

Undergraduate Economics Program Courses

About Course Numbers:

Each Carnegie Mellon course number begins with a two-digit prefix that designates the department offering the course (i.e., 76-xxx courses are offered by the Department of English). Although each department maintains its own course numbering practices, typically, the first digit after the prefix indicates the class level: xx-1xx courses are freshmen-level, xx-2xx courses are sophomore level, etc. Depending on the department, xx-6xx courses may be either undergraduate senior-level or graduate-level, and xx-7xx courses and higher are graduate-level. Consult the Schedule of Classes (<https://enr-apps.as.cmu.edu/open/SOC/SOCServlet/>) each semester for course offerings and for any necessary pre-requisites or co-requisites.

73-003 Transfer Credit

All Semesters

This number "holds" a place for an economics transfer credit courses so that these courses can be used in the academic audit system. Student receiving 73-003 credit have met the requirement of earning the equivalent of a "C" in their non-CMU economics course; however, have not earned the equivalent of a "B" which would provide credit for a CMU economics course equivalency.

73-060 Economics: BaseCamp

Fall: 3 units

This short course will launch you into the economics intellectual space and get you thinking like an economist. Through a series of presentations by some of CMU's great economics thinkers you will learn how economic reasoning harnessed to data can lead to better policy design and better business decision making. Presentations may cover the economics of bitcoin and crypto-currency, online market design, financial crises, the future of work, how to become involved in economics research, healthcare, the environment, and other topics. The presentations will be curated by one of CMU's research economists and there will be plenty of opportunities for discussion and debate. The course will also introduce you to the CMU approach to economics and map out the CMU economics major landscape.

73-065 Nudging Behavior in Business and Public Policy

Spring: 3 units

This course applies the insights of Behavioral Economics to inform business and policy decisions. A nudge encourages desired behavior by framing the decision or environment such that various cognitive processes and heuristics are engaged in favor of the desired outcome. The use of this branch of social science has been used successfully by the UK and US governments by the Behavioural Insights Team and Social and Behavioral Sciences Team, respectively. Nudges have also been used effectively by the United Nations, via UNICEF, to address and change a variety of behaviors such as gender violence and sanitation practices. In 2016 the Supreme Committee for Delivery and Legacy founded the Qatar Behavioral Insights Unit (QBIU) and it was incorporated as a foundation under the Qatar Financial Center in 2019. This foundation is known as B4Development (B4D) and would be of interest and importance to CMUQ students. One of the partners of B4D is the Qatar Foundation.

73-102 Principles of Microeconomics

Fall and Spring: 9 units

The course is an introduction to microeconomic principles and how to think like an economist. Market and policy outcomes are largely a function of individual decisions. These questions typically take the form: how much and what combination of things should I buy? When do we want businesses to go bust? Should the government fund student tuition? It's my hope that you'll also start to think about everyday questions from an economic lens: why were bicycles so hard to find this past summer? Is Uber surge pricing just a rip-off? Is illegal streaming bad for consumers? Throughout the semester, we will build a toolkit to allow us to understand how these decisions interact and explain market successes, market failures, and the role of government in the marketplace. Toward the end of the semester, we'll change a few underlying assumptions and address a variety of questions related to strategic interaction. Some of the topics we will begin to introduce include credible threats, commitment problems, and the strategic use of information. Not open to students who have received credit for 73-100. While there are no calculus pre-requisites for this course, students are encouraged to enroll in 73-102 after they've passed 21-111. (Lecture, 2 hours; Recitation, 1 hour).

73-103 Principles of Macroeconomics

All Semesters: 9 units

A one-semester course that teaches the fundamentals of macroeconomics. Students will learn how macroeconomic analysis can explain national economic activity and how government intervention might stabilize an economy. Topics include: defining and measuring national wealth, economic growth, credit markets, unemployment, interest rates, inflation, and the monetary system. Additional emphasis will be paid to: long-term economic development, political economy, financial crises and topics that are central to contemporary macroeconomic debates such as the impact of technological change, migration, and trade on the macroeconomy. Students will access macroeconomic databases, and then use basic statistics to describe and isolate empirical patterns in macro-data. Not open to students who have received credit for 73-100. (Lecture, 2 hours; Recitation, 1 hour). Prerequisite: 73-102 Min. grade C

73-104 Principles of Microeconomics Accelerated

Intermittent: 9 units

This course is a rigorous introduction to microeconomic principles and how to think like an economist. The students are expected to have a successful, prior exposure to fundamental concepts and therefore, the course is at a faster pace than its sister course, 73102, and covers additional topics. The questions typically take the form: What is the optimal consumption pattern for me as an individual? What is the profit maximizing pattern of labor and capital goods for a firm? When do we want businesses to go bust? Should the government fund student tuition? How can firms hire the best match for them? Why kind of informational asymmetries exist in double-sided markets? It's my hope that the students start to think about everyday questions from an economic lens: Why were cars so hard to find during the pandemic? Is Uber surge pricing just a rip-off? Is illegal streaming bad for consumers? Throughout the semester, we will build a toolkit to allow us to understand how these decisions interact and explain market successes, market failures, and the role of the third parties in the marketplace. Some later topics include credible threats, commitment problems, and the strategic use of information. Knowledge of basic calculus as covered in 21-111 would be helpful for the students. Only students with an AP Microeconomics Exam score of 4 or 5 and qualifying IB/Cambridge Economics exam scores are eligible to enroll in this course. Students without exam credit should enroll in 73-102 Principles of Microeconomics.

73-111 Internship I

All Semesters

By permission of the Undergraduate Economics Program.

73-112 Internship II

All Semesters: 3 units

The goal of this course is for you to reflect critically and constructively on your internship and to help you identify a path that will allow you to build on your internship experiences. By permission of the Undergraduate Economics Program. Open only to declared Economics, Economics and Mathematical Sciences, Economics and Politics, and Economics and Statistics majors.

73-113 Internship III

All Semesters: 3 units

The goal of this course is for you to reflect critically and constructively on your internship and to help you identify a path that will allow you to build on your internship experiences. By permission of the Undergraduate Economics Program. Open only to declared Economics, Economics and Mathematical Sciences, Economics and Politics, and Economics and Statistics majors.

73-155 Markets, Models, and Math

Spring: 9 units

The Markets, Models and Math (M3) course is designed to allow students to reflect on the thought processes that drive science, viewed through the lens of economics. While the economics focus will highlight the way economists use data and models to understand the economic phenomena we see in the real world, the course is also designed to add depth of understanding for students who major in some other discipline, for the simple reason that the things economists study touch on all aspects of human existence, whether it is understanding the cost-benefit trade-offs in architectural design, in the engineering of new products or production technologies, or understanding the grand arc of political discourse in history or the way it has shaped our laws.

73-158 Markets, Models, and Math

Spring; 9 units

The Markets, Models and Math (M3) course is designed to allow students to reflect on the thought processes that drive science, viewed through the lens of economics. While the economics focus will highlight the way economists use data and models to understand the economic phenomena we see in the real world, the course is also designed to add depth of understanding for students who major in some other discipline, for the simple reason that the things economists study touch on all aspects of human existence, whether it is understanding the cost-benefit trade-offs in architectural design, in the engineering of new products or production technologies, or understanding the grand arc of political discourse in history or the way it has shaped our laws. The course is also meant to introduce, in an intuitive way, the kinds of mathematical tools and reasoning that economists use, what the economic historian Philip Mirowski has called "the unreasonable efficacy of mathematics in economic analysis".

Prerequisites: 21-111 and 73-102 Min. grade C

73-199 Experiential Learning in Business and Economics

All Semesters; 3 units

Students will collaborate to create an economic newsletter called "Southwestern PA Economy in a Snapshot," a regional version of the well-known national version produced by the New York Fed (https://www.newyorkfed.org/medialibrary/media/research/snapshot/snapshot_january2021.pdf?la=en). The newsletter will lay the groundwork for a regular online publication produced by Carnegie Mellon Economics, a combination of data analysis/visualization and economic commentary. The ultimate goal is for the newsletter to be a to-go economics document for policy makers and business leaders in Pittsburgh and the surrounding region. Students will use a combination of data science skills, computer programming skills, and a basic knowledge of the relevant economic data. They will produce a professional, co-authored report that will serve as a valuable resume item for future career prospects. They will form small teams, each of which will create an Economic Commentary that uses the newsletter's data to provide analysis of a contemporary economic issue that is important for the Pittsburgh region. During the tenure of the course, students will also acquire new skills in computer programming, data analysis and economics. The course will "contribute to a broader body of knowledge" by obtaining, organizing and publicizing regional economic data where no such product currently exists. It will "identify and develop skills needed to approach and tackle a practical problem or issue." That is, students will take skills obtained in the single pre-req course (Principles of Macroeconomics) and combine them with skills that almost all 1st year students take in data analysis and produce a professional piece of economic analysis. They will see how their academic education can be applied in way that this useful to business people and policy makers.

Prerequisite: 73-102 Min. grade C

73-230 Intermediate Microeconomics

Fall and Spring; 9 units

This course builds on the Principles of Economics course. It focuses on the following topics: theory of the consumer, theory of the producer, perfectly competitive market equilibrium, imperfect competition, and market failures due to asymmetric information such as adverse selection and moral hazard. (Lecture, 3 hours; Recitation, 1 hour).

Prerequisites: (21-256 or 21-268 or 21-269 or 21-259) and (73-102 Min. grade C or 73-100 Min. grade C)

73-240 Intermediate Macroeconomics

Fall and Spring; 9 units

Through macroeconomic models built upon microeconomic foundations, insights are developed into economic growth processes and business cycles. Topics include aggregation and measurement, national income, business cycle measurement, economic welfare theorems and social inefficiencies, the effect of government fiscal policy upon employment and productivity, and the relationship between investment, interest rates and economic growth. (Lecture, 3 hours; Recitation, 1 hour). Minimum grade of "C" required in all economics pre-requisite courses.

Prerequisites: (21-256 and 73-100 Min. grade C) or (21-256 and 73-102 Min. grade C and 73-103 Min. grade C) or (21-259 and 73-100 Min. grade C) or (73-102 Min. grade C and 73-103 Min. grade C and 21-259)

73-255 Independent Study in Economics

Fall and Spring

The Independent Study course in economics allows students to pursue their own research interests in any of a variety of topics in economics. A typical independent study course involves a semester long project under the supervision of an appropriate faculty advisor. The nature and scope of the project are determined by the student and faculty advisor; the project proposal must be approved by an Undergraduate Economics Program staff member. Minimum grade of "C" required in all economics pre-requisite courses.

Prerequisites: 21-120 and 73-160 Min. grade C

73-258 Developing Blockchain Use Case

Intermittent; 6 units

Blockchains, or distributed ledger and consensus technologies, hold tremendous promise for improving markets and organically handling private, secure data. As CMU develops its own blockchain and token and #8212;-CMU Coin and #8212;-a central concern is to determine the set of applications that such technology would be most useful for. This course is designed for students to propose and, potentially, develop applications or use cases for a campus blockchain. <http://tinyurl.com/cmucoincourse> (<http://tinyurl.com/cmucoincourse/>) The course begins with a brief introduction to blockchain using Bitcoin as an example of a blockchain protocol. We will examine the market failure Bitcoin was intended to resolve as well as the role of cryptography and distributed systems in enabling this new technology to create societal value. The course will go on to discuss the boundaries of the role of cryptography in blockchain. Next, we will use these tools to evaluate existing, real-world blockchain use cases with an eye towards developing our own applications of these emerging technologies. Along the way, we will learn practical development skills in distributed ledger technologies to understand blockchain programming and application development. Finally, students will propose their own blockchain use cases for CMU's own proprietary blockchain. No formal prerequisites, but familiarity with programming is highly recommended.

73-265 Economics and Data Science

All Semesters; 9 units

This course is at the intersection of economic analysis, computing and statistics. It develops foundational skills in these areas and provides students with hands-on experience in identifying, analyzing and solving real-world data challenges in economics and business. Students will learn the basics of database and data manipulation, how to visualize, present and interpret data related to economic and business activity by employing statistics and statistical analysis, machine learning, visualization techniques. Students will also be taught a programming language suitable for data science/analysis. Databases will include leading economic indicators; emerging market country indicators; bond and equity returns; exchange rates; stock options; education and income by zip code; sales data; innovation diffusion; experimental and survey data and many others. Applications will include analyzing the effectiveness of different internet pricing strategies on firm sales, the impact of taking online classes on a worker's earnings, the relationship between regional employment and trade policies; constructing investment risk indices for emerging markets; predicting employee productivity with machine learning tools; assessing health (sleep and exercise) improvements associated with wearable technologies (e.g. FitBit). Additionally, the course will provide students with communication skills to effectively describe their findings for technical and non-technical audiences. Minimum grade of "C" required in all economics pre-requisite courses.

Prerequisites: (70-207 or 36-247 or 36-225 or 36-220 or 36-219 or 36-218 or 36-217 or 36-207 or 36-202 or 36-201 or 36-200 or 21-325 or 15-259) and 73-102 Min. grade C

73-270 Professional Communication for Economists

Fall and Spring; 9 units

A writing course specifically designed for second-year and third-year Economics majors and additional majors. Students gain experience with technical writing techniques and skills needed for both their eventual professional careers. The course emphasizes both individual and group projects. (Seminar, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses.

Prerequisites: (76-108 or 76-107 or 76-106 or 76-102 or 76-101) and 73-102 Min. grade C and 73-103 Min. grade C

73-274 Econometrics I

Spring; 9 units

Data tools are important in guiding decisions and strategies for individuals, businesses, and policymakers. This course will prepare you for data-driven decision making, providing both theoretical backgrounds and empirical illustrations of the techniques that are necessary to cope with real-world (imperfect) data. Specifically, the course covers tools and methods for estimating economic relationships, testing economic theories, and evaluating business and government policy. This course builds on either of the two Statistical Reasoning courses (36-200/201) and the Economics and Data Science course (73-265), and it sets underpinnings for Econometrics II (73-275) for more advanced tools and insights for business and economics data analyses. Students pursuing the ECOMTH or MTHECO degrees may enroll in 73-274 after the completion of 36-225. Minimum grade of "C" required in all economics and statistics pre-requisite courses.

Prerequisites: (21-269 or 21-256 or 21-259 or 21-268) and 73-265 Min. grade C and (73-240 Min. grade C or 73-230 Min. grade C)

73-315 Market Design

Intermittent: 9 units

In this course, we consider the design of various market mechanisms. We learn the typical causes of market failures and why we need to design new markets. For each topic, we start with a case study of a problem, develop a theory to address it, and consider its possible solutions. The class is roughly divided into three parts: matching, auctions, and further topics. In the first part, we study markets where there is no money and no prices (matching markets). Instead, we have people preferences over possible matching outcomes. Examples include placing doctors in residency positions, assigning students to schools, and assigning kidneys to transplant patients. We will learn algorithms that have desirable theoretical properties and are often used in practice. In the second part, we consider the problem of allocating of single or multiple goods (a house, a painting, or the rights to a natural resource such as oil or timber) using auctions. We discuss how different types of auctions work in theory and practice. We will look at the auctions used in financial markets to sell treasury bills, the auctions used by Google, Microsoft and Facebook to sell advertising, and the auctions used by governments to sell radio spectrum licenses. In the third part, we consider further important topics of market design. We will look into problems of high-frequency trading, digital markets, the allocation of refugees among European countries, and proposals to fix market for carbon pollution permits. An important goal of the course is to show how recent achievements of game theory and mechanism design lead to important practical applications and to inspire you to use these ideas in your life and workplace. (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses.

Prerequisites: (21-269 or 21-268 or 21-259 or 21-256) and 73-230 Min. grade C

73-327 Advanced Topics In Macroeconomics And Real Business Cycles

Intermittent: 9 units

For analysts and decision makers in a variety of positions, such as business managers and government policy makers, a thorough understanding of the economy as a whole helps to make well-informed decisions. Examples of important knowledge about the economy are its sources of growth, the main impulses that cause the economy to fluctuate over time and enter into booms and recessions, the way in which these impulses propagate over time, and the state of the economy in general. The main objective of this course is to lay the foundation for such an understanding and present a framework within which we can (and will) evaluate a variety of aggregate phenomena. Minimum grade of "C" required in all economics pre-requisite courses.

Prerequisites: (21-269 or 21-256 or 21-259 or 21-268) and 73-240 Min. grade C

73-328 Health Economics

Fall: 12 units

This course will teach the student to use economic analysis to understand critical issues in health care and health policy. We will address issues such as the following: 1. What factors best explain the level and rate of growth of U.S. health expenditures? 2. Does the recent high rate of growth of U.S. health care expenditures make U.S. firms less competitive in international markets? 3. What are some of the likely consequences (intended and unintended) of the proposed reforms to Medicare? 4. Can physicians induce demand for their services? 5. What are the impacts of managed care on the health care system? 6. Do strong affiliations between physicians and health plans hurt competition? (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses. Junior standing required.

Prerequisites: 21-120 and 73-102 Min. grade C

73-332 Political Economy

Spring: 9 units

The Political Economy course looks at how groups within society organize for self-governance. The course will begin with an overview of the ways groups of individuals organize for collective action by examining different types of political institutions, the role these institutions play in different contexts, and the economic and strategic micro-foundations that give rise to these institutions. We will then examine the empirical evidence supporting this taxonomy, leading to a more detailed consideration of institutions that moderate social conflicts. The next part of the course examines basic results in social choice theory: the Condorcet paradox, Arrow's Impossibility Theorem, majority rule, median voter theories, and modern treatments of probabilistic voting models that allow for strategic behavior, misrepresentation of preferences, and policy manipulation. From this basis for understanding collective choice mechanisms, we will then examine how institutions foster cooperation, looking in detail at problems of public goods allocation, redistribution of income, the organization of clubs - interest groups and lobbying associations and #8212;in the private sector, and the organization of legislative activities in the public sector. In our examination of voting and electoral mechanisms, we will look at practical applications of the theory to problems of gerrymandering, voter suppression, and propaganda that feature prominently in contemporary political discourse.

Prerequisites: (73-230 Min. grade C or 73-160 Min. grade C) and (36-201 or 36-200)

73-337 Business of Blockchain

Intermittent: 9 units

Economics and business strategy is fundamental for the design and development of blockchain use cases. This course will introduce students to foundational economic concepts to help them understand the role cryptocurrencies play in securing blockchains, how different "tokenomics" models impact cryptocurrency prices, the different means to create liquidity or resolve illiquidity in decentralized finance (DeFi) applications such as stablecoins, collateralized-lending, yield farming, or automated market making, the roles of Central Bank Digital Currencies, as well as models to evaluate the value-added of blockchain-based versus traditional business propositions. This course may use third-party course material that is not available for individual purchase from the publisher. If so, the third-party course material will be secured and provided by the Tepper School to students enrolled in the course, and students enrolled in the course will be required to pay to the University the associated additional course materials fee for the third-party course material provided. The amount of the course materials fee is dependent on the University's cost of the particular materials provided, and typically ranges from \$13 to \$75.

Prerequisites: 73-103 Min. grade C and 73-102 Min. grade C

73-338 Financial Crises and Risk

Fall: 9 units

This course provides an in-depth examination of the causes of financial crises as well as what governments can do to prevent them or at least reduce their cost. The course is designed to provide an understanding of individual attitudes towards risk and individual decision making about savings and investment under uncertainty, and to use this understanding to evaluate the various economic roles played by financial institutions in helping individuals manage risk, especially those roles which may lead to economic instability and crises. In addition, the course may cover bubbles and swindles, especially when these spillover to the broader macroeconomy; the role of information in banking in normal times and in bank runs; crisis resolution techniques; and the extensive history of attempts to improve regulation so as to reduce the frequency and cost of crises. (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses.

Prerequisites: (21-269 or 21-268 or 21-259 or 21-256) and 73-102 Min. grade C and 73-240 Min. grade C

73-341 Managing through Incentives

Intermittent: 9 units

We live in an exciting age of information and knowledge when inspiring employees within a firm becomes increasing important. Aligning the objectives of workers, managers, and owners by providing them with appropriate incentives becomes an emerging paradigm in the modern business world. In this course, we learn how to reason about incentives between managers and employees, between managers and owners, and within a team of co-workers. We cover a broad range of topics including objective and subjective performance measurements, relative performance evaluations, relational contracts, and executive compensation. The course relies on business case discussions, rigorous theoretical material, and numerous class activities. (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses.

Prerequisites: (21-259 or 21-268 or 21-269 or 21-256) and (36-217 or 36-225 or 36-218 or 36-219 or 36-220 or 36-200 or 36-207 or 70-207 or 36-202 or 36-201) and 73-230 Min. grade C

73-347 Game Theory Applications for Economics and Business

Fall: 9 units

An introduction to the theory of non-cooperative games with an emphasis on economic applications. After an initial examination of two-person, zero-sum games, the notion of a Nash equilibrium in an n-person, non-cooperative game is considered. Existence of and refinements to the equilibrium concept are discussed in the context of both normal and extensive form games. Economic applications may include various topics, including Cournot and Bertrand oligopoly models, general competitive exchange equilibrium, and free rider problems. (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses.

73-348 Behavioral Economics

Spring: 9 units

This course introduces students to behavioral economics which is a subfield of economics that incorporates insights from other social sciences, such as psychology, into economic models and aims to explain the anomalies challenging some of the classical economic models. (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses. Prerequisites: (36-200 or 36-225 or 36-207 or 36-217 or 70-207) and 21-120 and (73-102 Min. grade C or 73-100 Min. grade C)

73-352 Public Economics

Fall: 9 units

In this course, students analyze the role of governments in market economies and their impact on the behavior and welfare of citizens. Reasons for government intervention in markets are examined in light of some of the economic challenges faced by modern societies in an increasingly globalized marketplace. Topics include: taxation and expenditure policies, externalities and market failure, social security, public assistance and income redistribution programs. There will also be some coverage of the role of local governments in the economy with respect to such issues as crime, urban development and education. (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses. Prerequisites: (21-256 or 21-259 or 21-269 or 21-268) and 73-230 Min. grade C

73-353 Financial Regulation in the Digital Age

Spring: 9 units

The financial crisis and the digitalization of the financial markets have focused attention on the role of regulation for our financial system and the broader economy in recent years. Among the settings that are especially important in the digital economy are electronic trading, big data, algorithms, robo investing, winner-take-all economics, securities offerings, property rights and cyber assets. The course will address the foundations of regulation ("why regulate?") from various perspectives within a market economy, highlighting the sources of "market failure" (such as externalities, adverse selection, and natural monopoly) and potential remedies (such as disclosure, taxes and fees, antitrust prohibitions, privacy requirements, price regulation and guarantees). The conflicting goals among regulators (and why we have multiple regulators) and their impact on the meaning of regulation will be considered along with regulatory competition/arbitrage. Portions of the course will tackle relatively broad questions such as: Why regulate? Why could it be beneficial to restrict permitted algorithms? Are our markets rigged? How suitable are antitrust remedies in the digital era? What is the law of unintended consequences? What is the objective of a policy advocate? Are regulators and regulatory policies a systemic risk? How can regulators enhance the predictability and credibility of their policies? Should we bar insider trading? Should regulations be determined and motivated based upon cost-benefit analysis? How can we evaluate the success or failure of particular regulations and whether they have achieved their objectives? To what extent did the Dodd-Frank Act ensure financial stability?(Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses. Prerequisites: (21-268 or 21-269 or 21-259 or 21-256) and 73-230 Min. grade C

73-359 Benefit-Cost Analysis

Intermittent: 9 units

The evaluation of public private sector projects. The theory of benefit-cost analysis and related techniques, such as cost-effectiveness analysis. Attention is given to such issues as valuing goods and services that are not normally traded in the marketplace (e.g., the value of an individual's life) and the social rate of discount. Applications are considered in detail. (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses. Prerequisites: (73-102 Min. grade C or 73-100 Min. grade C) and (36-225 or 36-202 or 36-200 or 36-220 or 36-217 or 36-207 or 70-207)

73-365 Firms, Market Structures, and Strategy

Fall: 9 units

This course is concerned with the economic analysis of industrial markets that are not perfectly competitive. The effects of imperfect competition on firms' decisions (pricing, location, advertising, research and development, among others) are reviewed. Implications of these effects in terms of public policy are also discussed from a variety of perspectives. Finally, applications to actual markets are considered. (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses. Prerequisites: (21-269 or 21-259 or 21-256 or 21-268) and 73-230 Min. grade C

73-366 Designing the Digital Economy

Spring: 9 units

This class analyzes the economics of e-commerce and technology. It will identify the critical features that differentiate the technology firms from traditional industries, and examine the implications for business strategy. The class will discuss topics such as network effects, switching costs, and platform markets. To complement the economic theory, we will also consider a case study of a firm each week. These have three aims: to provide applications for the concepts developed in the lectures; to inform you about different industries; and to help develop your written, rhetorical and presentation skills. Minimum grade of "C" required in all economics pre-requisite courses. Prerequisites: (21-268 or 21-269 or 21-259 or 21-256) and 73-230 Min. grade C and (36-208 or 36-220 or 36-226 or 70-208 or 73-265 Min. grade C or 73-274 Min. grade C or 73-374 Min. grade C or 73-407 Min. grade C or 36-202)

73-369 Islamic Economics

Intermittent: 9 units

This course is designed to introduce students to the basics of Islamic Finance. The course will start with an analysis of the Shariah rules that define Islamic Finance. Students will then look at the main investment structures and map these against the traditional conventional banking products. The course wraps up with a critique of complex project finance structures through a Shariah compliance lens to identify the gaps between theory and practice.

73-374 Econometrics II

Fall: 9 units

The material covered in this course extends from the material covered in Econometrics I (73-274). The course will include both the theory behind the methods and a hands-on analysis of actual data, providing students the tools for both research and industry jobs. Theories and methodologies covered will include: nonlinear regression models, qualitative response regression models, panel data estimators, simultaneous-equation models, and time series. (Lecture, 3 hours; Recitation, 1 hour). Minimum grade of "C" required in all economics and statistics pre-requisite courses. Prerequisites: (21-268 or 21-259 or 21-256 or 21-269) and 73-230 Min. grade C and 73-274 Min. grade C

73-395 Independent Study in Economics

Fall and Spring

The Independent Study course in economics allows the student to pursue his or her own research interests in any of a variety of topics in economics. A typical independent study course involves a semester long project under the supervision of an appropriate faculty advisor. The nature and scope of the project are determined by the student and faculty advisor. Minimum grade standard of "C" applies only to economics courses. Prerequisites: (21-269 or 21-268 or 21-259 or 21-256) and (73-230 Min. grade C or 73-240 Min. grade C)

73-408 Law and Economics

Intermittent: 9 units

This course will provide a broad overview of the scholarly field known as "law and economics." The focus will be on how legal rules and institutions can correct market failures. We will discuss the economic function of contracts and, when contracts fail or are not feasible, the role of legal remedies to resolve disputes. We will also discuss at some length the choice between encouraging private parties to initiate legal actions to correct externalities and governmental actors, such as regulatory authorities. Extensive attention will be given to the economics of litigation, and to how private incentives to bring lawsuits differ from the social value of litigation. The economic motive to commit crimes, and the optimal governmental response to crime, will be studied in depth. Specific topics within the preceding broad themes include: the Coase Theorem; the tradeoff between the certainty and severity of punishment; the choice between ex ante and ex post sanctions; negligence versus strict liability; property rules; remedies for breach of contract; and the American rule versus the English rule for allocating litigation costs. (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses. Prerequisites: 21-120 and 73-102 Min. grade C

73-415 Data Driven Business and Public Policy Decision Making

Intermittent: 9 units

In this course students will learn to leverage data to inform business and policy decisions. The course will teach students various methods for data description, including techniques of data visualization and statistical techniques. Students will learn how to assess the precision of estimation techniques. The final part of the course covers examples taken from epidemiology, economics, business and public policy. (Lecture, 3 hours; Recitation: 1 hour). Minimum grade of "C" required in all economics and statistics pre-requisite courses.

Prerequisites: (21-268 or 21-259 or 21-269 or 21-256) and 73-230 Min. grade C and 73-265 Min. grade C

73-421 Emerging Markets

Fall: 9 units

The goal of the course is to study the economic and institutional forces that spur or hinder business activity and growth in emerging economies. The course is designed to provide both quantitative and theoretical foundations for the study of emerging markets. On the quantitative side, the course will introduce students to the empirical analysis of the growth forces and obstacles facing emerging markets by providing numerous hands-on opportunities using real-world data. On the theory side, the course will provide an overview of fiscal, trade and exchange rate policies adopted in emerging economies. The course will focus on successful emerging economies such as India, China, S. Korea and Ireland with broader lessons and comparisons drawn from developed countries. The course will also look at distressed economies, such as North Korea and Venezuela analyzing the challenges and opportunities faced by these developing nations today. (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses.

Prerequisites: (36-207 or 36-200 or 36-202 or 70-207 or 15-259) and 73-102 Min. grade C and 73-103 Min. grade C

73-423 Forecasting for Economics and Business

Spring: 9 units

Governments forecast economic indicators (e.g., GDP, job growth, etc.); businesses forecast sales; portfolio managers forecast asset return; the list goes on. Accurate forecasts are critical to robust organizational decision-making. This course will introduce students to modern methods for forecasting in economic and business applications. Topics covered include Bayesian, statistical, and online learning approaches to forecast construction and assessment, univariate and multivariate time series models and algorithms, and principled combination of multiple methods and data sources along with subject matter expertise to improve performance. Methods will be motivated by applications in macroeconomics, technology, marketing, and finance, with cases drawn from forecasting processes in a variety of business and government organizations. Students will implement forecasting methods in R, including in a real data forecasting competition. Prerequisites: (21-268 or 21-259 or 21-256 or 21-269) and (73-230 Min. grade C or 73-240 Min. grade C or 73-274 Min. grade C)

73-427 Sustainability, Energy, and Environmental Economics

Fall: 9 units

Topics related to sustainability and the environment are increasingly important to businesses, policymakers, and the general public. This course applies the tools of economic analysis to the problems of environmental protection, natural resource management, and energy production and use. The course will begin by introducing students to how an economist approaches problems of market failure commonly found in environmental contexts. Next, we will explore models that characterize solutions to such environmental issues. We will then address questions regarding measurement, policy design, and, finally, we will apply the tools that we have developed during the semester to the problems of climate change, and the optimal management of non-renewable resources. (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses.

Prerequisites: (73-102 Min. grade C or 73-100 Min. grade C) and (36-207 or 36-202 or 36-200 or 36-217 or 36-225 or 70-207 or 36-220)

73-469 Global Electronic Markets: Economics and the Internet

Fall: 9 units

The information revolution brought about by the Internet is having a dramatic impact on the organization of economic activity. Long-term contractual relationships that once governed corporate procurement are being dismantled as manufacturers use the Internet to market directly to the public. New transportation networks that used to simply move goods from point A to point B are evolving into dynamic inventory pipelines that allow manufacturers to track and even reroute shipments in real time. At the same time, individuals are making use of sophisticated search engines to comparison shop at a scale that would have been physically exhausting even five years ago. We will use the basic tools of economic analysis to understand how and why the changes in information technology are reshaping the economic landscape. (Lecture, 3 hours). Minimum grade standard of "C" applies only to economics courses.

Prerequisites: (21-268 or 21-256 or 21-259 or 21-269) and (73-230 Min. grade C or 73-160 Min. grade C)

73-476 American Economic History

Fall: 9 units

The study of economic history provides important perspective on current economic institutions and policies. A failure to understand the historical evolution of economic institutions or the variety of past economic experience is perhaps the worst shortcoming of many economists. The study of economic history provides an opportunity to test currently fashionable theories against data different from those used in their construction. In fact, this is a course in applied economics. The theories developed in the intermediate courses will be applied to episodes from the past in ways that increase understanding both of the specific historical episodes considered and the economic theories employed. (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses.

Prerequisites: 21-120 and (73-160 Min. grade C or 73-230 Min. grade C)

73-495 Advanced Independent Study in Economics

All Semesters

The Independent Study course in economics allows the student to pursue his or her own research interests in any of a variety of topics in economics. A typical independent study course involves a semester long project under the supervision of an appropriate faculty advisor. The nature and scope of the project are determined by the student and faculty advisor. Minimum grade standard of "C" applies only to economics courses.

Prerequisites: (21-259 or 21-268 or 21-269 or 21-256) and (73-230 Min. grade C or 73-240 Min. grade C)

Course Website: <http://tepper.cmu.edu/prospective-students/course-page/73495/advanced-independent-study-in-economics> (<http://tepper.cmu.edu/prospective-students/course-page/73495/advanced-independent-study-in-economics/>)

73-497 Senior Project

Fall: 9 units

A fourth-year project course, open only to Economics primary and additional majors with Senior standing. The senior project is a capstone course in economics. The purpose of the course is to showcase the analytical and quantitative skills that you have acquired as an undergraduate at Carnegie Mellon. The course project should reflect some independent applied research that is genuinely your own work. Thus a "book report" or a "literature review" are not sufficient exercises to satisfy this requirement. The following research approaches are acceptable for the research project: an empirical study based on a data set that you put together, an experimental study based on an experiment that you conducted, an analysis of survey data based on a survey that you conducted, a theoretical analysis based on a model that you have developed, based on your own algorithm. Students who write an honor thesis are exempted from this class. (Lecture, 3 hours). Minimum grade of "C" required in all economics pre-requisite courses.

Prerequisites: (21-269 or 21-268 or 21-256 or 21-259) and (73-407 Min. grade C or 73-374 Min. grade C or 73-274 Min. grade C or 73-265 Min. grade C or 36-226 or 36-303) and 73-230 Min. grade C and 73-240 Min. grade C

73-500 Tepper College Honors Thesis I

Fall and Spring

Economics majors with outstanding academic records and intellectual promise will be given the opportunity to undertake original research under the direction of individual faculty members. Research topics are selected by students and approved by faculty. Prerequisites: Senior standing in the Economics Program and permission of the Economics faculty. Minimum grade of "C" required in all economics and statistics pre-requisite courses. Prerequisites: (21-256 or 21-259 or 21-268 or 21-269) and (73-265 Min. grade C or 73-274 Min. grade C or 36-226 Min. grade C) and 73-230 Min. grade C and 73-240 Min. grade C

73-501 Tepper College Honors Thesis II

Fall and Spring

Economics majors with outstanding academic records and intellectual promise will be given the opportunity to undertake original research under the direction of individual faculty members. Research topics are selected by students and approved by faculty. Prerequisites include: Senior standing in the Economics Program and permission of the Economics faculty. Minimum grade of "C" required in all economics and statistics pre-requisite courses, and a minimum grade of "B" required in Tepper College Honors Thesis I. Prerequisites: (21-256 or 21-259 or 21-268 or 21-269) and 73-230 Min. grade C and 73-240 Min. grade C and 73-500 Min. grade B and (73-265 Min. grade C or 73-374 Min. grade C)