Undergraduate Business Administration 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.

70-100 Global Business
Fall and Spring: 9 units
The course is for non-Tepper BA students and provides a comprehensive overview of business, including how enterprises determine goals, strategies and operational tactics in competitive markets and the increasingly global environment. It covers different types of businesses - entrepreneurial and corporate, industries, markets, and economies. Students learn about the role of business in society, the various functional areas that make business work, and how companies develop plans and processes to achieve their goals for customers, shareholders, and employees. The course has special emphasis on providing a broad overview of business to augment students major area of study for their professional development. Declared Tepper BA students are not eligible to enroll.

70-104 Business Leadership Endeavor I
Fall and Spring: 3 units
Business Leadership Endeavor (BLE) is a required 3-mini course sequence (70-104, 70-204, 70-304) offered to undergraduate business students only. BLE 70-104 is the first mini of the BLE course sequence. Each previous mini will serve as a pre-requisite for the next in sequence. BLE introduces students to their leadership journey via four development frameworks: student development, personal development, professional development, and community development. BLE 70-104 will introduce students to the fundamental building blocks required for their development. Students will learn to develop and improve habits, sharpen personal and professional development skills, and develop meaningful networks.

70-105 Business Leadership Endeavor: Intern
Intermittent: 1 unit
Business Leadership Endeavor (BLE) is a 3-year undergraduate business course sequence that provides personal development and professional preparation. 70-105 Business Leadership Endeavor: Intern starts the BLE sequence, ideally in the first year. Students in 70-105 become familiar with leadership competencies that will contribute to achievement of personal goals, conduct a self assessment and put together a personal development plan. Students should expect to devote a minimum of 18 hours to preparation of their personal development plan, including attendance at class, events and presentations, self assessment, learning about activity opportunities, and discussing options with upper class students for completion over their sophomore and junior years. The outcome of the 70-105-205-305 BLE course sequence is student readiness for a professional life of leadership and global citizenship. This course is available to business students only.

70-106 Business Science
Fall: 9 units
This course is Business Science. It will prepare Tepper Business Majors for the study of business to come. The focus on the class is on the three core ‘lenses’ used to study and advance the science and practice of business. We will study: the mathematics of optimization, economics, and the behavior in and of organizations. These are the foundations of the disciplines of finance, accounting, marketing, …, that follow in the curriculum. Over the course of the semester, we will tackle complex multifaceted business problems. Think of examples like, bike-share and the ‘share-economy,’ international trade and supply chain, AI and the impact on work. For each case, we will work to apply the three lenses. A pillar for the semester is that business problems are not siloed in narrow disciplines, we must draw resources from disciplines across the entire university. The second pillar of our class is solving all problems - across all of society - requires your understanding of business science.

70-110 Business Computing
Intermittent: 9 units
Students will learn how individuals and organizations use computing technologies to support and improve their businesses. At an individual level, students will build their skills with Microsoft Excel and other personal productivity tools. At an organizational level, the class looks at ways in which businesses of all sizes and types leverage computing technologies to run their businesses more efficiently, make better business decisions, and create new business opportunities. This course is reserved for first-year Business students; others may enroll by special permission from the UBA office only.

70-122 Introduction to Accounting
Intermittent: 9 units
This course provides the knowledge and skills necessary for the student to understand financial statements and financial records and to make use of the information for management and investment decisions. Topics include an overview of financial statements: the income statement, the balance sheet, the income statement, and the cash flow statement; sales revenue, receivables, and cash; cost of goods sold and inventory; long-lived assets and depreciation, and amortization; current and long-term liabilities; owners’ equity; investments in other corporations; an introduction to financial statement analysis and international issues dealing with financial statements.

70-160 Graphic Media Management
Intermittent: 9 units
This course covers fundamental topics related to graphic media. Modern graphic techniques are studied in context of the historical developments that underlie them. The greatest emphasis is placed on the current graphic processes, but studying their historical development gives the learner better understanding of their applications today, as well as a sense of the direction in which technology can be expected to move in the future. Information from this course can provide professionals in all industries with tactical advantages in choosing among graphic media options when allocating their media budgets. This course is designed to equip students with a measure of graphic literacy, which refers to the skills and knowledge needed to produce graphic documents that enhance the communication aims of the author. Graphic literacy is an invaluable skill for success in the communication age wherein most professionals are engaged in some aspect of producing graphic documents. Topics of investigation include: traditional printing methods, typography, color reproduction, digital photography, digital cinema, papermaking, electronic paper, graphic displays, inks & coatings, finishing techniques, document security, electrophotographic printing, inkjet printing, large format printing, and holography. Open to undergraduates of all class years. No prerequisites.

70-196 Publishing on the World Wide Web
Intermittent: 9 units
This is an introductory course in Publishing on the World Wide Web. The class has both a classroom component and a lab component. Over the past two decades, the World Wide Web has become an essential communications venue for private individuals and businesses alike. The classroom component of this course examines a variety of topics related to web publishing including: the design and usability of web sites, the appropriate use of file formats, the emergence of e-commerce, the integration of other media, the increased use of mobile devices, the sudden rise of social media, the increased use of 3D environments on the web, the delivery of streaming media across the web, and other topics. The lab component of the class takes the students through a series of exercises beginning with HTML and CSS and progressing to the use of Adobe Dreamweaver, one of the premiere web development software programs. Students use these tools to make well-designed functional websites exhibiting the principles learned in the classroom component of the class. The students are instructed in some of the latest web publishing methods, such as the use of HTML5, CSS3, and fluid grid design which allows the same HTML file to be automatically reconfigured for mobile devices, tablets, and desktop computers. Scripting languages and the development of databases for websites are beyond the scope of this class. Open to undergraduates of all class years. No prerequisites. Formerly course number 70-643.
70-201 Professional and Service Projects  
Intermittent: 9 units  
This course is designed to improve your effectiveness as a professional and engage you in activities by which you can explore the value of service in professional development. Professional service broadens one’s opportunities to improve their skills and knowledge through practice, helps one to develop networks of high social capital, allows one to experience and explore activities vital to the development of leadership abilities, and promotes awareness about community involvement and social responsibility in one’s professional life. The primary mechanism to achieve this will be via participation in a semester long group project focused on analyzing an issue/opportunity within an organization of your choice and designing an implementation plan along with recommendations. Course topics will expose you to skills that are needed in order to be successful in the real world.

70-204 Business Leadership Endeavor II  
Intermittent: 3 units  
Business Leadership Endeavor (BLE) is a required 3-mini course sequence offered to undergraduate business students only. BLE 70-205 is the second mini of the BLE course sequence. Each previous mini will serve as a pre-requisite for the next in sequence. BLE introduces students to their leadership journey via four development frameworks: student development, personal development, professional development, and community development. BLE 70-205 will help students assemble their fundamental building blocks in a way that supports their continued development. The course will continue to emphasize the importance of strong habits, meaningful networks, and ongoing skill development. Students will begin to connect this development with personal and professional goals.

70-205 Business Leadership Endeavor II  
Intermittent: 4 units  
Business Leadership Endeavor (BLE) is a required 3-mini course sequence offered to undergraduate business students only. BLE 70-205 is the second mini of the BLE course sequence. Each previous mini will serve as a pre-requisite for the next in sequence. BLE introduces students to their leadership journey via four development frameworks: student development, personal development, professional development, and community development. BLE 70-205 will help students assemble their fundamental building blocks in a way that supports their continued development. The course will continue to emphasize the importance of strong habits, meaningful networks, and ongoing skill development. Students will begin to connect this development with personal and professional goals.  
Prerequisite: 70-105

70-207 Probability and Statistics for Business Applications  
Spring and Summer: 9 units  
Elementary ideas in probability, statistics, and data analysis are presented in the context of their importance to modern business management. Prerequisites: 21-120 or 21-112  
Course Website: http://tepper.cmu.edu/prospective-students/course-page/70207/probability-and-statistics-for-business (http://tepper.cmu.edu/prospective-students/course-page/70207/probability-and-statistics-for-business/)

70-208 Regression Analysis  
Fall and Summer: 9 units  
This class focuses on the statistical analysis of the relationship between two or more random variables. In particular, we examine the estimation of the conditional mean of the dependent variable as a function of independent variables using linear regression. We draw on statistical theory to determine the precision of our estimates and to conduct inference about the population, and we examine a number of applications to business, finance, and economics throughout the course. Prerequisites: (21-120 or 21-112) and (36-218 or 36-247 or 36-207 or 36-220 or 70-207 or 36-201 or 36-200) and (73-100 or 73-102)  
Course Website: http://tepper.cmu.edu/prospective-students/course-page/70208/regression-analysis (http://tepper.cmu.edu/prospective-students/course-page/70208/regression-analysis/)

70-246 Innovation & Entrepreneurial Mindset  
Fall and Spring: 6 units  
This course is designed to introduce students to the theory and frameworks used to develop and implement innovative solutions to societal and entrepreneurial problems. The curriculum incorporates the latest on innovative behavioral traits and frameworks with a highly experiential format to expose undergraduate students to out of the box thinking. For example, the instructor would use the lecture section of the class to explain the behavioral techniques that lead to innovative solutions (based on the Innovator’s DNA by Clayton Christensen). Teams of 3-6 students each would then examine a problem and be asked to generate 3 potential solutions and a proposed solution, using the techniques presented. Volunteers from the local Carnegie Mellon and entrepreneurial community will serve as mentors and judges, thereby providing a real world learning and networking experience. Ultimately, the best solution will be selected, using a shark tank format. While the selection of a winning solution will be fun for the class, the students will be graded on their having demonstrated the theory & techniques presented in class. Each week will address a new and important topic related to the innovative & entrepreneurial mindset. Weekly format will include one day of lecture and one day of application of the theory introduced in a fun and competitive format.

70-257 Optimization for Business  
Intermittent: 9 units  
This course provides a mathematical foundation for the application of optimization techniques to business problems, as well as the practical implementation of these methods. Mathematical optimization techniques have been applied for decades in the context of logistics, supply chain management, and strategic planning, with great success. In recent years, the application of mathematical optimization has penetrated, and in some cases (re-)defined, many other areas such as the (financial) service industry, analytical marketing, health care, and web-based businesses. In this course, the most important methods and techniques underlying mathematical optimization are studied. These include linear programming, integer programming, and nonlinear programming as basic mathematical methodologies. Based on these, we also consider methodologies for particular problem classes such as network models and traveling salesman problems. During the course we will emphasize mathematical modeling, that is, creating a mathematical description that reflects a given practical problem described in words. Motivated by these mathematical models, we then discuss the necessary mathematical techniques for finding optimal solutions. Lastly, we consider the solution of these problems using optimization software, i.e., we represent the mathematical models in Excel and use Excel Solver to compute an optimal solution. Prerequisites: 21-259 or 21-256

70-258 Developing Blockchain Use Case  
All Semesters: 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—CMU Coin—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 technology 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.

70-304 Business Leadership Endeavor III  
Intermittent: 3 units  
Business Leadership Endeavor (BLE) is a required 3-mini course sequence offered to undergraduate business students. BLE 70-305 is the third mini of the BLE course sequence. BLE introduces students to their leadership journey via four development frameworks: student development, personal development, professional development, and community development. BLE 70-305 will continue to build strong personal and professional skills as students get closer to their professional endeavors. Students will be applying learned skills in and out of the classroom and will begin to see the how the assembled skills are beneficial to themselves and others. This course will emphasize the importance of continued broad growth and lifelong learning.
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70-305 Business Leadership Endeavor III
Fall and Spring: 4 units
Business Leadership Endeavor (BLE) is a required 3-mini course sequence offered to undergraduate business students. BLE 70-305 is the third mini of the BLE course sequence. BLE introduces students to their leadership journey via four development frameworks: student development, personal development, professional development, and community development. BLE 70-305 will continue to build strong personal and professional skills as students get closer to their professional endeavors. Students will be applying learned skills in and out of the classroom and will begin to see how the assembled skills are beneficial to themselves and others. This course will emphasize the importance of continued broad growth and lifelong learning.
Prerequisite: 70-205

70-311 Organizational Behavior
Intermittent: 9 units
This course examines the factors which influence individual, group and firm behavior in the context of the workplace. Topics covered include perception, group behavior, decision making, motivation, leadership and organizational design and change.
Prerequisites: 76-102 or 76-101 or (76-107 and 76-106) or (76-108 and 76-106) or (76-108 and 76-107) or 76-245 or 76-331 or 76-347 or 76-327 or 76-102

70-321 Negotiation and Conflict Resolution
Intermittent: 9 units
This course will complement the technical and diagnostic skills you have learned in other courses. A basic premise of the course is that, while you will need analytical skills to discover optimal solutions to problems, you will also need a broad array of negotiation skills to implement these solutions and make sure that they are truly effective. Your long-term effectiveness - both in your professional and personal life - is likely to depend on your negotiating abilities. This course will give you the opportunity to develop these skills experientially and to understand the analytical frameworks that underlie negotiations.
Prerequisites: 76-102 or 76-101 or (76-106 and 76-107) or (76-108 and 76-108) or (76-107 and 76-108)

70-332 Business, Society and Ethics
Intermittent: 9 units
This course explores the impact of business on society and society's impact on business. The external forces affecting business entities include legal requirements and legal rights, community expectations, ethical norms and cultural factors.
Prerequisites: 76-102 or 76-101 or (76-106 and 76-107) or (76-108 and 76-108) or (76-107 and 76-108)

70-339 FinTech
Intermittent: 9 units
The financial services industry is a leader in the use of information technology. Firms in banking, securities, investments, insurance and financial marketplaces are among the most information intensive and innovative users of technology. The course will examine the role and potential of technology in this industry. The course begins with a description of the financial markets, specifically equity, foreign exchange, and derivatives, and the systems that enable them. It considers exchanges, ECNs, ATS's Order Management Systems, Straight through Processing, Fix Protocol, and post trading clearance and settlement. It covers the design, evaluation and execution of popular trading strategies that are used by professionals in the various markets. There is increasing interest, in particular, on systematic trading strategies and execution systems because of their scalability and transparency. The course covers both Algorithmic and High Frequency Trading and analyzes issues regarding latency, scalability, and reliability.
Prerequisite: 70-391

70-340 Business Communications
Intermittent: 9 units
Business Communications develops and sharpens your written, oral, and interpersonal communication, introducing you to common forms of professional writing and speaking in specific business situations. The course explores crucial rhetorical issues that impact your ability to communicate and achieve your objectives as a business leader.
Prerequisites: 76-102 or 76-101 or (76-107 and 76-106) or (76-108 and 76-106) or (76-108 and 76-107)

70-341 Team Dynamics and Leadership
Intermittent: 9 units
Organizations have greatly expanded their use of teams to accomplish a wide variety of objectives. Teams develop new products, provide professional services, and start new businesses. Temporary teams are frequently assembled to make difficult decisions, solve cross-functional problems, and generate new ideas. Advances in communication technology allow people dispersed across the globe to collaborate virtually, creating many new opportunities and challenges for leaders of such teams. This course will provide you the knowledge and skills to communicate in teams and to lead them effectively. It will help you better communicate in and lead teams and organizations. You will learn both effective leadership practices as well as how to avoid common leadership mistakes. Our readings reflect both the scientific and practice literatures and class exercises, cases, and projects provide the opportunity to apply what you learn.
Prerequisites: 36-220 or 36-247 or 36-200 or 36-201 or 36-207 or 36-217 or 70-207 or 36-225
Course Website: http://tepper.cmu.edu/prospective-students/course-page/70341/organizational-communication/(http://tepper.cmu.edu/prospective-students/course-page/70341/organizational-communication/)

70-342 Managing Across Cultures
Spring: 9 units
This course is designed for students who expect to do business in other countries or work with people from other cultures. It provides an intellectual framework for understanding other cultures (and eventually one's own), as well as detailed studies of particular countries. It discusses how culture defines organizations, contracts, personal relationships, attitudes toward authority, time and space, ethics, wealth, and subcultures, and how these affect business. Student teams study a culture of their choice and make presentations, based on interviews and literature research.
Prerequisites: 76-101 or 76-102 or (76-108 and 76-107) or (76-107 and 76-106) or (76-108 and 76-106)

70-345 Business Presentations
Intermittent: 9 units
In this course, students prepare, present, discuss, and critique different oral presentations currently practiced in business. Topics include developing your presence in a professional setting; projecting credibility, professionalism, and authority; and planning presentations to influence business audiences. Assignments and cases will cover informative and persuasive presentations, which will vary from term to term and may include talks such as product pitches, team-driven strategic plans, and state-of-the-company addresses.
Prerequisites: 73-270 or 70-340

70-347 Publishing Management in the Information Age
Fall and Spring: 9 units
In this course, the publishing industry is studied from a variety of perspectives, but, primarily, with reference to the changes that have been caused by the phenomenon referred to as the information age. The information age is characterized by the ability of individuals to transfer information freely and have instant access to knowledge that would have been difficult or impossible to find previously. The digitization of information and the rise of electronic media have confounded the traditional publishing houses who have struggled to find their footing in this new environment. The information age has also provided new forms of information dissemination and inexpensive means of self-publishing and on-demand publishing. This course examines the history of the publishing industry in western society including books, magazines, and newspapers. It then looks at the disruptive effect that the information age has had in this industry and at the new publishing paradigms that are evolving to take advantage of digital media. The course also includes lab experiences using Adobe InDesign to help students develop skills in designing and preparing pieces for publication by a variety of media. The lab experiences culminate in an independently published book that is written, designed, and assembled entirely by the students in this course. The book stands as a showcase for the research and journalistic skills of the students, as well as a clear demonstration of the students' proficiency in the content and skills taught in this course. Although this course is open to undergraduates of all class years, it is aimed at 3rd and 4th year students. No prerequisites. The course has been previously listed as number 70-194.
70-348 Cross-Cultural Business Communications
Intermittent: 9 units
This course considers cultural behaviors, assumptions, values, and conflicts surrounding business communication across cultures. It will begin with an evolving definition of culture and consider several cultural variables that may affect communicative success (i.e. collectivist/individualist cultures, high-/low-context languages, monochronic/polychronic cultures). Students will research and present findings on the characteristics of specific cultures. They will prepare business documents and presentations that build on the knowledge and skills acquired in 70-340, Business Communication, and reflect new sensitivities to the needs of specific cross-cultural audiences. This course is offered only at the Carnegie Mellon-Qatar campus.
Prerequisites: 15-221 or 70-340 or 76-270

70-349 Color Reproduction & Management
Intermittent: 9 units
Today, we are bombarded by color media in many forms. In the competitive advertising world, the accurate reproduction of color in various media is both a challenge and a necessity. This course examines topics related to the use of color and its reproduction in a variety of media, including photography, print, television, cinema, the Internet. Of prime importance are issues related to the successful specification, transfer, measurement, and application of color to maximize communication efficiency. Students will study the physical nature of light and properties of color, as well as the control parameters for optimum color realism will be examined. Modern methods for managing color files to achieve consistent color appearance through different media will be an integral part of this course. The course contains a laboratory component consisting of a series of in-depth exercises in Adobe Photoshop giving students an opportunity to apply color correction and image manipulation techniques, and to become more adept at using this important software tool. Although this course is open to undergraduates of all class years, it is aimed at 3rd and 4th year students.

70-350 Acting for Business
Intermittent: 9 units
Perception may or may not be Reality. But Perception is, in fact, what Influences people. This experiential communications course focuses on how you as a Leader can choose to more effectively express yourself & influence others using practical, hands-on tools from Acting in professional, live Theatre. You will choose to effectively Influence your Listeners' perception of you through the use of: 'Action'; Assertiveness, Confidence & Expressiveness (ACE); the Visual, Aural & Temporal Communication Tools; and the incorporation of The Seven Steps Of Effective Influence (or core competencies).

70-352 Business Acting
Spring: 3 units
This is a one-week course that is offered only at CMU in Qatar. This course provides a uniquely broadening educational experience for business students through an exploration & understanding of the process of Acting & the unique performance/audience relationship. Using techniques of Acting, the course will concern itself with: a new self-awareness & greater confidence in public communication; the expansion & diversification of one's range of personal expression; methods to more effectively shape a public performance & of empowering the student to put his/her best Self forward when in contact with an audience; & a re-investment in passion.

70-364 Business Law
Intermittent: 9 units
This course covers the fundamental principles of law that govern business affairs in the United States, with some reference to the laws of other countries. The topics include constitutional sources of business law, administrative agencies, contract law, agency, employment, business forms (corporations, partnerships, limited partnerships, limited liability companies, agency arrangements, franchises), intellectual property and unfair competition, legal liability of professionals, international trade and antitrust.
Prerequisites: 70-340 or 76-102 or 76-101 or (76-106 and 76-107) or (76-108 and 76-106) or (76-107 and 76-108)

70-365 International Trade and International Law
Intermittent: 9 units
This course discusses the international legal system and laws that affect international trade. It covers the Foreign Corrupt Practices Act, treaties and concessions, shipping and customs, appointment of foreign sales agents, resolution of trade disputes, international mergers and joint ventures, international competition law, UN sales convention, international trade organizations (IMF, WTO, World Bank, etc.), risk insurance, cultural factors, international E-Commerce and intellectual property.
Prerequisites: 73-100 or 73-102

70-366 Intellectual Property and E-Commerce
Intermittent: 6 units
The course is intended to instruct students on the creation of the Internet and the World Wide Web, including the creation of the Domain Name System. The course will provide an understanding of how the WWW 'Web' operates (from its creation to the present), how the laws of various countries interact with the Web; how issues of privacy are addressed and the role of private parties and government in monitoring privacy. The course will examine how intellectual property is created and protected; who owns the property; and the role of ownership of the intellectual property interacts with antitrust laws. The course examines how contracts are formed and administered on the Web by entities created to minimize taxes and personal liability risks for the owners/shareholders of those entities.
Prerequisites: 76-102 or 76-101 or (76-106 and 76-107) or (76-108 and 76-106) or (76-107 and 76-108)

70-371 Operations Management
Fall and Spring: 9 units
This course is an introduction to production and operations management that covers both manufacturing and services. It deals with strategic issues (design of flexible supply), planning issues (capacity management), and operational issues (inventory management and information). The linkage between strategy and tactics will be emphasized. The students will learn concepts and tools that will help them to manage from the 'boardroom' to the 'toolroom.'
Prerequisites: 36-220 or 36-247 or 36-225 or 36-207 or 36-200 or 36-201 or 70-207 or 36-218

70-374 Data Mining & Business Analytics
Intermittent: 9 units
Interest in big data analytics has skyrocketed recently. The recent explosion in large-scale high-resolution data enables managers to ask and answer questions regarding businesses and consumers at a whole new level. Managers are faced with data about businesses and consumers that are growing faster than they can be utilized. Data mining enables business to extract useful consumer behavior and preferences from seemingly tremendous and unorganized data, which then can be utilized for data-driven decision-making and competitive advantage. Applications can be found in e-commerce, sales, marketing, finance, operations, etc. In this hands-on introductory class, you will learn the basic concepts and techniques of data mining in addition to when and how they can be applied to improve many aspects of business and consumers' welfare. Throughout the course, we will use R, a powerful open-source statistical language and one of the main tools in data mining and business analytics, fast becoming a mainstream tool. With this tool, you will learn about variety of exploratory and predictive data analytics techniques such as Naive Bayes classifier, nearest neighbor approaches, decision trees, clustering algorithms, etc.
Prerequisites: 36-202 or 36-208 or 70-208

70-376 Energy Systems
Fall: 9 units
This course will provide students with an understanding of the systems and markets that provide energy to businesses and consumers. Students will be introduced to the sources and uses of energy, and how they have evolved and the possible paths over which they may evolve in the next decades. This course places an emphasis on electric energy, the single largest energy source in many industrial economies, but also covers natural gas, oil, and selected other primary energy sources. Students will learn the energy flows in the USA and the world, as well as the business-relevant characteristics of the engineered systems that provide the energy in various forms. Both traditional and emerging energy sources will be discussed, and students will understand the difference between an energy carrier and an energy source. We will also discuss some of the issues that arise without proper management of the physical risks of energy systems. Students will learn some of the history of electric power regulation and the inconsistent subsidy structures that have provided opportunities and challenges for energy companies and investors, including discussion of how emissions restrictions affect fuel, engineering, investment, and project finance choices. The history of electric power markets will be discussed, with an eye to examining the opportunities that market changes create for business.

Course Website: http://tepper.cmu.edu/prospective-students/course-page/70376/energy-systems (http://tepper.cmu.edu/prospective-students/ course-page/70376/energy-systems/)
70-381 Marketing I
Fall and Spring: 9 units
An introduction to the nature and fundamentals of marketing and consumer behavior. Topics include an analysis of the economic and psychological factors influencing buyer behavior, marketing research, market segmentation, and the development of marketing programs (new product, price, advertising and distribution decisions).
Prerequisites: 76-102 or 76-101 or (76-107 and 76-106) or (76-106 and 76-108) or (76-107 and 76-108)

70-385 Consumer Behavior
Intermittent: 9 units
Marketing, in particular, begins and ends with the consumer from determining consumer needs to ensuring customer satisfaction. In this course, we will explore the most recent scientific research in marketing, psychology, and behavioral economics on judgment and decision-making. We will develop your ability to understand and influence what people want, how people decide what and when to buy, and whether people will be satisfied or dissatisfied with their decisions. These psychological insights are particularly useful for marketing strategy, brand positioning, and marketing communication decisions, but also yield insight into common biases in judgment and decision making, beyond marketing, to which you would otherwise fall prey. Why are people willing to drive across town to save $5 on a tank of gasoline, for example, when they would not drive a minute to save $5 on a refrigerator? We will discuss some of these applications in class. In addition, we will examine the methodology of market research (specific to consumer behavior) to build the tools you will need to interpret and base decisions on it.
Prerequisite: 70-381

70-386 Applied Behavioral Decision Making For Business
Intermittent: 6 units
This course is intended to give future managers, consultants, and policy makers an introduction to the insights and applications of behavioral decision making. Behavioral decision making is the interdisciplinary study of how people make decisions. It draws together research from psychology, economics, political science, and management, among other fields. Topics include heuristics and biases in inference and prediction, risk perceptions and attitudes, and the roles of group and emotional processes in decision making. In this course we will address applications of these findings from the various behavioral sciences to the study of business. This course is offered only at the Carnegie Mellon-Qatar campus.
Prerequisites: (36-200 or 36-201 or 70-207) and 73-100

70-391 Finance
Intermittent: 9 units
Firms create value by making good investment decisions. Finance is the field of management science tasked with making this happen. It is a set of tools with which firms identify good investments and decide how to pay for them. Paying for them ultimately involves getting money from households. Therefore, finance also describes the investment decisions of households and the resulting allocation of the economy’s resources across firms and time. This course is the introductory finance course in the undergraduate business program. The main topics covered in the course are Financial Markets, Net Present Value, The Objective of the Firm, Discounted Cash Flow, Portfolio Theory and the Cost of Capital, The Efficient Markets Hypothesis, The Capital Structure of the Firm, and Business Valuation. Time permitting, the course will also provide an introduction to option markets and derivative securities. Upon completing the course a student will be able to consider a large and complex business problem, make some assumptions, structure the firms’ cash flows in a spreadsheet, calculate the value of different solutions to the problem, and make a decision.
Prerequisites: (73-100 or 73-102) and (36-225 or 36-217 or 70-207 or 36-201 or 36-200 or 36-207)

70-395 Funding Entrepreneurial Ventures
Intermittent: 9 units
So you want to do a startup and you know that you need funding. There are multiple ways to fund a new venture: bootstrapping, economic value of different solutions to the problem, and make a decision.
Prerequisites: 76-102 or 76-101 or (76-107 and 76-106) or (76-106 and 76-108) or (76-107 and 76-108)

70-398 International Finance
Intermittent: 9 units
International Finance is an elective course designed to give students the opportunity to analyze real-world problems in international capital markets. Topics covered include: exchange rate determination and quoting, international parity relations, foreign exchange hedging strategies using forwards and options, foreign exchange exposure management, international bond market, currency swap market, global equity market, international portfolio risk assessment and performance measurement. Students develop problem solving and communication skills with presentations and critical discussions of case studies.
Prerequisite: 70-391

70-401 Management Game
Intermittent: 12 units
This course is designed to integrate the managerial concepts and techniques studied earlier in the curriculum and to focus on elements of organizational structure and behavior. Student teams assume the role of top management of firms competing in an international economy simulated by the Carnegie Mellon University Management Game. Each team is responsible to a Board of Directors comprised of alumni of the MBA program and business masters students. Emphasis is placed on the development and implementation of sound organizational decision structures as well as the formulation of effective competitive strategies. The course is reserved for senior-year business majors and additional majors.
Prerequisites: 70-122 and 70-371 and 70-381 and 70-391

70-412 Advanced Business Communications: Power, Persuasion, and Problem-solving
All Semesters: 9 units
Challenges such as communicating leadership and expertise to a newly formed team, receiving unclear expectations, limited time to complete a complex problem, persuading a reluctant colleague, showcasing yourself in a crucial performance review all occur in business. This advanced course digs deeper into how leaders and successful professionals navigate the complex workplace of surprise, ambiguity, crisis, and diversity. You’ll explore varied, often high-stakes workplace scenarios to build your persuasive ability, linguistic skill, communicative flexibility, agility, and confidence.
Prerequisites: (70-340 and 70-345) or 73-270

70-415 Introduction to Entrepreneurship
Intermittent: 9 units
This course is an introductory course designed to provide an overview of entrepreneurship, develop an entrepreneurial frame of mind and learn the fundamentals of lean start up development. Students, Sophomore year or higher, interested in founding or contributing to a start-up venture, regardless of areas of discipline (engineering, design, business, computer science, music, drama and more), are welcome. Students can expect to gain a basic understanding of functional areas such as customer discovery, sales, business planning, risk management, venture funding, and more. This class also features “The Apprentice Experience” that afford the students the opportunity to develop, produce and sell a product in a real world and competitive environment. The class is structured in a lecture, followed by applied workshop format. Students will be learning the fundamental tools required for any start up and then applying said tools and techniques to analyze and execute real world business opportunities. Interdisciplinary teams will generate ideas and explore their potential as viable businesses. Numerous student teams have completed this class with real world opportunities. Lectures, guest speakers, case studies, and exercises will also be integrated.

70-416 New Venture Creation
Intermittent: 9 units
This course exposes students to the nuances of financing new ventures, getting them started legally and marketing their products or services. Students pull together all the ideas and information from different functional aspects of their projects into coherent and persuasive mini-business plans that serve as roadmaps for building their businesses; and useful instruments to find sufficient financing for the new ventures, so that they can convince the outside world that these opportunities are viable, with substantial potential for success.
Prerequisites: 70-425 or 15-390 or 70-414 Min. grade C or 70-421 Min. grade C or 70-420 Min. grade C or 70-415 Min. grade C
70-421 Entrepreneurship for Computer Scientists
Intermittent: 9 units
This course is primarily for non-business school students; it includes most of Introduction to Entrepreneurship (70-415), assumes no background courses in business and involves additional sessions for core business concepts. Students with majors in science, technology, engineering or computer science are exposed to fundamental concepts and issues in innovation, business and entrepreneurship. Students can expect to gain a basic understanding of functional areas such as finance, funding, marketing, sales and management. Student Status: Sophomore year or higher.

70-422 Managerial Accounting
Intermittent: 9 units
The purpose of this course is to prepare students to make sensible business decisions using accounting information. An essential topic in the course is the measurement and allocation of costs to assist decision making in organizations. The course covers standard topics in cost accounting, such as cost behavior and relevant costs, and connect these to broader issues in microeconomics, decision theory, corporate finance, and operations management. Classes contain a mixture of conventional lectures, problem solving, business cases, and simulations.
Prerequisites: 70-122 and (36-207 or 36-201 or 36-200 or 70-207)

70-423 Technology-Based Entrepreneurship
Spring: 9 units
This course is offered only at Carnegie Mellon's campus in Qatar. This course is designed as an introduction to entrepreneurship and basic business concepts for engineering and science students. There are no prerequisites. Students learn basic business concepts, business models, entrepreneurial thinking, idea generation, opportunity recognition, and the basics of accounting, marketing and strategy development. There is no final examination. Instead, students, working in teams, generate an original idea for a startup business and prepare a business plan and an investor presentation, which sets forth the basic strategies, business models and evaluates the opportunity afforded by their original idea. This course also is consistent with the broad mission of Carnegie Mellon University in Qatar's entrepreneurship program, which is described below. The broad mission of the entrepreneurship program at Carnegie Mellon University in Qatar is three-pronged: a. To encourage and develop entrepreneurial and innovative thinking in a business setting whether or not it is a startup company; b. To obtain the basic skills to start a new venture; c. To stimulate self-evaluation for life direction.

70-424 Corporate Financial Reporting
Intermittent: 9 units
This course is designed to strengthen your ability to correctly interpret financial statements and their accompanying disclosures. The course is aimed at anyone whose career might involve working with accounting and other financial data, and should be especially useful for those interested in consulting and financial analysis. Throughout the semester we will discuss the key disclosure rules in the United States, the communication methods available to managers, managers’ incentives and ability to exert discretion over reported earnings, and the interplay between a company’s corporate strategy and its financial reporting policies and practices. The course emphasizes a number of topics of recent interest to the business community including the quality of earnings, mergers and acquisitions, corporate innovation and R&D, post-employment benefits, executive compensation, and intangible assets.
Prerequisite: 70-122
Course Website: http://tepper.cmu.edu/prospective-students/course-page/70424/corporate-financial-reporting (http://tepper.cmu.edu/prospective-students/course-page/70424/corporate-financial-reporting/)

70-425 Entrepreneurship for the Creative Industries
Intermittent: 9 units
This is an introductory course designed primarily for undergraduates in the College of Fine Arts who want to create new businesses, products, services, or thriving careers as independent artists. Students can expect to develop an entrepreneurial mindset, learn how creative firms and industries are structured, and build practical skills for finding, evaluating and putting entrepreneurial opportunities into action. We will analyze real world examples, for-profit and not-for-profit, from film, art, architecture, fashion, music, media, theater, retail, and design. The class will explore the core functional areas critical to building entrepreneurial entities, including teams, ideation, marketing and sales, financial analysis, and funding. Interdisciplinary teams will generate ideas and explore their potential as viable businesses or sustainable not-for-profits. Lectures, guest speakers, case studies, and exercises will also be integrated.

70-427 Modern Banks: Strategy and Regulation
Intermittent: 9 units
This course focuses on (1) the financial statement analysis of banks and bank-like financial institutions ( thrifts, mortgage banks, and commercial banks); and (2) the accounting and disclosure rules for financial instruments they hold (interest rate risk disclosures, loan loss disclosures, fair value accounting for financial instruments, securitization accounting, derivatives and hedge accounting, and market risk disclosures). The main goal of the course is to provide students with an in-depth understanding of how financial reports provide unusually specific and detailed (but not perfect) information about certain risks and performance of these financial institutions. Their financial statements increasingly are based on fair value accounting and their financial reports include increasingly extensive risk and estimation sensitivity disclosures. Both fair value accounting and risk and estimation sensitivity disclosures are necessary ingredients for financial reports to convey financial institutions’ risk and performance in today’s world of complex, structured, value and risk partitioning financial instruments and transactions. While financial institutions often report imperfect (or worse) fair value measurements and risk and estimation sensitivity disclosures, careful joint analysis of the information they provide invariably yields important clues about their risks and performance. While this course is most relevant to students interested in financial institutions, much of the accounting material also pertains to a varying extent to other types of firms. For example, many firms securitize their accounts receivable or hedge their commodity, interest rate, or foreign exchange risk using derivatives.
Prerequisites: 70-122 and 70-391

70-428 Financial Statement Analysis
Intermittent: 9 units
This course is about fundamental analysis using financial statements. We develop and apply technologies for understanding and identifying firm activities that generate shareholder value and for developing valuation benchmarks. The ultimate goal of such analysis is to aid the security valuation and risk analysis exercises. This course is intended to help students establish a good foundation and introduce students the basics of equity and debt analysis techniques. Taking Finance (70-391) before this course is recommended, though not a formal prerequisite.
Prerequisite: 70-122
Course Website: http://tepper.cmu.edu/prospective-students/course-page/70428/financial-statement-analysis (http://tepper.cmu.edu/prospective-students/course-page/70428/financial-statement-analysis/)

70-429 Accounting for Financial Institutions
Fall: 9 units
The banking sector is important because it drives the financial growth of an economy. This sector accepts deposits from the public and issues loans, and thus the banking sector expands in response to positive changes in retail, corporate and government business demand. Similarly, if a slowdown occurs this results in a reduction in demand for banking sector services. As a result, the important starting point for a financial analyst, who wants to assess current and future economic growth, are the financial statements of banks and the information they contain. To extract this information, however, requires being able to read and interpret the financial statements of a bank. These statements are very different from reading traditional corporate financial statements. As a result, the first objective of this course is to learn how to read financial statements generated from the banking sector including how to interpret and evaluate these statements. The banking sector in Qatar is unique because it has two important and separate subsectors —- Islamic and conventional banking. Each of these subsectors have a different banking business model which in turn generate differences in their financial statements. As a result a second important objective for this course is to learn how to read and evaluate the financial statements from each of these subsectors.
Prerequisite: 70-122

70-430 International Management
Intermittent: 9 units
This course uses the case method to examine the strategic and operational issues in management practice and decision-making that are important in operating a business that spans national borders. Topics include political and economic risk assessment, technology transfer, cultural analysis, negotiation, social responsibility, organization structure, supply chain management and trends in direct investment and their impact on developing strategies for entering and becoming successful in international markets.
Undergraduate Business Administration Program Courses

70-437 Organizational Learning and Knowledge Management
Intermittent: 9 units
Managing knowledge effectively is key to the performance and competitiveness of both entrepreneurial and established organizations. The course examines why some organizations are better than others at learning from experience and developing new knowledge. The course focuses on how organizations innovate or create new knowledge, how they retain knowledge, and how they transfer knowledge throughout enterprises. Strategic implications of new results on organizational learning and knowledge management are also developed. Students will acquire a greater appreciation of the dynamics of organizations and factors contributing to their successful performance. A mix of lectures, cases and exercises are used to increase your ability to create, retain and transfer knowledge effectively in organizations.
Prerequisites: 36-226 or 36-225 or 36-220 or 36-217 or 36-202 or 36-208 or 70-208

70-438 Commercialization and Innovation
Intermittent: 9 units
The course is targeted at entrepreneurs and innovators who are interested in introducing innovations to the marketplace through start-up, emerging and established organizations. Class participants will learn how to evaluate, develop and implement opportunities for innovation, using an emergent or iterative approach (the lean methodology). Students will also learn a variety of methodologies to identify opportunities for innovation including how to identify unserved customers, identifying what jobs customers need to do, and how to incorporate innovations originating from end users, suppliers, materials manufacturers, and other entities outside the firm. Students will learn how to develop a Business Model, identify a Minimum Viable Product, and a Market Entry Point. The course is divided into two parts. In the first half students will be exposed to theories and strategies of innovation through readings and case studies. In the second half students will identify and develop their own product concept utilizing concepts developed in the first part of the course, and step-by-step develop their business model, organizational plan, strategic partners, marketing message, sales plan, and financing strategy.
Prerequisites: (73-100 or 73-102) and (15-390 or 70-415 or 70-425 or 70-414 or 70-421 or 70-420)

70-440 Corporate Strategy
Intermittent: 9 units
This course is designed to provide the student with a general management perspective and an understanding of the total business enterprise. It builds upon previous course work in functional areas and provides insights and analytical tools which a general manager should have in order to plan and implement successful business strategy. The student will analyze complex business problems and formulate realistic strategic solutions. Emphasis is placed on the practical application of business theory by the student in his/her business career.

70-443 Digital Marketing and Social Media Strategy
Intermittent: 9 units
This course explores issues related to digital and social media marketing. This is a hands-on class where you will use real world data, case studies and participation in Google online marketing challenge. The following topics would be covered in detail: (a) Search Engine Optimization - you will learn how search engines, keyword auctions, and search engine marketing work, and how to optimize your pay per click advertisement efforts; (b) Econo-Mining - you will also learn on how firms are getting or can get useful information from user generated content using text mining and opinion mining capabilities to drive their product development, placement, and advertisement decisions. Using real world data you will analyze whether the traditional approaches for driving advertising or product development strategy are in alignment with what you learn from user generated content; (c) Social Media Marketing - you will learn how to design a social media marketing campaign. What are the key ingredients that make such campaigns successful? How do you run a campaign for a viral product; (d) Forecasting Demand Using Publicly Available Online Search Data - you will learn how to build better forecasting models for demand using Google search data (Google Trends and Insights); (e) Wisdom of the Crowds: we will cover how to design crowdsourcing contests, what and how to crowdsource. You will also learn what prediction markets are, how they work, how to design them, when prediction markets are successful and what kinds of questions are best suited for prediction markets.

70-447 Client Consulting Project: Strategic Management of the Enterprise
Intermittent: 12 units
This is a project course for senior business majors offered in partnership with real-world client companies. Teams of five to six students are given a client to engage with for the semester on a specific consulting project assignment. Students will learn about the challenges of the multi-dimensional and complex issues faced by managers, including learning the concepts and skills to handle ambiguity, perform a persuasive data analysis, and communicate the findings effectively. Students will develop a deeper understanding of how organizations can coordinate and leverage synergies across a range of disciples by effective deployment of technologies and organizational structures and processes. Teams will have an opportunity to work with clients on a wide mix of problems spanning multiple functions, including strategy, operations, technology and marketing. Specifically, teams will address issues such as big data, mobile application strategies, supply chain, digital media, complexity management, healthcare delivery models and healthcare marketing strategy. Regular meetings with the instructor will be scheduled to guide teams during client engagement and co-ordinate with the executives at their client company. The deliverables will be in the form of a report/prototype and a final presentation to the client’s executive team. No classes to attend, but weekly team meetings with times to be determined. The course is for undergraduate seniors only, and enrollment is by special permission.
Prerequisites: 70-381 and 70-391 and 70-371

70-449 Social, Economic and Information Networks
Spring: 9 units
Interaction is a fundamental part of social science: firms market products to consumers, people share opinions and information with their friends, workers collaborate on projects, agents form alliances and coalitions. In this course, we will explore the emerging field of social networks to put structure on this diverse mass of connections. Using a mixture of theoretical, empirical, and computational methods, we will learn about the structure and function of social networks. We will look at how an individual’s position in a social network reflects her role in the community. We will learn to identify tastemakers and trendsetters by looking at how information moves through our increasingly connected society. We will consider how our own position in the social network affects our behavior, opinions, and outcomes. And we will explore where social networks come from, and what affects their structure. The material in this course will be interdisciplinary, drawn from the fields of math, computer science, physics, sociology, political science, and economics. By the end of the course, you will have the tools and knowledge needed to analyze social networks on your own. The course is capped with a project where you will use your skills to answer your own questions.
Prerequisites: (36-200 or 73-230 Min. grade C or 36-201) and (36-201 or 70-207 or 36-207)
Course Website: http://tepper.cmu.edu/prospective-students/course-page/70449/social-economic-information-networks (http://tepper.cmu.edu/prospective-students/course-page/70449/social-economic-information-networks/)

70-453 Business Technology for Consulting
Intermittent: 9 units
In this course, you will learn how to effectively lead and undertake information system analysis and design projects. In doing so you will develop your ‘intellectual toolbox’ for business technologies consulting by learning to apply specific tools and techniques such as BPMN and Agile development methodologies. You will practice applying these techniques on a variety of case studies, examples, and a substantial semester-long project. Beyond the concrete analysis and design techniques, you will develop a set of work practices and habits of thought that should serve you well in your consulting career. This will be a very hands-on course in which you will largely learn by doing. Most class sessions will include a combination of in-class presentation by the instructor, some discussion (possibly of a case study), and exercises to practice working with the day's tools and concepts. Homework assignments, in-class presentations, and a semester-long term project are essential parts of the course.
Prerequisites: 70-110 or 70-451
Course Website: http://tepper.cmu.edu/prospective-students/course-page/70453/business-technology-for-consulting (http://tepper.cmu.edu/prospective-students/course-page/70453/business-technology-for-consulting/)
**70-455 Modern Data Management**

Intermittent: 9 units

Data drives modern business. Transactional data systems keep the world’s economy operating smoothly by tracking and processing the movement of bits, money, atoms, and attention across the planet. Analytic systems help managers understand and optimize their businesses. Robotic systems (both physical machines and software bots) are automating a tremendous amount of the work that has historically been done by people. In this course you will learn to use a set of data management tools to capture, manage, analyze, and understand data so to help your organization do business better, faster, and cheaper.

**70-460 Mathematical Models for Consulting**

Intermittent: 9 units

This course will cover a wide variety of mathematical models and techniques that are used by consultants and lie at the heart of modern decision-support systems. We will discuss the benefits and limitations of different models and follow a practical spreadsheet-based approach to provide hands-on experience with Excel Solver. The course will build on the knowledge you have gained from the prerequisite courses; we will develop your model-building skills, explore some technique-oriented skills such as linear, integer, and nonlinear programming, and experiment with heuristic solution methods. While going through different models and techniques, we will also see real-world examples of how these models are actually used in practical business environments.

Prerequisites: 21-292 or 21-257 or 70-257

**70-462 Uncertainty and Risk Modeling**

Intermittent: 9 units

This is a hands-on course on modeling and simulation of business systems under uncertainty. It takes the perspective of the consultant whose job is to analyze existing or potential business processes and provide recommendations for managerial decision-making. Recognizing that most businesses are subject to high levels of variability, risk and uncertainty, it will adopt a stochastic approach to characterize the behavior of business systems and processes, and explore the effects of alternative decisions in this context. Two modeling methodologies will be covered: (i) stochastic modeling, and (ii) stochastic simulation. Examples are drawn from different managerial domains, such as supply chain management, risk management, marketing, and project management. The lectures, homework assignments, exam and term project will focus on modeling, computational, and analytical skills. Computational implementations will be done in Excel using the @Risk add-in (during the first half of the course to build simple simulation models) and the Arena software (during the second half of the course to build more complex models based on discrete-event simulation). Course objectives:

1. Recognize uncertainty in business systems and processes, and their impact on managerial decisions (e.g., demand uncertainty, financial risk, etc.).
3. Specify probabilistic distributions for inputs from available data.
4. Generate probabilistic distributions for outputs and relevant performance metrics (e.g., average, standard deviation, distribution tails).
5. Develop computational models to simulate complex stochastic processes using appropriate software.
6. Communicate outcomes of uncertainty analyses and implications for managerial decision-making.

Prerequisites: 36-225 or 70-207 or 36-220 or 36-200 or 36-201 or 36-200

**70-465 Technology Strategy**

Intermittent: 9 units

This course is about business strategy for technology-intensive industries. Examples of such industries are computer hardware and software, media and entertainment, telecommunications and e-commerce. We will explore the unique economic circumstances facing firms in these industries and identify strategies that enable firms to succeed given these circumstances. You will learn to analyze pricing strategies including versioning and bundling; product standardization decisions; managing product complements; exploiting network effects; managing platform competition. This course will help you understand the unique economic characteristics seen in today’s technology-intensive markets and how they impact the strategic interactions among firms and consumers. We will study, for example: Why firms in the IT industry give away their best products for free? Why makers of video gaming consoles subsidize end users (but tax game developers) while competitive operating system makers subsidize software developers (but overcharge end users)? Why Sony won the Blu-Ray format war against HD-DVD which was sponsored by a whole array of companies? In order to understand how firms strategically interact with consumers in technology-intensive industries this course will use a combination of simple but rigorous analytical models, emerging theories, and formal case studies.

Prerequisites: 21-120 and (21-256 or 21-259) and 73-100 and 73-230

**70-467 Machine Learning for Business Analytics**

Intermittent: 9 units

This course introduces students to the machine learning tools and software that drive modern predictive analytics in business settings. Students will gain an understanding of a variety of popular machine learning algorithms including linear and logistic regression, random forests, and neural networks. Each algorithm will be introduced with real-world business applications, and students will learn to implement these algorithms on data. The course is taught in the programming language R (prior programming experience is not required).

Prerequisites: (21-256 or 21-259) and (70-207 or 36-220 or 36-200)

**70-469 End to End Business Analytics**

Intermittent: 9 units

Deriving value from business data is an integrative process. It requires putting together the virtuous pipeline of using the data to derive descriptive and diagnostic inferences, building explainable predictive models and incorporating them in prescriptive decision making. This course charts this process end-to-end by describing and integrating common tools for modeling uncertainty, machine learning, and optimization in the context of common applications from finance, marketing and operations. The coursework is based on data-driven cases that will have students analyzing data from real business applications to derive their own insights, predictions and decisions and communicating them effectively. The course will prepare students for careers in consulting and any form of business data analysis in any functional area.

Prerequisites: (70-207 or 36-200 or 36-220) and (21-292 or 70-257 or 21-257)

**70-471 Supply Chain Management**

Intermittent: 9 units

This course will discuss basic issues in supply chain management to answer how a company should design its supply chain and how a company should administer its operations policy to satisfy the company’s business strategy. We will also examine how firms interact with other entities within the supply chain, and how one can turn the system/network of entities across the supply chain to its own advantage by capturing economic surplus effectively. Special attention will be paid to analyzing the strengths and weaknesses of supply chains from a strategic, qualitative level. At the same time, we will also learn how to make effective trade-offs in operational decisions from a tactical, quantitative level.

Prerequisite: 70-371

**70-477 Real Options: Creating Value Beyond NPV**

Intermittent: 9 units

Real options analysis is an approach to the management of operational assets that exploits managerial flexibility in decision-making and combines it with market-driven valuations. This course will cover: how managers use all the available information when making decisions. It is thus particularly useful when managing projects that involve dynamic and state-contingent choices among alternatives (options), especially of a strategic nature. Examples include investing in and developing new products or technology, expanding/reducing manufacturing capacity, and suspending/resuming production. The valuation of financial options is the conceptual basis of real options management (but this course does not assume prior knowledge of this topic). Real options analysis extends this fundamental market-driven valuation approach to a much broader spectrum of business applications that feature dynamic decision-making. It thus contrasts the standard net present value rule used by static discounted cash flow analysis. The resulting managerial decisions and asset valuations can be very different when real options analysis is used rather than static discounted cash flow analysis. The course learning objectives are to (i) develop the students ability to take an unstructured problem and implement real options analysis in a structured manner; (ii) integrate market-driven valuation and dynamic decision-making techniques into a practical, yet rigorous, business analytics toolkit; and (iii) provide examples of successful practice and applications in a variety of industries.

**70-480 International Marketing**

Intermittent: 9 units

This course is designed to provide students with a basic understanding of global marketing and how it is practiced in different parts of the world. The course is structured around the key issues in international marketing, such as market entry, product development, pricing, promotion, and distribution. The course covers a variety of topics, including international market analysis, international market entry strategies, and international marketing planning and control. The course also emphasizes the importance of understanding cultural and social differences in international markets and how they impact marketing strategies. The course includes case studies and projects to help students develop practical skills in international marketing.
70-481 Marketing Research
Intermittent: 9 units
The purpose of this course is to teach multiple research techniques used in marketing. This course is an applied marketing course that gives insight into how various techniques are used in marketing research firms. There are three projects and a final. The first project is designed to teach students about research survey methods. The second is an experiment in which the whole class is involved. The third, an individual project, is designed to teach quantitative research techniques.
Prerequisites: (36-202 or 70-208) and 70-381

70-482 Pricing Strategy
Intermittent: 9 units
Pricing is a critical marketing decision which enables a firm to translate customer value into profit. This course provides a first survey of pricing concepts. Instead of discussing pricing in isolation, we focus on the interplay between pricing and other aspects of marketing, such as positioning, branding and advertising. To this end, we provide a formal treatment of pricing concepts in the framework of game theory. Finally, we also discuss non-pricing tools that firms can use in order to capture customer value. Specifically, we cover cases wherein firms generate a profit while keeping their services free, a phenomena that is widely observed among Internet firms. This course has no formal prerequisite, but a willingness to study formal (i.e., mathematical) models is assumed. Any previous exposure to microeconomics analysis and game theory will be helpful.

70-483 Advertising and Marketing Communications
Intermittent: 9 units
‘Integrated Marketing Communications (IMC) is a strategic business process used to plan, develop, execute, and evaluate coordinated, measurable, persuasive brand communication programs over time with consumers, customers, prospects, and other targeted, relevant external and internal audiences.’ (source: Don Schultz). IMC is specifically designed to ensure that all communication strategies and messages are unified and integrated across all channels and, importantly, begin with the consumer/customer. It is critical that marketers understand the limitations of marcom tactics as well as how to best leverage and integrate marcom tactics for the strongest, most consistent and authentic brand voice in the targeted marketplace. The entire IMC process is driven by the customer, and in the case of our discussions in this class, the consumer. The course is designed to help students understand the integrated marketing communications model, the strategy and tools of the marketing mix and what makes an iconic brand. The course is designed in five sections: Part One focuses on understanding brands - iconic brands, terminology and types of branding. Part Two focuses on the understanding of consumer behavior - one of the, if not the most critical part of understanding marketing. Brands are built and defined in the minds of consumers. Part Three focuses on IMC and the framework used by brand management to develop strategy, and understand audience segmentation and brand positioning to drive IMC. Part Four focuses on understanding the IMC tactics available to marketers including advertising, social media and digital marketing, events and public relations. Part five concludes with the deeper study of an iconic brand.
Prerequisite: 70-381
Course Website: http://tepper.cmu.edu/prospective-students/course-page/70483/advertising-and-marketing-communication/

70-485 Product and Brand Management
Intermittent: 9 units
Product managers are essentially the 'CEO' of the product line. Brand and product management provides strategic vision and leadership for the product and service, both 1) understanding the market opportunity and what must be done for successfully delivering on the brand promise and 2) leading across the organization, often without authority, to achieve that success. Product/service success in a dynamic market is subject to many factors, including marketplace needs, reactions and activities of competition, the strategy and change within one's own firm, operating and financial constraints, demand forecast uncertainty, and more. By taking this course, you will learn the principles of product and brand management and understand what it is like and what it takes to be a successful marketing leader.
Prerequisite: 70-381

70-488 Marketing Digital Media
Spring: 6 units
(Formerly titled ‘Interactive Marketing’) In this course we analyze how marketing practice changes when products are distributed and consumed in digital formats. This course focuses on several areas where digitization is likely to have the most profound affect on the field of marketing. These areas include promotion, competitive strategy, channel conflict, pricing, and identifying and differentiating customers. We will use both lectures, cases, and analysis of real-world datasets to analyze these issues.
Prerequisite: 70-381

70-491 Responsible Finance
Fall: 9 units
One of the outcomes from the financial crash of 2008 and the resulting credibility gap faced by traditional financial institutions has been a strong growth in the Responsible Finance sector with Thomson Reuters estimating investments in this sector at US$59 trillion. The purpose of the Responsible Finance course is to introduce the students to this rapidly growing sector and help them gain an understanding of the driving forces behind the growth as well as the knowledge of the products in this space. The course will be delivered in modules covering Islamic Finance, Social Banking and challenges posed by FinTech to the conventional Banking Market. Given that these markets are expected to challenge the traditional banking sector, this course complements our existing selection of finance electives to help students get a comprehensive view of the global financial sector and gain access to a broader job market that goes beyond traditional banking.
Prerequisite: 70-391

70-492 Investment Analysis
Intermittent: 9 units
Investment analysis provides you the concepts and tools used to analyze publicly traded securities, and you will learn how to these tools to real world situations. The course is organized as a tour of the different kinds of securities used in the financial markets. You will analyze how security prices are determined, the relations between the prices of different securities, their risks and returns, and how to choose a portfolio or strategy from different asset classes.
Prerequisites: 21-370 or 70-391

70-495 Corporate Finance
Spring: 9 units
Students develop an advanced financial perspective on how firms make investment, financing, and management decisions. The course starts with simple net present value rules and builds the theoretical framework to address more sophisticated issues and problems including risk management, mergers, acquisitions, executive compensation, corporate governance, and dividend payout policies. Theory is supplemented with numerous case study examples.
Prerequisites: 21-370 or 70-391

70-496 Entrepreneurial Finance: Valuation & Deal
Spring: 9 units
This case-based course studies the financing and valuation of high-growth entrepreneurial firms in the venture capital market. We address the requirements and limitations of a wide array of valuation techniques from the perspective of both the demand and supply side of the market. The entrepreneur's perspective (demand) concerns identifying financing needs and value. The investor's perspective (supply) requires the use a set of tools to evaluate, structure and price financing deals. The tools include discounted cash flow, the VC method, comparables analysis and real options. Venture capitalists act as financial intermediaries and provide both capital and guidance to entrepreneurial firms. These facts introduce unique twists on valuation and deal selection. The course will include four cases over the mini which require group work, class participation and group presentations.
Prerequisite: 70-391

70-497 Derivative Securities
Intermittent: 9 units
This course has two goals. The first goal is to help you to master the tools to price and hedge and understand the risk exposures of any contingent claim on any underlying variable. The second goal of this course is to practice using these pricing and hedging tools in derivative structuring and sales. The focus here is on designing and pricing derivative securities to trade on specialized market views and to hedge customized risk exposures. The course also highlights practical issues about model calibration, model risk, and dynamic and static hedging.
Prerequisites: 21-370 or 70-391
Course Website: http://tepper.cmu.edu/prospective-students/course-page/70497/derivative-securities/
**70-499 Internship**
*Intermittent: 3 units*
Students doing a business-related internship for academic credit may enroll in this course for three units with a pass/no pass grade. Students must submit an internship agreement form to the instructor for approval prior to the start of the internship. A summary writing assignment must be submitted after the internship in order to receive credit. Enrollment with special permission.

**70-500 Honors Thesis I**
*Intermittent*
Business students with outstanding academic records may undertake an Honors Thesis. The topic is of the student's choice but must have some original aspect in the question being explored, the data set, or in the methods that are used. It must also be of sufficient academic rigor to meet the approval of a faculty advisor with expertise in the project's area. Students enroll each semester in a 9-unit independent study course with their faculty advisor for the project (70-500 in the fall and 70-501 in the spring). Students and their faculty advisor develop a course description for the project and submit it for approval as two 9-unit courses to the BA department. Enrollment by permission of the BA Program.

**70-501 Honor Thesis II**
*Intermittent*
Business students with outstanding academic records may undertake an Honors Thesis. The topic is of the student's choice but must have some original aspect in the question being explored, the data set, or in the methods that are used. It must also be of sufficient academic rigor to meet the approval of a faculty advisor with expertise in the project's area. Students enroll each semester in a 9-unit independent study course with their faculty advisor for the project (70-500 in the fall and 70-501 in the spring). Students and their faculty advisor develop a course description for the project and submit it for approval as two 9-unit courses to the BA Director. Enrollment by permission of the BA Program.

**70-502 Independent Study in Management**
*Fall and Spring*
Students with a special interest in Management/Production not covered by a formal Business course may develop an Independent Study Course in that area. Readings and work to be completed are by agreement between the student and an individual faculty member. Enrollment by permission of the BA program.

**70-503 Independent Study in Marketing**
*All Semesters*
Students with a special interest in Marketing not covered by a formal Business course may develop an Independent Study Course in that area. Readings and work to be completed are by agreement between the student and an individual faculty member. Enrollment by permission of the BA Program.

**70-504 Independent Study in Organizational Behavior**
*All Semesters*
Students with a special interest in Organizational Behavior not covered by a formal Business course may develop an Independent Study Course in that area. Readings and work to be completed are by agreement between the student and an individual faculty member. Enrollment by permission of the BA Program.

**70-505 Independent Study in Finance**
*All Semesters*
Students with a special interest in Finance not covered by a formal Business course may develop an Independent Study Course in that area. Readings and work to be completed are by agreement between the student and an individual faculty member. Enrollment by permission of the BA Program.

**70-506 Independent Study Management Information Systems**
*All Semesters*
Students with a special interest in Management Information Systems not covered by a formal Business course may develop an Independent Study Course in that area. Readings and work to be completed are by agreement between the student and an individual faculty member. Enrollment by permission of the BA Program.

**70-507 Independent Study in Business Communications**
*All Semesters*
Students with a special interest in Business Communications not covered by a formal Business course may develop an Independent Study Course in that area. Readings and work to be completed are by agreement between the student and an individual faculty member. Enrollment by permission of the BA Program.

**70-508 Independent Study in International Management**
*All Semesters*
Missing Course Description - please contact the teaching department.

**70-514 Independent Study: Graphic Media Management**
*Fall and Spring*
This course enables students to independently pursue special topics related to graphic media. Enrollment is by permission of the Instructor and the Executive Director of the Business Administration program.