 and (MATH 212 or (MATH 221 and MATH 222))
Description: Coverage of mathematical topics used in economics, such as linear algebra, optimization, and real analysis, with applications to fundamental topics in economic theory, constrained optimization, labor market dynamics, game theory and Leontief input-output model. Emphasizes logical clarity and mathematical rigor, along with the ability to follow and construct mathematical proofs. Students must have either (1) made a grade of B- or higher in MATH 212 or MATH 221/MATH 222 taken at Rice, or (2) received transfer credit for MATH 212 or MATH 221/ MATH 222 and received approval of the course instructor. Mutually Exclusive: Cannot register for ECON 308 if student has credit for ECON 401.

ECON 310 - ECONOMETRICS
Short Title: ECONOMETRICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 4
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 209 and ECON 308
Description: Survey of estimation and forecasting models. Includes multiple regression time series analysis. A good understanding of linear algebra is highly desirable. Cross-list: STAT 376. Mutually Exclusive: Cannot register for ECON 310 if student has credit for ECON 409/STAT 400.

ECON 320 - PUBLIC POLICY AND SOCIAL PROGRAM EVALUATION
Short Title: EVALUATION OF SOCIAL PROGRAMS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 307 or STAT 310 or STAT 315 or SOSC 302
Description: This course covers quantitative methods to evaluate three aspects of public policy and social programs. The first aspect is the quality of the implementation: are public policy and social programs implemented according to plan? The second aspect is impact: are interventions impacting the populations or issues for which they were designed? The third aspect is cost: do the program benefits justify the costs? The course audience are students interested in innovation in public policy and the design of social programs that aim to reduce inequality and to increase prosperity.

ECON 343 - CORPORATE FINANCE
Short Title: CORPORATE FINANCE
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group II
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): (ECON 100 or ECON 200) and (STAT 280 or STAT 305 or STAT 310 or STAT 315 or ECON 307 or STAT 312 or POLI 395 or PSYC 339 or SOSC 362) and BUSI 305
Description: Corporate financial management including tools used to evaluate and select investment projects and the method of financing those investments. The influence of corporate control on investment decisions. The valuation of stocks, bonds and options using the time value of money, the trade-off between risk and return, and arbitrage. Mutually Exclusive: Cannot register for ECON 343 if student has credit for BUSI 343.
ECON 355 - FINANCIAL MARKETS  
**Short Title:** FINANCIAL MARKETS  
**Department:** Economics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Distribution Group:** Distribution Group I  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
**Course Level:** Undergraduate Upper-Level  
**Prerequisite(s):** ECON 200  
**Description:** Principles governing U.S. and international equity and debt markets, and the interactions between such markets and national monetary and exchange rate policies. Focuses on the role of financial markets and institutions in the allocation and transfer of credit and risk, and examines various existing and suggested regulatory frameworks.  

ECON 365 - WORLD ECONOMIC HISTORY  
**Short Title:** WORLD ECONOMIC HISTORY  
**Department:** Economics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Distribution Group:** Distribution Group I  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
**Course Level:** Undergraduate Upper-Level  
**Prerequisite(s):** ECON 100 and ECON 200 and ECON 203  
**Description:** Study and analysis of world economy focusing on the economic expansion of Western countries between the 14th and 21st centuries. Emphasis on contextual changes in economy, geography, history, society, culture, religion and politics in determining economic leadership of certain economies, such as Italy, Portugal, Spain, the United Kingdom, Belgium, the Netherlands, France, Germany, Sweden, the United States and Japan. Cross-list: HIST 365.  

ECON 399 - INDEPENDENT RESEARCH  
**Short Title:** INDEPENDENT RESEARCH  
**Department:** Economics  
**Grade Mode:** Standard Letter  
**Course Type:** Research  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
**Course Level:** Undergraduate Upper-Level  
**Prerequisite(s):** ECON 203 and ECON 209 and (ECON 300 or ECON 305)  
**Description:** Independent research project under the supervision of a faculty member who must approve the topic. Consult the department website under "Independent Research" for additional details. Students must have a GPA of 3.0 or higher in the prerequisite courses and must have taken the 400-level course or courses most relevant to the research topic. Faculty advisors may require additional prerequisites. Instructor and department permission required. Not offered during the summer. Instructor Permission Required.  

ECON 415 - LABOR ECONOMICS  
**Short Title:** LABOR ECONOMICS  
**Department:** Economics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
**Course Level:** Undergraduate Upper-Level  
**Prerequisite(s):** ECON 200  
**Description:** Empirical evidence and theories relating to several features of labor markets. Topics covered may include fertility, health, criminal behavior, labor force participation, hours of work, education and training, geographical and inter-firm labor mobility, static and dynamic labor demand, unions, discrimination, government intervention in labor markets, and "hedonic" equilibria in labor markets. Graduate/Undergraduate Equivalency: ECON 515. Mutually Exclusive: Cannot register for ECON 415 if student has credit for ECON 515.  

ECON 418 - ECONOMIC FORECASTING  
**Short Title:** ECONOMIC FORECASTING  
**Department:** Economics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
**Course Level:** Undergraduate Upper-Level  
**Prerequisite(s):** ECON 203 and ECON 209  
**Description:** Application of econometric techniques to problems in macroeconomics and financial economics. The course focuses on macroeconomic forecasting and test of economic theories using stationary and non-stationary time-series data. Methods include predictive regressions, vector autoregressions, impulse response functions, and variance decomposition. Tests and comparisons of forecast accuracy are also included. Projects will be completed in STATA.  

ECON 419 - ADVANCED TOPICS IN ECONOMETRICS  
**Short Title:** ADV TOPICS IN ECONOMETRICS  
**Department:** Economics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
**Course Level:** Undergraduate Upper-Level  
**Prerequisite(s):** ECON 310 or STAT 376  
**Description:** Introduction to advanced econometrics, with an emphasis on methods used in microeconomic applications. Methods covered are used in the estimation of the demand for goods and services, production functions, and for analyzing the impact of social programs.
ECON 422 - INTERNATIONAL ECONOMICS AND FINANCE
Short Title: INTERNATIONAL ECON & FINANCE
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200 and ECON 203
Description: Studies the economic relationships among countries. Explores the sources of comparative advantage and reasons for trade policies. Examines foreign exchange and international capital markets and linkages between exchange rates, interest rates, and prices. Includes trade theory, tariffs, and other trade restrictions, an overview of historical and institutional developments, and current policy issues. Mutually Exclusive: Cannot register for ECON 422 if student has credit for ECON 420/ECON 421.

ECON 432 - POLITICAL ECONOMY
Short Title: POLITICAL ECONOMY
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200 and (ECON 300 or ECON 305)
Description: Analyzes income redistribution, taxation, the production of public goods, and other actions of the public sector as determined by a political process simultaneously with the economic process of exchange and production. Investigates the connection between public policies and the political forces that shape them.

ECON 435 - INDUSTRIAL ORGANIZATION
Short Title: INDUSTRIAL ORGANIZATION
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): (ECON 300 or ECON 305) and (ECON 209 or ECON 310)
Description: Covers topics in industrial organization and market design, including oligopoly, mergers, demand, matching and auctions.

ECON 437 - ENERGY ECONOMICS
Short Title: ENERGY ECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200
Description: Discussion of key aspects in the supply and demand of energy. Topics include optimal extraction of depletable resources, transportation, storage, end-use and efficiency, and the relationship between economic activity, energy, and the environment. Cross-list: ENST 437. Graduate/Undergraduate Equivalency: ECON 601. Mutually Exclusive: Cannot register for ECON 437 if student has credit for ECON 601.

ECON 439 - ADVANCED TOPICS IN LAW AND ECONOMICS
Short Title: ADV TOPICS IN LAW AND ECON
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200
Description: Addresses the role of economics in understanding the legal system, in particular how the law allocates entitlements and risk in property, tort and contract law. Intended primarily for students who are considering attending law school and uses instruction methods appropriate for that goal.

ECON 441 - EMPIRICAL METHODS FOR INDUSTRIAL ORGANIZATION
Short Title: EMPIRICAL METHODS FOR IO
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200 and ECON 209
Description: Covers empirical methods for the analysis of markets and industries. Focuses on various topics related to incomplete information in industrial organization. Topics include markets, strategy, interactions among firms, and the pricing of products, including non-linear pricing.
ECON 443 - FINANCIAL ECONOMICS
Short Title: FINANCIAL ECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 305 and (ECON 307 or STAT 310 or STAT 315 or DSCI 301)
Description: Economic analysis of the operation of financial markets from a mathematical and theoretical perspective. Topics include asset pricing, risk management, portfolio theory, arbitrage theory, and market efficiency. Emphasizes the application of the financial concepts to decisions faced by households and firms.

ECON 445 - MANAGERIAL ECONOMICS
Short Title: MANAGERIAL ECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200
Description: Application of economics to the determination of the profitability of the firm. Includes organization theory and problems of control. A student may not receive credit for ECON 445 and ECON 245/POLI 245.

ECON 449 - PRINCIPLES OF FINANCIAL ENGINEERING
Short Title: FINANCIAL ENGINEERING
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): (ECON 308 or MATH 211) and MATH 212 and (ECON 310 or STAT 376)
Description: Covers the use of financial securities and derivatives to take or hedge financial risk positions, including most commonly used instruments, from simple forwards and futures to exotic options and swaptions. Studies the pricing of derivative securities with emphasis on the mechanics and uses of financial engineering methods. Mutually Exclusive: Cannot register for ECON 449 if student has credit for STAT 449.

ECON 450 - ECONOMIC DEVELOPMENT
Short Title: ECONOMIC DEVELOPMENT
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200 and ECON 203
Description: This course covers different dimensions of economic development, focusing on poverty, inequality, demography, and health. It provides an overview of the economies of less developed countries, the lives of the poor, and the theories for why some countries are rich and others are poor. It also describes how labor and credit markets function in poor countries, the consequences for health and education, and the role of institutions.

ECON 452 - RELIGION, ETHICS, AND ECONOMICS
Short Title: RELIGION, ETHICS, & ECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200 and (ECON 307 or STAT 310 or STAT 315 or DSCI 301)
Description: Reviews economic models of the demand, supply, and markets for religion, including the effects of economic conditions on religious choice and vice versa. Students will write a term paper on topics of their choosing, subject to professor's approval. Recommended Prerequisite(s): ECON 209 or ECON 310 or STAT 376.

ECON 455 - MONEY AND BANKING
Short Title: MONEY AND BANKING
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200 and ECON 203
Description: Micro-foundations of monetary, fiscal and financial theory. Examines the unique roles of money and of banking in providing the transactions mechanism and in the functioning of financial markets. Explains the use of valued fiat, unbacked money which appears to violate basic microeconomics, in the context of Samuelson's overlapping generations model, including the implications for monetary and fiscal policy and for inflation. Discusses bank runs and financial instability.
**ECON 460 - ADVANCED TOPICS IN ECONOMIC DEVELOPMENT**  
*Short Title*: ADV TOPICS ECON DEVELOPMENT  
*Department*: Economics  
*Grade Mode*: Standard Letter  
*Course Type*: Lecture  
*Credit Hours*: 3  
*Restrictions*: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting level students.  
*Course Level*: Undergraduate Upper-Level  
*Prerequisite(s)*: ECON 200 and ECON 450  
*Description*: Focuses on role of taxation, finance and international trade, foreign investment and foreign aid in economic development.

**ECON 462 - ECONOMICS OF HUMAN CAPITAL**  
*Short Title*: ECONOMICS OF HUMAN CAPITAL  
*Department*: Economics  
*Grade Mode*: Standard Letter  
*Course Type*: Lecture  
*Credit Hours*: 3  
*Restrictions*: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting level students.  
*Course Level*: Undergraduate Upper-Level  
*Prerequisite(s)*: ECON 320  
*Description*: This course covers theory that describes the central role of human capital in determining economic growth and inequality, uses advanced econometric techniques to test if the theory is consistent with data, and presents insights for public policy that can improve human capital formation, increase economic growth and reduce social inequality.

**ECON 470 - MARKET DESIGN**  
*Short Title*: MARKET DESIGN  
*Department*: Economics  
*Grade Mode*: Standard Letter  
*Course Type*: Lecture  
*Credit Hours*: 3  
*Restrictions*: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting level students.  
*Course Level*: Undergraduate Upper-Level  
*Prerequisite(s)*: ECON 200 and (ECON 307 or STAT 310 or STAT 315 or DSCI 301)  
*Description*: Regulators, entrepreneurs and economists have recently been involved in the design of novel markets for radio spectrum, kidneys, on-line advertising, school choice, etc. This course utilizes game theory to provide the theoretical underpinning of such markets via real world examples, including the study of institutional details that can determine the success or failure of a market.

**ECON 477 - SPECIAL TOPICS**  
*Short Title*: SPECIAL TOPICS  
*Department*: Economics  
*Grade Mode*: Standard Letter  
*Course Type*: Lecture, Laboratory, Internship/Practicum, Seminar  
*Credit Hours*: 1-4  
*Restrictions*: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting level students.  
*Course Level*: Undergraduate Upper-Level  
*Description*: Topics and credit hours vary each semester. Contact department for current semester’s topic(s). Repeatable for Credit.

**ECON 479 - ECONOMIC MODELING AND PUBLIC POLICY**  
*Short Title*: ECONOMIC MODLG & PUBLIC POLICY  
*Department*: Economics  
*Grade Mode*: Standard Letter  
*Course Type*: Lecture  
*Credit Hours*: 3  
*Restrictions*: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting level students.  
*Course Level*: Undergraduate Upper-Level  
*Prerequisite(s)*: ECON 200  
*Description*: Examines the use of computational dynamic models to analyze the effects of economic policy reforms. Introduces computer programming methods to simulate household and firm behavior in partial and general equilibrium frameworks. Policy evaluation includes personal and corporate income taxes, Social Security, retirement savings incentives, and social insurance programs.

**ECON 480 - ENVIRONMENTAL ECONOMICS**  
*Short Title*: ENVIRONMENTAL ECONOMICS  
*Department*: Economics  
*Grade Mode*: Standard Letter  
*Course Type*: Lecture  
*Credit Hours*: 3  
*Restrictions*: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting level students.  
*Course Level*: Undergraduate Upper-Level  
*Prerequisite(s)*: ECON 200  
*Description*: Uses economic theories of externalities and common property resources to analyze how markets, legal institutions, regulations, taxes and subsidies, and voluntary activity can affect the supply of environmental amenities, such as clean air, clean water, and wilderness areas. Also discusses methods for determining the demand for environmental amenities. Cross-list: ENST 480.

**ECON 481 - HEALTH ECONOMICS**  
*Short Title*: HEALTH ECONOMICS  
*Department*: Economics  
*Grade Mode*: Standard Letter  
*Course Type*: Lecture  
*Credit Hours*: 3  
*Restrictions*: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting level students.  
*Course Level*: Undergraduate Upper-Level  
*Prerequisite(s)*: ECON 200 or (ECON 310 or STAT 376)  
*Description*: Study of determinants of health, including behavioral, economic and social factors and access to health care. Application of economics to understand health insurance, the hospital and physician markets, pharmaceuticals, and the health care system. Effects of regulation and methods of payment. Graduate/Undergraduate Equivalency: ECON 565. Mutually Exclusive: Cannot register for ECON 481 if student has credit for ECON 565.
ECON 483 - PUBLIC FINANCE
Short Title: PUBLIC FINANCE
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200
Description: Provides an economic analysis of tax policy, focusing on the current national debate regarding the relative merits of income and consumption-based taxes in terms of equity, efficiency, and simplicity. Analyzes tax effects on individual and business behavior and discusses general equilibrium modeling of the economic and distributional effects of alternative tax reforms. Special topics include optimal taxation, taxation of the family, estate taxation, taxation of electronic commerce, and state and local public finance.

ECON 484 - PUBLIC ECONOMICS
Short Title: PUBLIC ECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200 and MATH 212
Description: Theory and evidence on government expenditure policy. Topics include the theory of public goods, education, state and local public goods, redistribution and welfare policy, cost-benefit analysis, social insurance programs such as social security and unemployment insurance, and health care policy.

ECON 485 - THE ECONOMICS OF SUSTAINABILITY, CONSERVATION, AND PANDEMICS
Short Title: ECON, CONSERVATION & PANDEMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200
Description: This course will cover issues related to conservation, sustainability and pandemics from an economics point of view. Topics will include the need for conservation policies and planning, how science informs conservation strategies, incentives and the design of conservation agreements, and the role of deforestation and wildlife markets in pandemic emergence. Policies to reduce the likelihood of pandemic emergence, as well as the effects of pandemics like influenza, HIV, and COVID-19 on the global economy will also be discussed. Recommended Prerequisite(s): MATH 212

ECON 489 - ECONOMICS OF SOCIAL NETWORKS
Short Title: ECONOMICS OF SOCIAL NETWORKS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 200 and ECON 209
Description: This course introduces research on social networks and analyzes how these networks affect our choices: the products we buy, the careers we follow, whom we marry, how we raise our children. Students will learn about network measurement and formation and the influence of social networks on our decisions.

ECON 496 - RESEARCH IN ECONOMIC THEORY
Short Title: RESEARCH IN ECONOMIC THEORY
Department: Economics
Grade Mode: Standard Letter
Course Type: Research
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 203 and (ECON 310 or STAT 376) and ECON 305
Description: Capstone course for MTEC majors whose primary interest is in economic theory. Review and analysis of seminal and current research in economic theory, including independent analysis by the student. Topics vary from year to year.

ECON 497 - RESEARCH IN ECONOMETRICS
Short Title: RESEARCH IN ECONOMETRICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Research
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 203 and (ECON 310 or STAT 376) and ECON 305
Description: Capstone course for MTEC majors whose primary interest is in econometrics. Review and analysis of seminal and current research in econometrics, including independent analysis by the student. Topics vary from year to year.
ECON 498 - HONORS PROGRAM IN ECONOMICS-I
Short Title: HONORS PROGRAM IN ECONOMICS-I
Department: Economics
Grade Mode: Standard Letter
Course Type: Research
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 203 and (ECON 209 or ECON 310) and (ECON 300 or ECON 305)
Description: Research workshop open to ECON and MTEC majors. Students must have a GPA of at least 3.67 in all courses taken toward satisfying major requirements, and must have taken all ECON courses directly related to the topic of their research. Students develop a research idea, construct an economic model with testable hypotheses, test those hypotheses, and write and present an academic quality paper. Econometrics pre-requisite is ECON 209 for ECON majors and ECON 310 for MTEC majors.

ECON 499 - HONORS PROGRAM IN ECONOMICS-II
Short Title: HONORS PROGRAM IN ECONOMICS-II
Department: Economics
Grade Mode: Standard Letter
Course Type: Research
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ECON 498
Description: Continuation of ECON 498. University credit only.

ECON 501 - MICROECONOMICS I
Short Title: MICROECONOMICS I
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Consumer theory including choice under certainty, producer theory, partial and general equilibrium analysis.

ECON 502 - MACROECONOMICS
Short Title: MACROECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Review of static general equilibrium theory; elements of functional analysis for optimization; deterministic and stochastic difference equations, local stability analysis; introduction to Markov processes; dynamic optimization techniques, including stochastic optimal control theory, dynamic programing, and robust control; applications to growth theory, search, industrial organization, and monetary economics; dynamic stochastic general equilibrium modeling.

ECON 505 - FINANCIAL ECONOMICS I
Short Title: FINANCIAL ECONOMICS I
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): ECON 501 and ECON 502
Description: Introduction at the graduate level to asset pricing and portfolio choice theory. Covers single-period and dynamic models, including pricing by arbitrage, mean-variance analysis, factor models, dynamic programming, recursive utility, and an introduction to continuous-time finance. Cross-list: BUSI 521.

ECON 507 - MATHEMATICAL ECONOMICS I
Short Title: MATHEMATICAL ECONOMICS I
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Introduction at the graduate level to asset pricing and portfolio choice theory. Covers single-period and dynamic models, including pricing by arbitrage, mean-variance analysis, factor models, dynamic programming, recursive utility, and an introduction to continuous-time finance. Cross-list: BUSI 521.

ECON 504 - COMPUTATIONAL ECONOMICS
Short Title: COMPUTATIONAL ECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Research
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): ECON 501 and ECON 502 and ECON 505 and ECON 508 and ECON 510 and ECON 511 and MATH 321
Description: Numerical methods most commonly used in economics and their application to frontier research projects in economic modeling. Topics include optimization theory and numerical integration. Cross-list: STAT 604.

ECON 506 - FINANCIAL ECONOMICS II
Short Title: FINANCIAL ECONOMICS II
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): ECON 501 and ECON 502
Description: Introduction at the graduate level to asset pricing and portfolio choice theory. Covers single-period and dynamic models, including pricing by arbitrage, mean-variance analysis, factor models, dynamic programming, recursive utility, and an introduction to continuous-time finance. Cross-list: BUSI 521.

ECON 508 - MICROECONOMICS II
Short Title: MICROECONOMICS II
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 5
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Two modules: (1) Introduces students to the mathematical tools of game theory and the modeling of economic settings as games. Covers normal form games, extensive form games with perfect information, Bayesian games, and extensive form games with imperfect information; (2) introduces students to information economics and the theory of mechanism design. Applies tools from game theory and linear and non-linear
ECON 509 - TOPICS IN MICROECONOMICS  
Short Title: TOPICS IN MICROECONOMICS  
Department: Economics  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Prerequisite(s): ECON 508  
Description: Role of private information in mathematical models of collective decision making. Emphasizes information acquisition by voters, and information disclosure by the political parties or media outlets. Topics include: the value of private information in a single-agent decision problem; various statistical concepts of informativeness; Shannon entropy and rational inattention; models of strategic voting; cost-benefit analysis of information acquisition and optimization; deliberation and information transmission; mathematical modeling of information disclosure by media outlets. Repeatable for Credit.

ECON 510 - ECONOMETRICS I  
Short Title: ECONOMETRICS I  
Department: Economics  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Description: Estimation and inference in single equation regression models, multicollinearity, autocorrelated and heteroskedastic disturbances, distributed lags, asymptotic theory, and maximum likelihood techniques. Emphasis is placed on critical analysis of the literature. Cross-list: STAT 610.

ECON 511 - ECONOMETRICS II  
Short Title: ECONOMETRICS II  
Department: Economics  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Prerequisite(s): ECON 501 and ECON 502 and ECON 505 and ECON 508 and ECON 510 and ECON 511 and MATH 321  
Description: Core topics include monopoly, price discrimination, vertical control, short-run price competition, dynamic price competition and tacit collusion, price and non-price competition with differentiated products, entry barriers, information and strategic behavior (e.g. limit pricing, auctions), and research and development.

ECON 514 - INDUSTRIAL ORGANIZATION AND CONTROL  
Short Title: INDUST'L ORGANIZATION&CONTROL  
Department: Economics  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Prerequisite(s): ECON 501 and ECON 502 and ECON 505 and ECON 508 and ECON 510 and ECON 511 and MATH 321  
Description: Mathematical and statistical analysis of empirical evidence and theories relating to several features of labor markets. Topics covered may include fertility, health, criminal behavior, labor force participation, hours of work, education and training, geographical and inter-firm labor mobility, static and dynamic labor demand, unions, discrimination, government intervention in labor markets, and "hedonic" equilibria in labor markets. Graduate/Undergraduate Equivalency: ECON 415. Mutually Exclusive: Cannot register for ECON 515 if student has credit for ECON 415.

ECON 516 - EMPIRICAL MICROECONOMICS  
Short Title: EMPIRICAL MICROECONOMICS  
Department: Economics  
Grade Mode: Standard Letter  
Course Type: Lecture/Laboratory  
Credit Hours: 3  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Prerequisite(s): ECON 501 and ECON 502 and ECON 505 and ECON 508 and ECON 510 and ECON 511 and MATH 321  
Description: Overview of methods used in empirical microeconomic research. Examples are drawn from health economics, law and economics, and business economics. Emphasis is placed on designing econometric and statistical analyses to test economic hypotheses. Class projects will expand on analyses from previously published studies.
ECON 517 - EMPIRICAL INDUSTRIAL ORGANIZATION
Short Title: EMPirical INDUSTRIAL ORG
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): ECON 501 and ECON 502 and ECON 505 and ECON 508 and ECON 510 and ECON 511 and MATH 321
Description: Examines economic models of competition and industry structure. These include models of demand, supply, investment and entry. Special attention is paid to economic statistical modeling of industries and the use of price and game theory in industrial organization. Matching and market design are also covered.

ECON 518 - INTERNATIONAL MACROECONOMICS
Short Title: INTERNATIONAL MACROECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Effects of fiscal and monetary policies on exchange rates and the current account and balance of payments. Includes exchange market efficiency, exchange rates and prices, LDC debt, and policy coordination.

ECON 519 - ECONOMIC GROWTH & DEVELOPMENT
Short Title: ECONOMIC GROWTH & DEVELOPMENT
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): ECON 501 and ECON 502 and ECON 510 and ECON 511
Description: Examines economic models of competition and industry structure. These include models of demand, supply, investment and entry. Special attention is paid to economic statistical modeling of industries and the use of price and game theory in industrial organization. Matching and market design are also covered.

ECON 522 - PUBLIC ECONOMICS: TAX POLICY
Short Title: PUBLIC ECONOMICS: TAX POLICY
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Study of the effects of taxation on individual and firm behavior, general equilibrium tax incidence analysis, optimal taxation theory, optimal implementation of tax reform, analysis of comprehensive income, and consumption taxes.
ECON 575 - TOPICS IN FINANCIAL ECONOMICS
Short Title: TOPICS IN FINANCIAL ECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): ECON 505
Description: Topics in asset pricing, corporate financial theory, and market microstructure, including asymmetric information, learning, heterogeneous priors, market frictions, nonstandard preferences, production models, q theory, real options, dynamic capital structure, quote-driven markets, order-driven markets, and dealer markets. Repeatable for Credit.

ECON 576 - TOPICS IN MACROECONOMICS
Short Title: TOPICS IN MACROECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Discussion topics in macroeconomics. Repeatable for Credit.

ECON 577 - TOPICS IN ECONOMIC THEORY I
Short Title: TOPICS IN ECONOMIC THEORY I
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Discussion of topics in advanced economic theory. Repeatable for Credit.

ECON 578 - TOPICS IN ECONOMETRICS I
Short Title: TOPICS IN ECONOMETRICS I
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Discussion of selected topics in advanced econometrics. Repeatable for Credit.

ECON 579 - TOPICS IN ECONOMETRICS II
Short Title: TOPICS IN ECONOMETRICS II
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): ECON 511
Description: Discussion of selected topics in advanced econometrics that focus on the mathematical and statistical modeling of such phenomena as (1) extended panel data methods; (2) spatial econometrics; (3) bootstrapping; (4) factor models, wavelets, smoothing-splines, sieves; (5) model averaging; (6) continuous and discrete dynamic programming models; (7) econometrics of auctions; (8) BLP methods of demand estimation; (9) structural and non-structural models of producer behavior; (10) point and set identification; (11) Bayesian Econometrics/Metropolis-Hastings MCMC algorithms. Repeatable for Credit.

ECON 592 - TOPICS IN POLICY AND APPLIED ECONOMICS
Short Title: TOP-POLICY&APPL'D ECON
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Discussion of selected topics and applied economics. Repeatable for Credit.

ECON 593 - WORKSHOP IN MICROECONOMICS
Short Title: WORKSHOP IN ECONOMICS
Department: Economics
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Seminars on advanced topics in macroeconomics, microeconomics, econometrics and applied microeconomic theory, presented through guest lectures by leading researchers. Repeatable for credit. Repeatable for Credit.

ECON 594 - WORKSHOP IN ECONOMICS I
Short Title: WORKSHOP IN ECONOMICS I
Department: Economics
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Seminars on advanced topics in macroeconomics, microeconomics, econometrics and applied microeconomic theory, presented through guest lectures by leading researchers. Repeatable for credit. Repeatable for Credit.
ECON 596 - RESEARCH SEMINAR
Short Title: RESEARCH SEMINAR
Department: Economics
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hours: 0.5
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Supervises fourth-year and fifth-year Ph.D. students in their quantitative dissertation research in preparation for graduation. Students must present their own research at least once during the semester. Repeatable for Credit.

ECON 597 - READINGS IN ADVANCED TOPICS
Short Title: READINGS IN ADVANCED TOPICS
Department: Economics
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Independent Study
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Workshop prepares graduate students for completing innovative and original research. All second year graduate students must attend the workshop. Each week, a faculty member will give a brief lecture about their experience with research. Possible topics include how they came up with ideas, how those ideas evolved and became papers, how these papers proceeded through the publication process, etc. Alternatively, faculty members can present a broad overview of particular research areas and discuss outstanding questions in those areas. Repeatable for Credit.

ECON 598 - READINGS IN ADVANCED TOPICS
Short Title: READINGS IN ADVANCED TOPICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Independent Study
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Prepares second-year Ph.D. students to conduct quantitative research. After a critical review of existing economic models, statistical analysis of data and economic evaluations, students develop their own research agenda. Repeatable for Credit.

ECON 599 - SEMINAR WORKSHOP
Short Title: SEMINAR WORKSHOP
Department: Economics
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Research
Credit Hours: 0.5
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Promotes graduate students’ attendance and active participation in the Econ 593 and Econ 594 seminar workshops. Each student is required to attend at least fifteen ECON 593/594 seminars per semester, write a brief report on each seminar presentation they attend, prepare to present a background paper for three of the seminars they plan to attend, and participate in post seminar discussions. Repeatable for Credit.

ECON 601 - ENERGY ECONOMICS I
Short Title: ENERGY ECONOMICS I
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: Introduces the energy sector to students, discusses key aspects of energy supply, demand and pricing, and is foundational for the MEECON degree. Topics include optimal extraction of depletable resources, investment in energy-using capital, trade of energy commodities, storage, end-use demand and energy efficiency, and the relationship between economic activity, energy and the environment. Students learn to apply dynamic optimization, linear programming and econometric techniques in addressing the course topics. Graduate/Undergraduate Equivalency: ECON 437. Mutually Exclusive: Cannot register for ECON 601 if student has credit for ECON 437.

ECON 602 - MICROECONOMICS OF THE ENERGY SECTOR
Short Title: MICROECONOMICS - ENERGY SECTOR
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: Covers basic microeconomic concepts and applies them to contemporary issues in the energy sector. Topics covered include demand and supply analysis, market equilibrium and different market structures, international trade, investment and capacity expansion, risk and investment finance, and economic analysis of energy policy including environmental policy. This course enables students to apply quantitative microeconomic theory in order to make data-driven recommendations to case studies presented by industry partners.

ECON 603 - APPLIED ECONOMETRICS FOR ENERGY MARKETS
Short Title: APPLIED ECONOMETRICS ENGY MKTS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: Covers basic microeconomic concepts and applies them to contemporary issues in the energy sector. Topics covered include demand and supply analysis, market equilibrium and different market structures, international trade, investment and capacity expansion, risk and investment finance, and economic analysis of energy policy including environmental policy. This course enables students to apply quantitative microeconomic theory in order to make data-driven recommendations to case studies presented by industry partners.
ECON 604 - ENERGY ECONOMICS II
Short Title: ENERGY ECONOMICS II
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: Explores a variety of topics in energy modeling and energy data analysis. Topics include optimal extraction of depletable resources, game theoretic approaches to OPEC behavior, national oil company behavior, models of storable energy commodities and energy demand by end-use sector, energy security and fundamental drivers of commodity prices. This course tasks students to expand on the dynamic optimization problems and econometric techniques applied to energy economics. Mutually Exclusive: Cannot register for ECON 604 if student has credit for ECON 547.

ECON 605 - TAXATION IN THE ENERGY SECTOR
Short Title: TAXATION IN THE ENERGY SECTOR
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: Introduces basic principles of taxation, and general equilibrium modeling of the economic effects of taxes, and applies them to federal and state taxes on the energy sector. Topics include royalties resource rent taxes, corporate income taxes including international tax issues such as transfer pricing and income shifting, excess profit taxes, production-sharing agreements, and environmental taxes. Students will formulate, implement, and use quantitative models to solve problems related to private and public decision making in the context of taxes applied to U.S. energy systems.

ECON 606 - CORPORATE FINANCE FOR THE ENERGY SECTOR
Short Title: CORP FINANCE - ENERGY SECTOR
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: Examines the investment decisions of corporations, the valuation of stock, bonds and options investments by individual investors. The implications of investor decisions for corporations, and specifically the manner in which they evaluate investment projects and finance investments are a core focus. Examples and case studies focus on the energy sector. Students will increase their understanding of financing and investment decision as the relate to energy companies and energy related projects using analytical and mathematical techniques to make data-driven recommendation to real-world problems.

ECON 607 - THE ECONOMICS OF ENERGY AND THE ENVIRONMENT
Short Title: ECON OF ENERGY & ENVIRONMENT
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: This course provides students with an introduction to, and overview of, policies to protect environmental resources against emissions from energy production and use and hazardous wastes. The first part of the course will present an economic analysis of the costs and benefits of using different types of policies to control emissions from fossil fuel use. The remainder of the course, taught from a practitioner’s perspective, will discuss the interrelationship between science, institutions and politics when designing environmental policy. The focus will be on problems associated with oil and gas production - especially water contamination and use - and hazardous waste disposal.

ECON 608 - RISK MANAGEMENT IN THE ENERGY INDUSTRY
Short Title: RISK MANAGEMENT/ENERGYINDUSTRY
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: This course introduces quantitative risk management techniques often employed in the energy industry. It covers topics such as real options, value at risk, conditional value at risk, and expected shortfall, as well as the use of derivatives for trading and hedging various risk exposures. The course is methodologically self-contained and provides students with hands-on experience with state-of-the-art software to measure and manage risk-adjusted returns of heterogeneous asset portfolios.

ECON 610 - ENERGY AND THE MACROECONOMY
Short Title: ENERGY & THE MACROECONOMY
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: Discusses connections between energy and economic activity at the regional, national, and international level, and especially the role of energy shocks in economic fluctuations, innovations in energy supply as drivers of regional economic growth, and the role of energy commodities in transportation and international trade.
ECON 611 - GEOPOLITICS OF ENERGY
Short Title: GEOPOLITICS OF ENERGY
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: Explores the geopolitical issues around energy security and trade by focusing on role of energy as the world's largest business and a strategic requirement of the modern nation-state, a source of power in international relations, and a major influence on national politics and institutions. This course equips students with the analytical skills to inform policy debates, advocate for the interests of principals, and advise policy makers and firms amid rapid changes in energy markets. Students learn both to produce sound empirical analysis by employing state of the art econometric techniques and to be discerning consumers of empirical research.

ECON 612 - ENERGY PROJECT DEVELOPMENT
Short Title: ENERGY PROJECT DEVELOPMENT
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: This course will cover the development of energy projects, especially electric power projects, from inception through to financing. It examines key issues such as: siting/permitting, including compliance with federal, state and local environmental and regulatory issues; fuel supply agreements; capital cost pricing; off-take agreements; and the various methods of project financing. Microsoft Excel is used for project financial analysis, including revenue and cost modeling, debt management, project net cash flow, project internal rate of return and net present value. The course also will cover strategies to monetize the project including development fees, carried equity, and private and public sale of equity, including initial public offerings ("IPOs").

ECON 613 - INTERNATIONAL TRADE IN ENERGY
Short Title: INTERNATIONAL TRADE IN ENERGY
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: This course explores the effects of international trade and the determinants of the amount of trade between countries in energy commodities, and the role of international capital flows in financing energy projects, in particular. It will also discuss the many ways that governments can alter international trade through various policies.

ECON 614 - POLITICAL ECONOMY OF OIL IN DEVELOPING COUNTRIES
Short Title: POLITICAL ECONOMY OF OIL
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: This course evaluates the political and economic determinants of oil and gas policies in developing countries and their impact on world markets, the interaction between states and oil companies, the challenges of oil wealth management, and the causal links between resource dependency, development, institutions, and political regimes. Although the main focus is on oil production, natural gas is also analyzed, and both are compared to other natural resources. Emphasis is on the analysis of institutional change and the functions of institutional change in the energy industry using data-driven methods to examine case studies.

ECON 615 - SOCIAL STUDIES OF ENERGY
Short Title: SOCIAL STUDIES OF ENERGY
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: Investigate the ways in which energy production and consumption impacts social life. By studying the implementation and use of renewable and on-renewable energy infrastructures in different parts of the world, the students will develop a contextual, self-reflexive and critical lens that will help them make decisions in later stages of their careers.

ECON 620 - INDUSTRIAL ORGANIZATION AND THE ENERGY SECTOR
Short Title: INDUSTRIAL ORG & ENERGY SECTOR
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: The course will discuss monopoly, oligopoly, and the underlying sources of monopoly power in energy industries and how the industries can be restructured to isolate the monopoly elements from the more competitive ones. Other topics include price discrimination, vertical control, mergers and acquisitions, and strategic behavior between firms.
ECON 621 - THE ECONOMICS OF THE ELECTRICITY INDUSTRY
Short Title: ELECTRICITY INDUSTRY ECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: Discusses the determinants of the cost of electricity, the effects of organizing the industry in different ways, the need to encourage sufficient investment in reserve capacity, and the use of information technology to allow for new ways of pricing electricity, operating the network and coordinating supply and demand. Students will learn to analyze the behavior of power markets, the effect of different policies, and draw empirical solutions to the real-world issues.

ECON 622 - TRANSPORTATION ECONOMICS
Short Title: TRANSPORTATION ECONOMICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: Discusses transportation as a major source of energy demand in modern post-industrial economies and of future demands in emerging economies. Emphasizes that the demand for energy use in the transportation sector involves modeling household choices, economic growth and demographic transition, government decisions to support transportation infrastructure development, and the introduction of new technologies. Students will apply problem solving and analytical skills to perform calculations related to transportation energy and its environmental impact.

ECON 677 - SPECIAL TOPICS
Short Title: SPECIAL TOPICS
Department: Economics
Grade Mode: Standard Letter
Course Type: Internship/Practicum, Laboratory, Lecture, Seminar, Independent Study, Lecture/Laboratory
Credit Hours: 1-4
Restrictions: Enrollment is limited to Graduate or Visiting Graduate level students.
Course Level: Graduate
Description: Topics and credit hours vary each semester. Contact department for current semester's topic(s). Repeatable for Credit.

ECON 699 - PRACTICUM
Short Title: PRACTICUM
Department: Economics
Grade Mode: Standard Letter
Course Type: Internship/Practicum
Credit Hours: 4
Restrictions: Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Energy Economics degree.
Course Level: Graduate
Description: Projects developed by an industry advisory group to be researched and presented to participating industry at completion of all course work. Internships with an approved employer may be substituted. Emphasis on skill building components may include: analyzing data for accuracy and reconciliation across different sources, quantitative analysis and risk assessment of a firm's portfolio of assets and capital investment opportunities, and briefing expert and non-expert audiences.

ECON 600 - DEPARTMENTAL SERVICE COURSE
Short Title: DEPARTMENTAL SERVICE COURSE
Department: Economics
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Independent Study
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Assists students in the dissertation writing process. Students must write an independent and original piece of quantitative research that is of sufficient quality to merit publication in an academic economics journal. Towards this objective, faculty mentor evaluate and critique the research of PhD students who are either preparing research before formally selecting a dissertation topic or actively engaged in dissertation research. Repeatable for Credit.

ECON 800 - GRADUATE RESEARCH
Short Title: GRADUATE RESEARCH
Department: Economics
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Research
Credit Hours: 1-12
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Students must write an independent and original piece of quantitative research that is of sufficient quality to merit publication in an academic economics journal. Towards this objective, faculty mentor evaluate and critique the research of PhD students who are either preparing research before formally selecting a dissertation topic or actively engaged in dissertation research. Repeatable for Credit.

Description and Code Legend
Note: Internally, the university uses the following descriptions, codes, and abbreviations for this academic program. The following is a quick reference:

Course Catalog/Schedule
• Course offerings/subject code: ECON

Department Description and Code
• Economics: ECON

Undergraduate Degree Description and Code
• Bachelor of Arts degree: BA
Undergraduate Major Description and Code

• Major in Mathematical Economic Analysis: MTEC

CIP Code and Description ¹

• MTEC Major/Program: CIP Code/Title: 45.0603 - Econometrics and Quantitative Economics

¹ Classification of Instructional Programs (CIP) 2020 Codes and Descriptions from the National Center for Education Statistics: https://nces.ed.gov/ipeds/cipcode/