MASTER OF BUSINESS ADMINISTRATION, CYBERSECURITY

Courses

Accounting

ACCT 5400 Introduction to Accounting   3 Credits
This course examines the basic concepts necessary to understand the information provided by financial and managerial accounting systems. The focus is on interpretation of basic information, as students learn about internal and external financial reporting. Topics include: accrual accounting; revenue and expense recognition; accounting for assets, liabilities, and equities; accumulation and assignment of costs to products and services; and budgeting. Previously AC 0400.

ACCT 6500 Accounting Information for Decision-Making   3 Credits
Prerequisite: ACCT 5400.
This course emphasizes the use of accounting information by managers for decision-making. It is designed to provide managers with the skills necessary to interpret analytical information supplied by the financial and managerial accounting systems. Financial accounting concepts based on profit, liquidity, solvency, and capital structure are used in the process of employing management accounting tools to decisions and evaluate organization performance and changes in cost, profit and investment centers. Previously AC 0500.

ACCT 6510 Issues in a Regulatory Reporting Environment   3 Credits
This course brings together technical accounting and reporting concepts and theories with a focus on the financial accounting information that is required to be filed with regulatory agencies, the most predominant being the Securities and Exchange Commission. This course aims to provide an in-depth conceptual understanding of regulatory reporting requirements coupled with an appreciation of how these regulations affect the quality of information in publicly available corporate reports. Students will enhance their ability to analyze and understand unique and complex future accounting issues and possible solutions. The course is taught seminar style with students leading the discussions of cases and research. Previously AC 0510.

ACCT 6515 Property Transactions: Regulatory and Tax Issues   3 Credits
This course covers concepts that are relevant in practice for both a public and private accounting and taxation setting. Drawing on and integrating complimentary law and tax topics, the course will consider issues such as: real estate used in a trade or business or held for the production of rental income, ownership of a principal residence, and indirect ownership of real-estate interests in the form of securities under federal law, including a REIT, as well as secured transactions and bankruptcy. Crosslisted with TAXN 6515.

ACCT 6520 International Accounting   3 Credits
The primary focus of this course is the study of International Financial Reporting Standards (IFRS). Particular emphasis will be placed on developing an understanding of significant differences between the current United States Generally Accepted Accounting Principles (GAAP) and IFRS standards. Students will also learn the pros and cons of U.S. GAAP and IFRS approaches for select technical accounting issues. Some other non-IFRS related topics include International Taxation, International Transfer pricing and the impact of culture on the development of accounting standards and practices throughout the world. Previously AC 0520.

ACCT 6525 Law of Commercial Transactions: Advanced Studies in the Uniform Commercial Code   3 Credits
This course provides students with a foundation in the Law of Commercial Transactions. The course begins with a review of the principles of common law contracts which underpins many aspects of the Uniform Commercial Code. This course entails an advanced study of several provisions of the Uniform Commercial Code (hereinafter referred to as "UCC" or "the Code"). The sections of the Code to be studied include Article 2 Sales, Article 2A Leases of Goods, Articles 3 and 4 Negotiable Instruments and Bank Deposits and Collections, and Article 9 Secured Transactions. With an emphasis on case analyses and/or problem sets, students taking the course will have the opportunity to improve their critical thinking and written and oral communication skills, particularly as they relate to the legal settings associated with the UCC. Crosslisted with TAXN 6525. Previously MG 0512.

ACCT 6530 Accounting for Governments, Hospitals, and Universities   3 Credits
This course examines the generally accepted accounting principles applicable to governmental entities (as issued by GASB) as well as accounting principles applicable to not-for-profit entities (as issued by FASB). The focus will be on the financial statements and reports prepared by state and local governments and financial reporting for the wide array of not-for-profit entities with an emphasis on the contrast of these entities with for-profit accounting. Previously AC 0530.

ACCT 6550 Topics in Accounting Systems and Data Analytics   3 Credits
This course addresses technological topics of current interest to the accounting profession. Topics such as accounting information systems, cybersecurity, enterprise resource planning systems, and business intelligence may be discussed, but the focus of the class will be development of computer skills for extraction, data visualization, and cleaning and analysis of accounting data. Previously AC 0550.

ACCT 6555 Issues in Internal Audit   3 Credits
This course covers internal audit from a broad perspective. Course topics cover three main areas: internal audit basics, risks, and metrics. During the course, students will develop critical thinking skills (particularly employing professional skepticism) and learn to effectively communicate their professional opinions. Previously AC 0555.

ACCT 6560 Audit Issues in a Global Environment   3 Credits
This course will expose students to the global profession of auditing, with a primary focus on public company auditors. Topics will vary any given semester, but may include the following: the different international organizations that set auditing standards and enforce auditing standards; the impact of culture on auditing standards and practices throughout the world; the impact of International Financial Reporting Standards on international and U.S. auditing rules; the evaluation of audit evidence; auditor independence; materiality; internal controls; computer assisted audit tools and techniques; fraud detection and forensic accounting. The course is taught seminar style, with students leading the discussions of cases and current articles. Assignments are designed to develop students' written and oral communication skills, analytical skills, and critical thinking skills. Previously AC 0560.

ACCT 6565 Forensic Accounting   3 Credits
This course provides students with a foundation in investigative accounting. Topics covered include identifying, investigating and documenting fraud and providing litigation support for forensic engagements. With an emphasis on case analyses and/or independent research, students taking the course will have the opportunity to improve their critical thinking and written and oral communication skills, particularly as they relate to the legal settings associated with investigative accounting. Previously AC 0565.

ACCT 6570 Issues in Accounting Ethics   3 Credits
This course investigates ethical problems in contemporary accounting practice. The goal is to increase students' ethical perception so they are better able to identify, consider, and ultimately act on the ethical issues they may face in their professional accounting career, regardless of specialty area (e.g., audit, tax, and corporate accounting). The course is taught seminar style, with students leading the discussions of cases and current articles. Assignments are designed to develop students' written and oral communication skills, analytical skills, and critical thinking skills. Previously AC 0570.

ACCT 6580 Financial Statement Analysis   3 Credits
The course is designed to increase and extend the knowledge of the student in financial statement information and topics introduced in undergraduate courses in intermediate and advanced financial accounting through lecture, problem solving and case analysis. A critical examination of both objective and subjective aspects of financial reporting will be undertaken with both quantitative as well as qualitative assessments of financial information emphasized. Previously AC 0580.

ACCT 6585 Effective Communications for Accounting Professionals   3 Credits
In this course, students will practice communicating effectively in accounting settings. Topics include considering the communication needs of accountants' diverse audiences, adapting communications to varying purposes, and writing and speaking clearly and concisely in both preparing accounting-specific documents and in presenting accounting-focused information. Crosslisted with TAXN 6585.

ACCT 6900 Seminar: Special Topics in Accounting   3 Credits
This course presents recent practitioner and academic literature in various areas of accounting, including guest speakers where appropriate. Topics change semester to semester, depending upon faculty and student interests. Previously AC 0585.

ACCT 6970 Research on Contemporary Issues in Accounting   3 Credits
This course is a designated research course. In it students will investigate, analyze, develop, and present recommendations for emerging issues, recent pronouncements of accounting rule-making bodies and/or unresolved controversies relating to contemporary financial reporting. In doing so, students will consider institutional, historical, and international perspectives. In their research, students are expected to use authoritative resources (e.g., FASB and/or IASB pronouncements). The course is taught seminar style, with students leading the discussions of cases and current articles. Assignments are designed to develop students' written and oral communication skills, analytical skills, and critical thinking skills. Previously AC 0590.

ACCT 6980 Practicum in Accounting   3 Credits
This course builds on the in-class lessons covered during the student's graduate studies by providing the student with the opportunity to apply their academic knowledge to a professional accounting context. As such, it is an experiential learning activity. Successful completion of the practicum will entitle students to three credits that count as a graduate-level accounting elective. Enrollment by permission of the department chair or designee. This course may not be repeated for credit. Previously AC 0591.

ACCT 6990 Independent Study   3 Credits
This course provides students with an opportunity to develop research skills while exploring a specific contemporary accounting issue with a full-time faculty member specializing in the area of the discipline. Students are expected to complete a significant research paper as the primary requirement of this course. Enrollment by permission from department chair or designee only. Previously AC 0598.

Analytics

DATA 5400 Applied Business Statistics   3 Credits
Using spreadsheet software, this hands-on course teaches a variety of quantitative methods for analyzing data to help make decisions. Topics include: data presentation and communication, probability distributions, sampling, hypothesis testing and regression, and time series analysis. This course uses numerous case studies and examples from finance, marketing, operations, accounting, and other areas of business to illustrate the realistic use of statistical methods. Previously QA 0400, BUAN 5400.

DATA 5405 Python Fundamentals   3 Credits
This course is an introduction to Python, with an emphasis on general programming concepts (structure, logic, data, etc.) that apply to just about any general purpose programming language. Starting with a review of fundamental programming concepts, the course uses short lessons, quizzes, and coding challenges to cover the basics of how Python is used in a professional Business Analytics setting. The course concludes with a final project designed to demonstrate proficiency. Previously BA 0405, BUAN 5405.

DATA 5410 Analytics Programming for Business   1.5 Credits
This course focuses on quantitative modeling and analyzing business problems using spreadsheet software, such as Excel and its add-ins. Topics include descriptive analytics, visualizing and exploring data, predictive modeling, regression analysis, time series analysis, portfolio decisions, risk management, and simulation. Business models relevant to finance, accounting, marketing, and operations management are set up and solved, with managerial interpretations and "what if" analyses to provide further insight into real business problems and solutions. Open to MS Management students only. Previously BA 0410, BUAN 5410.

DATA 6100 Fundamentals of Analytics   **3 Credits**
This is an introductory level graduate course focusing on spreadsheet modeling to analyze and solve business problems. Topics include descriptive analytics, data visualization, predictive modeling, time series analysis, and data mining. Contemporary analytical models utilized in finance, marketing, accounting, and management are set up and solved through case studies. Previously IS 0500, ISOM 6500.

DATA 6500 Leading with Analytics   **3 Credits**
This course provides a broad overview to the analytics profession, with a focus on data driven leadership and hands-on analytical skills. Starting with a foundation of analytical framing and statistical analysis, the course moves on to more advanced topics like data visualization and summarization, descriptive and inferential statistics, spreadsheet modeling for prediction, linear regression, risk analysis using Monte-Carlo simulation, linear and nonlinear optimization, and decision analysis. The course culminates with a group research project using curated big data datasets, as well as individual exercises in problem framing intending to be a component of an analytics capstone experience. Previously BA 0500, BUAN 6500.

DATA 6505 Data Munging in Python   **3 Credits**
Prerequisite: DATA 5405 or placement exam.
In this course, we introduce Python as a language and tool for collecting, preprocessing, and visualizing data for business analytics. Since Python is one of the most popular programming languages in machine learning, its fundamental programming logic and knowledge is essential for students to apply in analytics and to succeed in the job market. Specifically, this course focuses on the data munging phase, which includes collecting, preprocessing, and visualizing data, with respect to applications in business modeling, optimization, and statistical analysis. In addition, important techniques such as web scraping and Application Programming Interface (API) usage are introduced. The course culminates with a final project in exploratory data analysis, as well as individual exercises in data munging intending to be a component of an analytics capstone experience. Previously BA 0505, BUAN 6505.

DATA 6510 Data Warehousing and Visualization   **3 Credits**
This course introduces datasets, databases, data warehouses, data management, and data visualization techniques. Starting from the relational data model and basic database fundamentals, the course offers a hands-on introduction to Structured Query Language (SQL) for defining, manipulating, accessing, and managing data, accompanied by the basics of data modeling and normalization needed to ensure data integrity, including entity relationship modeling and diagrams. Additionally, the course simultaneously offers hands-on learning with visualization and interactive dashboards in Tableau. The course concludes with a comprehensive data warehousing and visualization project that gives each student the opportunity to integrate and apply the new knowledge and skills learned from this class. Previously BA 0510, BUAN 6510.

DATA 6520 Analytics Consulting and Strategy   **3 Credits**
Prerequisite: DATA 6500 or ISOM 5400 or ISOM 6500.
With the rise of analytics for cutting-edge business innovation, the industry needs business leaders who can solve an organization's most important problems by asking and answering questions using data. These business consultants need to bridge both the data analytics and business fields. This class tries to provide a "real world" consulting experience through a project-centric experiential approach, in addition to case studies of analytics consulting and business problem solving using descriptive, predictive and prescriptive analytics. When possible, class projects will be client-driven using community partners. Students work in teams using analytics to answer the client's current and important business questions using data. The students will approach these as business analytics consultants by using effective project management to gathering requirements, using continuous client engagement to deepen understanding of the problem, suggesting ways in which to explore the question and its possible solutions through data, running different data models to approach the solution, working with clients to come up with effective analytics strategies, making business presentations based on findings, incorporating the inevitable changes that come with real world projects, and recommending strategic solutions based on their findings. Previously IS 0520.

DATA 6530 Statistics and Forecasting   **3 Credits**
Prerequisite: DATA 5400 or placement exam.
This course introduces analytical techniques used for decision-making under uncertainty. Topics include time series and other forecasting techniques, such as Monte Carlo simulation, to assess the risk associated with managerial decisions. Specifically, we will cover data collection methods, time dependent models and analysis, advanced solver, time series techniques, exponential smoothing, moving averages, and Box-Jenkins (ARIMA) models. Application examples include financial models - stock prices, risk management - bond ratings, behavior models - customer attrition, customer likes/dislikes, buying patterns - propensity to buy, politics - identify swing voters, and sales. Previously QA 0500, BUAN 6530.

DATA 6540 Business Intelligence and Data Storytelling **3 Credits**
Prerequisite: DATA 6510.
Modernly, business intelligence has become far more interactive. This course provides an advanced application and overview of the new techniques for building interactive dashboards and tools now prevalent in this profession. Additionally, with data overload happening on every level, the importance of good data storytelling has soared. Using programming languages and environments such as Tableau and R, this course introduces students to the business intelligence profession and teaches the skills necessary to develop and deploy cloud-based interactive apps to assist in data and analytical storytelling, including insights into user interface design (UI) and user experience design (UX). The course concludes with a comprehensive project. Previously BA 0540, BUAN 6540.

DATA 6545 Data Science and MLOps   **3 Credits**
Prerequisite: DATA 6505.
This course provides an advanced understanding of the practices of machine learning techniques and operations (MLOps), with a special focus on business applications. To assure practical relevance, the emphasis of this course is on the applications of techniques and tools realizing machine learning in terms of business analytics. The course is organized following the Cross-Industry Standard Process for Data Mining (CRISP-DM) and all learned techniques are applied in a couple of semester-wide projects. Python is introduced and illustrated through a series of tutorials and case studies, and Automatic Machine Learning (AutoML) is introduced as well. Students are expected to actively participate in the course deliverables through independent assignments, lab work, and group projects. The course culminates with a final project in predictive analytics, as well as individual exercises in modeling and interpretation intending to be a component of an analytics capstone experience. Previously BA 0545, BUAN 6545.

DATA 6550 Big Data Management and Data Ops   **3 Credits**
Prerequisites: DATA 6505 and DATA 6510.
This course introduces the fundamentals of Big Data management and its implementation in the public cloud. Topics include classic theories of data architecture, dimensional database design, data pipelines, and data governance, supplemented with the latest developments in the emerging field of DataOps. The theory is grounded with hands-on experience building databases and data pipelines with the Modern Data Stack. Previously IS 0550.

DATA 6560 Sports Analytics   **3 Credits**
Sports analytics is transforming the way teams, leagues, players, coaches, referees, and fans perceive and appreciate their favorite pastimes and games, including major team sports such as baseball, basketball, football, soccer, cricket, and rugby, more individualized sports like tennis and golf, and brand-new innovations such as e-sports. In this course, students will gain experience in framing analytical questions in sports, discover and evaluate cutting-edge research and findings in sports analytics, develop hands-on skills in using and implementing sports analytics solutions, and learn how to communicate findings to a non-analytical audience in an impactful and actionable way. This course culminates in a scholarly sports analytics research paper.

DATA 6570 Artificial Intelligence Applications   **3 Credits**
Artificial intelligence is becoming far more prevalent in the business and analytics worlds, yet many analytics professionals are excluded from participating in this new wave because they lack the strong coding foundations that are typically needed to implement this new technology from scratch. However, recent advances in AI/ML have coincided with desktop and cloud tools that can be deployed far more easily to generate new models without complicated coding requirements. This course will teach students how to discover, use, and daisy-chain such tools to solve real-world business problems in ways that would otherwise be impossible.

DATA 6575 Deep Learning and Artificial Intelligence **3 Credits**
Prerequisite: DATA 6545.
This course introduces students to the latest development of machine learning, namely deep learning, as well as its applications to a variety of domains. Fundamental knowledge, such as the architectures of the deep neural networks, extraction of high-level features representing unstructured data, backpropagation, and stochastic gradient descent. Additionally, students get hands-on experience building deep neural network models with Python. Topics covered in this class include model building and optimization, image classification, natural language processing, generative models, and so forth. These topics cover the foundations and the latest developments in the field of deep learning.

DATA 6900 Contemporary Topics Seminar   **3 Credits**
This course draws from current literature and practice on information systems and/or operations management. The topics change from semester to semester, depending on student and faculty interest and may include: project management, e-business, management of science with spreadsheets, e-procurement, executive information systems, and other socioeconomic factors in the use of information technology. Previously IS 0585, ISOM 6900.

DATA 6990 Independent Study   **3 Credits**
This course provides an opportunity for students to complete a project or perform research under the direction of an Information Systems and Operations Management (ISOM) faculty member who has expertise in the topic being investigated. Students are expected to complete a significant project or research paper as the primary requirement of this course. Enrollment by permission of the ISOM Department Chair only. Previously IS 0598, ISOM 6990.

DATA 6999 Capstone: Business Analytics Applications **3 Credits**
Prerequisites: DATA 6530, DATA 6540, DATA 6545.
This capstone course for the MS Business Analytics program is to be taken in the last term before graduation. The purpose is to apply and integrate knowledge and skills learned in the program (statistics, modeling, data management, data mining, etc.) to a live data analytics project. The course is project-based, with students collaborating on their work under the guidance of faculty members. Application areas and format of the projects may vary, depending on faculty, dataset, and budget availability. However, the work should be rich enough to demonstrate mastery of business modeling and technology, with each student making a unique, demonstrable contribution to completion of the work. Previously BA 0590, BUAN 6999.

Business

BUSN 6980 Business Immersion Practicum   **1 or 3 Credits**
This course builds on the in-class lessons covered during the student's graduate studies by providing the student with an opportunity to apply their academic knowledge to a professional context. As such, it is an experiential learning activity. Successful completion of the practicum will entitle the student to three credits that count as a graduate-level elective. Enrollment open only by permission of the Director of Graduate Programs or designee. Previously BU 0501/0591.

Economics

ECON 5380 Econometrics   **3 Credits**
Prerequisites: ECON 5275, MATH 5417.
This course provides students the analytical tools necessary to test theories of microeconomic behavior through the lens of mathematical and statistical methods. These econometric methods have practical applications for any field where there is data recording events. The course further considers useful techniques and limitations of econometric analysis as well as practical applications of methods useful for bypassing data problems in measuring quantitative economic relationships. Undergraduate equivalent: ECON 4380.

ECON 5400 Principles of Economics for Business   **3 Credits**
This course examines the fundamentals of economic analysis from both the micro and macro perspectives; from individual consumer behavior to the choices firms make, as well as framing the aggregate economy and indicators that measure global economic activity. The basics of supply and demand, market structures, international trade, fiscal, and monetary policy are covered. A case study approach is utilized to facilitate discussion of real world examples of economic decision making in action.

ECON 5410 Principles of Microeconomics   **1.5 Credits**
This course is designed to provide an introduction to the underlying concepts and theories of microeconomics. Students will learn ideas and methodologies that help them to understand how markets behave, and how they are impacted by local, national, and international events. They will explore the behavior of consumers and producers in markets for goods and services, as well as global economic structures. They will assess the outcomes of market activity, and explore alternative methods of allocating resources when markets are determined to have failed. Previously EC 0410.

ECON 5415 Statistics for Business   **1.5 Credits**
Statistics is defined as a branch of mathematics dealing with the collection, analysis, interpretation, and presentation of masses of numerical data. This course will teach students the fundamentals of statistical analysis with an eye towards economic and business applications. Students will also learn about the limitations of statistics, and how to properly apply principles and present analytical results. Previously EC 0415.

ECON 6275 Managerial Economics and Firm Decision-making   **3 Credits**
This course will put mathematical, finance, and statistical tools to work to solve firm-level, applied microeconomic problems. The objective of the course is to build a set of strategies that help guide managerial decision-making through case studies and problem-solving exercises. The central point is that good business decisions depend on vast amounts of information that is provided to decision-makers by skilled professionals from a wide variety of disciplines. The tools developed in this course will help students to do this work in a sophisticated way.

ECON 6320 Macroeconomics for Business Leaders   **3 Credits**
This course endows current and future business leaders with the knowledge needed to understand the macroeconomic environment they inhabit. It first illustrates the indicators used to analyze trends in economic activity, inflation, and labor market dynamics. The topics discussed include the business cycle, monetary and fiscal policy, the future of long-run economic growth, and income differences across countries. Case studies focus on how to respond, as a business, in a changing macroeconomic environment.

ECON 6321 Cost Benefit Analysis   **3 Credits**
This course is a practical introduction to Cost-Benefit Analysis (CBA), as a quantitative monetary assessment method that can aid in effective decision-making. The course introduces students to the principles and techniques of preparing a CBA, including microeconomic foundations, valuation methods, discounting, the impact of risk and uncertainty, and distributional consequences. The course includes applications of CBA to a wide range of business decisions and public policy issues (e.g. public, development, health, and environmental projects).

ECON 6410 Public Finance and Budgeting   **3 Credits**
This course will examine the proper role government has to play in today's economy and will provide the fundamental and technical skills necessary to understand public budgeting and finances. Topics include the reasons for government involvement in the economy (market failure and redistribution), budgeting techniques at all levels of government, and sources of tax revenue. There will be a strong emphasis on issues related to state/local governments. By the end of this course students should have a strong understanding of the budgetary process at all levels, but in particular at the state/local level of government. Crosslisted with PUAD 5410.

ECON 6430 Economics of the Nonprofit Sector   **3 Credits**
This course will examine both the role that nonprofits play in the U.S. economy and how charitable organizations are managed and financed, including the interplay between the government and the Third Sector. Particular attention will be paid to distinctions between successful (impactful) nonprofits and those that are less effective in pursuing societal needs. New forms of philanthropic organizations will be examined, including benefit corporations and social marketing enterprises. In addition, new ethical practices, including impact investing, will be surveyed. Case studies will be utilized to illuminate the economic circumstances that can impact Individual nonprofits. Crosslisted with PUAD 5430.

ECON 6455 Healthcare Management   **3 Credits**
This course covers the management and financial aspects of healthcare provision in the United States. The transitions that are underway in the market that have influenced the manner in which healthcare is provided will be examined. The course will also discuss the rising cost of treatment and changes in the how services are provided. Students will examine the structure of management within various healthcare organizations, hospitals, networks, and small providers, and how that influences quality of care. The final part of the course will examine the financial nature of various organizational forms within the medical industry. Crosslisted with PUAD 5455.

ECON 6560 Global Financial Markets and Institutions   **3 Credits**
This course examines financial markets in the context of their function in the economic system. The material deals with the complexity of the financial markets and the variety of financial institutions that have developed, stressing the dynamic nature of the financial world, which is continually evolving. Crosslisted with FNCE 6560.

ECON 6602 Healthcare Economics   **3 Credits**
This course begins by applying microeconomic theory to the health sector of the U.S. economy with a focus on financial incentives throughout the healthcare system. Topics include the demand for healthcare and health insurance, quality improvement, managed care and the role of government. The U.S. experience is compared to healthcare systems in other countries. Evidence-based skills include cost analysis and business plan and budget development. Crosslisted with NURS 7602.

ECON 6801 Econometrics: Regression Analysis   **3 Credits**
Prerequisite: DATA 5400 or equivalent.
This course provides students the tools necessary to apply statistical methods to data in order to test economic theories, to inform government and private policy makers, and to instruct businesses on consumer behavior, pricing considerations, and cost considerations. In this course we will learn how to measure relationships between economic variables using rigorous econometric techniques. This includes understanding the purpose and methods of ordinary least squares (OLS) regression for cross-sectional and panel data for continuous data, as well as learning models for discrete choice data. We will learn the basic theory and practical means of performing these regressions as well as the methods of statistical inference for hypothesis testing, and students will apply this knowledge to datasets throughout the semester.

ECON 6802 Applied Time Series Analysis and Economic Forecasting   **3 Credits**
Prerequisite: DATA 5400 or equivalent (familiarity with linear regression).
This course provides students with the analytical tools necessary to analyze time series data in order to examine past trends and to forecast future ones. Students will learn practical time series forecasting techniques with particular emphasis on the ARIMA method and conditional volatility (ARCH) models and they will perform a variety of data analyses on the computer using R/Rstudio. These methods are extensively employed in economic, financial and business forecasts and can be used for various purposes such as stock market analysis, economic forecasting, risk assessment, budgetary analysis, Census analysis, yield projection, and sales forecasting. To gain a deeper understanding of how the methods work, their theoretical underpinnings will be discussed to some extent, however, the course is mainly concerned with the applications of these techniques in forecasting economic time series.

Finance

FNCE 5400 Principles of Finance   **3 Credits**
Prerequisites: ACCT 5400, DATA 5400.
This course examines the fundamental principles of modern finance that are helpful in understanding corporate finance, investments, and financial markets. More specifically, the course examines the time value of money; the functioning of capital markets; valuation of stocks, bonds, and corporate investments; risk measurement; and risk management. Students learn to use sources of financial data and spreadsheets to solve financial problems. Previously FI 0400.

FNCE 6500 Stakeholder Value   **3 Credits**
Prerequisite: FNCE 5400.
This course examines business decision-making with the aim of creating and managing value for stakeholders. Accordingly, students learn how to lead and manage a business in a competitive environment. This involves the formulation of corporate objectives and strategies, operational planning, and integration of various business functions leading to greater stakeholder value. Topics include investment and strategic financial decision-making. A business simulation facilitates the learning process. Previously FI 0500.

FNCE 6530 Corporate Finance   **3 Credits**
Prerequisite: FNCE 5400.
This course provides an exploration of theoretical and empirical literature on corporate financial policies and strategies. More specifically, the course deals with corporate investment decisions, capital budgeting under uncertainty, capital structure and the cost of capital, dividends and stock repurchases, mergers and acquisitions, equity carve-outs, spin-offs, and risk management. Previously FI 0530.

FNCE 6540 Investment Analysis   **3 Credits**
Prerequisite: FNCE 5400.
This course examines the determinants of valuation for bonds, stocks, options, and futures, stressing the function of efficient capital markets in developing the risk-return trade-offs essential to the valuation process. Previously FI 0540.

FNCE 6545 Portfolio Management   **3 Credits**
Prerequisite: FNCE 6540.
Students examine how individuals and firms allocate and finance their resources between risky and risk-free assets to maximize utility. Students use an overall model that provides the sense that the portfolio process is dynamic as well as adaptive. Topics include portfolio planning, investment analysis, and portfolio selection, evaluation, and revision. Previously FI 0545.

FNCE 6555 International Financial Management   **3 Credits**
Prerequisite: FNCE 6530.
The globalization of international financial markets presents international investors and multinational corporations with new challenges regarding opportunities and risks. This course examines the international financial environment of investments and corporate finance, evaluating the alternatives available to market participants in terms of risk and benefits. Topics include exchange rate determination, exchange rate exposure, basic financial equilibrium relationships, risk management including the use of currency options and futures, international capital budgeting and cost of capital, and short-term and international trade financing. Previously FI 0555.

FNCE 6560 Global Financial Markets and Institutions   **3 Credits**
This course examines financial markets in the context of their function in the economic system. The material deals with the complexity of the financial markets and the variety of financial institutions that have developed, stressing the dynamic nature of the financial world, which is continually evolving. Previously FI 0560.

FNCE 6565 Derivative Securities   **3 Credits**
Prerequisite: FNCE 6540 (concurrency allowed).
This course offers in-depth coverage of financial derivative securities, such as options futures and swaps. The course focuses on the principles that govern the pricing of these securities as well as their uses in hedging, speculation, and arbitrage activities. Previously FI 0565.

FNCE 6570 Fixed Income Securities   **3 Credits**
Prerequisite: FNCE 6540.
This course deals extensively with the analysis and management of fixed income securities, which constitute almost two-thirds of the market value of all outstanding securities. The course provides an analysis of treasury and agency securities, corporate bonds, international bonds, mortgage-backed securities, and related derivatives. More specifically, this course provides an in-depth analysis of fixed income investment characteristics, modern valuation, and portfolio strategies. Previously FI 0570.

FNCE 6575 Capital Budgeting   **3 Credits**
Prerequisite: FNCE 6530.
This course examines the decision methods employed in long-term asset investment and capital budgeting policy. The course includes a study of quantitative methods used in the capital budgeting process: simulation, mixed integer programming, and goal programming. Students use these techniques and supporting computer software to address questions raised in case studies. Previously FI 0575.

FNCE 6580 Financial Risk Management   **3 Credits**
Prerequisite: FNCE 6540.
This course focuses on the evaluation and management of corporate and portfolio risk. More specifically, this course examines the methods of evaluating and managing risk with the objective of contributing to value maximization. Risk assessment methodologies such as value-at-risk (VaR) and cash-flow-at-risk (CaR) are analyzed and used extensively. Previously FI 0580.

FNCE 6595 Research Methods in Finance   **3 Credits**
Prerequisite: FNCE 6540.
This course, open to MS in Finance students only, deals extensively with applied research methods in finance, a highly empirical discipline with practical relevance in the models and theories used. The central role of risk distinguishes research methodology in finance from the methodology used in other social sciences, necessitating the creation of new methods of investigation that are adopted by the finance industry at an astonishingly fast rate. For example, methods of assessing stationarity and long-run equilibrium, as well as methods measuring uncertainty, found a home in the finance area. This course covers traditional and new research methods that are directly, and in most instances, solely applicable to finance problems. Previously FI 0595.

FNCE 6900 Contemporary Topics Seminar   **3 Credits**
Prerequisites: FNCE 6530, FNCE 6540.
This course presents recent practitioner and academic literature in various areas of finance, including guest speakers where appropriate. Topics vary each semester to fit the interests of the seminar participants. Previously FI 0585.

FNCE 6990 Independent Research Seminar   **3 Credits**
Prerequisite: FNCE 6595.
This course, open to MS in Finance students only, provides participants with the opportunity to explore a financial topic of interest in depth, immersing students in detailed investigations requiring substantial research and analysis. Previously FI 0597.

FNCE 6991 Blockchain and Cryptocurrency   **3 Credits**
The sudden rise in the value of Bitcoin and other cryptocurrencies and its volatility focused the world's attention on cryptocurrencies as a means of payment. Blockchain technology powers Bitcoin and has been hyped as the next new, transformative technology. This class will first discuss the technical underpinnings of blockchain and review key concepts such as decentralization and consensus algorithms. The class will then discuss practical applications of blockchain technology. It will then then examine blockchain as an asset and review the dynamics of the cryptocurrency markets. It will conclude with the discussion of the future of blockchain.

FNCE 6992 Decentralized Finance   **3 Credits**
Decentralized finance (DeFi) allows parties to trade in a peer-to-peer, decentralized manner by replacing financial institutions and other intermediaries with blockchain-based smart contracts and by replacing traditional, physical currencies (e.g. U.S. dollars) with cryptocurrency (e.g. stable-coins pegged to a physical currency). This course will examine how FinTech companies are disrupting the traditional financial services industry and assess the pros and cons of these new technologies. Students in this course will also survey relevant aspects of banking and securities law, with a focus on current regulatory issues pertaining to DeFi and considerations of the future regulatory landscape.

FNCE 6993 Algorithmic Trading   **3 Credits**
This class introduces the necessary background knowledge and processes to design and implement algorithmic trading models including an introduction to financial markets, mechanics, participants, order types and execution, microstructure, and more. The course walks students through the process of generating trading strategies, quantifying the trading process, risk-based modeling concepts, back-testing and optimization techniques, technology and infrastructure, regulatory compliance, and key metrics of algorithmic trading model performance evaluation.

FNCE 6994 Ethical Considerations in and Regulation of FinTech **3 Credits**
While FinTech provides the world of finance with exciting new opportunities and innovations, they come with a new set of ethical considerations and potential new regulations. Ethical issues include potential breach of privacy of the data obtained through social media and other means. Artificial intelligence and machine learning and the use of large datasets of proprietary data could unintentionally lead to discrimination and adverse effects on diversity and inclusion efforts. Since much of the FinTech applications are linked to the internet, avoiding cyberattacks poses a large risk to successful implementation of any models. Successful leaders in the field of FinTech must understand ethical considerations associated with FinTech. It is also crucial for the manager to understand current regulation of FinTech and anticipate possible new regulation. This course will consider these and other ethical and legal considerations associated with FinTech.

Management

MGMT 5400 Organizational Behavior   **3 Credits**
This course examines micro-level organizational behavior theories as applied to organizational settings. Topics include motivation, leadership, job design, interpersonal relations, group dynamics, communication processes, organizational politics, career development, and strategies for change at the individual and group levels. The course uses an experiential format to provide students with a simulated practical understanding of these processes in their respective organizations. Previously MG 0400.

MGMT 5410 Understanding Organizations   **1.5 Credits**
This course examines micro level organizational behavior theories as applied to organizational settings. Topics will include motivation, leadership, interpersonal relations, group dynamics, and strategies for organizational culture and change. Previously MG 0410.

MGMT 6500 Leadership   **3 Credits**
Prerequisite: MGMT 5400.
Effective leadership provides a competitive advantage for an organization in the marketplace. The goal of this course is to enhance students' ability to successfully lead in an innovative, dynamic, global environment, building their confidence level to successfully lead in the 21st century. Building from a best practice "real-world" approach students will be given the opportunity to increase their knowledge and skill level through self-assessments, case studies, assignments, and experiential learning. An impactful set of strategies and techniques will be presented, covering situational leadership theories and practices, leading in multiple geographies and cultures, navigating team/organizational dynamics, influencing and motivating meaningful change, shaping culture, and creating vision and strategic direction. Previously MG 0500.

MGMT 6502 Law and Ethics for Critical Reasoning in Business 1.5 Credits
This course is designed to provide a solid basis in legal and ethical reasoning that can support effective decision-making about a wide range of complex business issues. Employing active learning methods, it efficiently provides students with the capacity to think independently in an informed, carefully reasoned way. Course content includes select legal topics, rules and concepts, models of legal reasoning and ethical analysis, and the relationship between the two. Previously MG 0509.

MGMT 6503 Legal and Ethical Environment of Business   3 Credits
This course helps students be more responsible and effective managers of the gray areas of business conduct that call for normative judgment and action. The course is designed to develop skills in logical reasoning, argument, and the incorporation of legal, social, and ethical considerations into decision-making. The course teaches the importance of legal and ethical business issues and enables students to make a difference in their organizations by engaging in reasoned consideration of the normative aspects of the firm. Using the case method, the course provides an overview of current topics, including the legal process, corporate governance, employee rights and responsibilities, intellectual property and technology, and the social responsibility of business to its various stakeholders. Previously MG 0503.

MGMT 6504 Managing People for Competitive Advantage   3 Credits
This course focuses on effectively managing people in organizations by emphasizing the critical links between strategy, leadership, organizational change, and human resource management. Topics include the strategic importance of people, leading organizational change, corporate social responsibility, implementing successful mergers and acquisitions, and fundamentals of human resource practices. Discussions interweave management theory with real-world practice. Class sessions are a combination of case discussions, experiential exercises, and lectures. Previously MG 0504.

MGMT 6505 Human Resource Strategies: An Analytics Approach   3 Credits
Human Resource Strategy is the linkage between human resource management (HRM) and firm strategy, contributing to competitive advantage of the firm. Human capital, which is knowledge, skills and abilities (KSA) of people, is one of the strategic assets of the firm. HRM entails recruitment and selection, training and development, total compensation and rewards, performance management, employee relations (such as diversity management, work life balance, legal and ethical compliance, safety issues) and other people related practices. In this course students will analyze how these practices can be aligned with the strategy of the firm and lead to greater firm performance. The students will take an analytics approach to generate for effectively managing employees so that business goals can be reached quickly and efficiently. the challenge of human resources analytics is to identify what data should be captured and how to use the data to model and predict capabilities so the organization gets an optimal return on investment (ROI) on its human capital. Previously MG 0505.

MGMT 6507 Negotiations and Dispute Resolution   3 Credits
Prerequisite: MGMT 6500.
This course uses the theories of negotiation and alternative dispute resolution, along with extensive experiential exercises, to build individual negotiation skills and to help students manage disputes from a business perspective. The course emphasizes ways of managing both internal and external disputes. Previously MG 0507.

MGMT 6508 Strategic Management of Technology and Innovation: The Entrepreneurial Firm   3 Credits
This course begins by presenting cutting-edge concepts and applications so that students understand the dynamics of innovation, the construction of a well-crafted innovation strategy, and the development of well-designed processes for implementing the innovation strategy. It then focuses on the building of an entrepreneurial organization as a critical core competency in the innovation process. Concurrent with this, it focuses on the development and support of the internal entrepreneur or "intrapreneur" as part of the process of developing organizational core competencies that build competitive comparative advantages that, in turn, allow the firm to strategically and tactically compete in the global marketplace. Topics explored include technology brokering, lead users, disruptive technologies and the use of chaos and complexity theory in the strategic planning process. Previously MG 0508.

MGMT 6515 Professional Development   0 Credits
The purpose of this course is to aid the process of professional career development at the graduate level. Students will develop professional resumes, practice interviewing skills, and develop a robust LinkedIn social media presence for networking in the job market. Previously MG 0515.

MGMT 6525 Employee Performance Management and Rewards for Competitive Advantage   3 Credits
This course builds on the foundational evaluations and reward concepts covered in "Managing People for Competitive Advantage." Students explore in some depth the employee performance management, compensation, and reward systems in organizations. Topics may include 360 degree feedback programs, ESOPs, profit sharing, gain sharing, and the strategic use of employee benefits. The course focuses on how employee performance management, compensation, and reward systems can lead to a competitive advantage for firms. Previously MG 0525.

MGMT 6530 Entrepreneurship   3 Credits
This course covers entrepreneurship and small business management. The course focuses on the development of entrepreneurial start-up ventures from the point of view of the founding entrepreneur. The course explores characteristics and skills of successful entrepreneurs, the stages of growth of entrepreneurial businesses, the crises in start-up ventures, and issues confronting family and small business management. Students may create their own start-up business plan in conjunction with faculty as the primary course requirement. Previously MG 0530.

MGMT 6531 Social Entrepreneurship   3 Credits
This course is about understanding how entrepreneurial skills can be used to craft innovative responses to pressing social needs. These skills are opportunity recognition, assembling resources, launching a venture, scaling it and finally ensuring its sustainability. There will be an emphasis, throughout the course, on how exemplar for-profit enterprises have been able to successfully contribute to widespread economic well-being and social development while enjoying significant profitability. Students will appreciate that the pursuit of profit and poverty alleviation need not be mutually exclusive domains and the institutional requirements that are needed to ensure this outcome. Previously MG 0531.

MGMT 6540 Cross Cultural Management and Sustainable Leadership   **3 Credits**

This course develops a framework for distinguishing the various stages of cooperative relationships across national cultures, which have distinct characteristics and call for different modes of behavior. The stages of this framework include: identifying a cross-cultural win-win strategy; translating the strategy into viable action plans; executing the strategy and making cross-cultural collaboration happen; and assuring that emerging synergistic organizations become self-initiating entities. The course identifies and discusses in detail the necessary managerial skills for the support of each of these stages. Previously MG 0540.

MGMT 6545 Law and Human Resources Management   **3 Credits**

Prerequisite: MGMT 6503.

This course examines law and public policy issues relating to employee rights and obligations, including employment discrimination, OSHA, pension and benefit issues, minimum wage, and workers' compensation. The course provides a basic overview of the law and its relevance to human resource strategy and operations. Previously MG 0545.

MGMT 6555 Labor Relations   **3 Credits**

Prerequisite: MGMT 6505.

The dual aim of this course is to acquaint students with the dynamics of the labor-management relationship and to make them better negotiators and managers of workplace conflict. Toward these ends, this course examines the processes of bargaining and dispute resolution, primarily in the context of the unionized environment. Case studies, law cases, and experiential exercises are used to explore issues such as negotiations strategy, mediation, and arbitration. Successful models of cooperative relations between management and labor are also covered. Previously MG 0555.

MGMT 6560 Career Planning and Development   **3 Credits**

Prerequisite: MGMT 6500.

This course provides students an opportunity to explore career planning and development issues from two perspectives, as a job-seeking candidate and as an employer engaged in the hiring and development process of employees. The course will provide theoretical background on a number of career development topics, including: career development over the life span, career transitions, work-family balance, and post-retirement issues. Cases on individuals negotiating career issues such as new roles associated with promotion, managing technical or entrepreneurial careers, aspects of derailment and family issues will be presented. The second part of the course will be devoted to experiential activities that are designed to enhance one's career planning skills. Students take a self-assessment survey and participate in workshops on resume creation, mock interviewing, and social media applications associated with the job search. Previously MG 0560.

MGMT 6584 Global Competitive Strategy   **3 Credits**

This course considers the formulation of effective policy and accompanying strategy actions, and the management of such policies and actions. It examines the role of the general manager in this process and presents the diversified issues and problems the management of a business firm may be required to consider and solve in strategic planning. This course also examines the problems and tasks of strategy implementation and the general manager's function of achieving expected objectives and establishing new ones to assure the continuity of the business organization. Students are required to prepare a business plan as part of this course. Previously MG 0584.

MGMT 6900 Contemporary Topics   **1-3 Credits**

This course examines recent practitioner and academic literature in various areas of management. Topics vary each semester. Guest speakers may be invited as appropriate. Previously MG 0580.

Marketing

MKTG 5400 Marketing Management   **3 Credits**

This course examines analytical and managerial techniques that apply to marketing functions with an emphasis on the development of a conceptual framework necessary to plan, organize, direct, and control the product and strategies needed for promotion, distribution, and pricing of a firm's products. The course also considers the relationship of marketing to other units within a firm. Previously MK 0400.

MKTG 5410 Marketing in the Digital World   **1.5 Credits**

This course will provide students with the understanding of the role of marketing in the modern corporation. The course integrates the fundamental concepts of marketing with the newest trends in digital and social media marketing. Emphasis will be placed on how firms execute marketing strategy utilizing the latest digital tools. Open to MS Management students only. Previously MK 0410.

MKTG 6500 Customer Value   **3 Credits**

Prerequisite: MKTG 5400.

This course examines the concept of customer value with the goal of understanding how it can be used to achieve customer satisfaction, which in turn generates loyalty and, ultimately, a long-term customer-firm relationship. Topics include the nature of the costs and benefits associated with the notion of customer value, measuring and analyzing customer value and satisfaction, and understanding the associated concepts of customer loyalty and customer relationship management. The class consists of a mix of lectures, case analyses, in-depth qualitative research projects, and opportunities for practical applications, such as a marketing simulation. Previously MK 0500.

MKTG 6505A Introductory Storytelling in Marketing   **1.5 Credits**

Prerequisite: MKTG 5400.

Storytelling is an essential part of marketing communication. This course will allow students to understand the power of "the story" in a marketing context in how brands can effectively communicate, persuade, and influence key audiences. Students will learn to leverage brand stories in building long-term relationships with customers. Students will acquire the basics of storytelling drawing from its inter-disciplinary nature including the models and science behind it. They will also learn about the critical elements and techniques used in storytelling. Students will work on in-class assignments using established brands to identify good story ideas along with ways to capture target audiences' attention. They will not only learn to understand and critique brand stories but also be able to craft and execute holistic brand-customer stories through various promotional mix platforms.

MKTG 6505B Advanced Storytelling in Marketing   **1.5 Credits**

Prerequisite: MKTG 6505A.

Storytelling with data is an essential part of marketing communication. This course will allow students to use data for effective brand-customer storytelling within an overarching brand strategy framework. Students will learn to apply the critical elements, techniques, including story angles and hooks in effectively communicating a brand-customer story backed with data. Students will work on an in-class project that entails research design, data collection and analysis to not only create a powerful data-oriented, brand-customer story but also to implement this story on at least one promotional mix platform.

MKTG 6510 Advanced Consumer Behavior for Managers   3 Credits
Prerequisite: MKTG 5400.
This course offers an interdisciplinary approach to understanding the behavior of consumers in the marketplace, covering concepts from the fields of economics, psychology, social psychology, sociology, and psychoanalysis. Topics include motivation, perception, attitudes, consumer search, and post-transactional behavior. Previously MK 0510.

MKTG 6520 Research for Marketing Insights and Decisions   3 Credits
Prerequisite: MKTG 5400.
This course provides an overview of the risks associated with marketing decisions and emphasizes developing skills for conducting basic market research. Topics include problem formulation, research design, data collection instruments, sampling and field operations, validity, data analysis, and presentation of results. Previously MK 0520.

MKTG 6525 Customer Experience   3 Credits
Customer experience (CX) occurs every time a customer interacts with a company via any channel, at any time, for any purpose. Creating word-class, end-to-end customer experiences has become an innovative way to gain sustainable competitive advantage, but it requires a deep understanding of both the customers and how they interact, as well as a commitment to change business processes based on that understanding. In this course, students will learn how to create compelling customer experiences along the whole process of customer touch-points, from prospect to purchase. Topics to be covered include pre-purchase profiling and segmentation of prospects, persona development, experience mapping, and the role of technology platforms and artificial intelligence that drive advanced customer journeys. The class consists of a mix of lectures, case analyses, and a project that includes designing, planning, and executing a complete Customer Experience for a selected brand/organization.

MKTG 6535 Strategic Brand Management   3 Credits
Prerequisite: MKTG 5400.
This course focuses on the theory and conceptual tools used to develop and implement product and service branding strategies, as means for insuring brand awareness, acceptance, and success, or "equity," in the marketplace. The course highlights the importance and impact of the brand in the marketplace, identifies various decisions involved in creating successful brands, provides an overview of different means for measuring brand effectiveness, and explores the existence of customer-brand relationships. The course incorporates three general modules: Module 1: Identifying/Developing Brand Equity; Module 2: Measuring Brand Equity; Module 3: Managing Brand Equity. Previously MK 0535.

MKTG 6540 Advertising Management   3 Credits
Prerequisite: MKTG 5400.
This course provides a comprehensive overview of advertising and promotional processes, and develops strategies facilitating managerial decisions in the areas of advertising, public relations, sales promotion, and direct marketing. This course analyzes the importance and influence of advertising in the changing marketplace; provides students with an integrated approach for analyzing marketing communication opportunities; develops the capability for designing, implementing, and evaluating advertising campaigns; and promotes an understanding of the different methods of measuring advertising effectiveness. Previously MK 0540.

MKTG 6550 Advanced Marketing Strategy   3 Credits
The course will focus on the importance of an effective marketing strategy in order for businesses to make key marketing decisions and be successful. In this course, students will learn to strategically analyze and solve marketing problems from a decision maker's perspective. Students will focus on solving four fundamental marketing problems known as the "First Principles of marketing strategy" that firms face when designing and implementing marketing strategies. In order to develop an effective marketing strategy, most critical decisions must address that 1) All customers differ; 2) All customers change; 3) All competitors react and 4) All resources are limited. Application of the principles will cover all elements of the marketing mix including topics such as research and development, demographic targeting and segmentation, pricing, product forecasting, marketing channels, sales force distribution and media allocation.

MKTG 6560 Category Management and Shopper Insights   3 Credits
Prerequisites: MKTG 5400, MKTG 6520.
In this course, students will learn how retailers and manufacturers engage in a collaborative process to manage a product category at retail for the purpose of optimizing shopper satisfaction to increase revenues and profits. The course imparts students with hands on training on how to analyze retail POS (Point of Sales) data (syndicated scanner data). An emphasis will be given to data interpretation and implication on strategic and tactical decision making related to product assortment, shelf set, promotion, and pricing decisions for the purpose of generating store traffic, improving shopper loyalty, and ultimately increasing revenues and profitability. Students will learn how to leverage insights through a combination of case studies, workshops and by creating compelling, fact-based presentations. Previously MK 0565.

MKTG 6570 Digital Marketing and Analytics   3 Credits
Prerequisite: MKTG 5400.
The aim of this course is to provide students with a strategic understanding of the scope and dynamics of digital marketing, as well as its impact on businesses and consumers. The course also imparts tactical knowledge regarding the current, industry-relevant, digital marketing tools and practices. In addition to learning how to plan and integrate marketing objectives across multiple digital platforms (including website, search, social media, email, and mobile), students will learn how to measure their impact through analytics. The course will also discuss ethical concerns surrounding digital consumer targeting, and provide students with best-practices for formulating a successful digital brand. Previously MK 0570.

MKTG 6580 Multivariate Analysis for Consumer Insights   3 Credits
Prerequisite: MKTG 5400, MKTG 6520.
With unprecedented growth in data availability, companies are increasingly focusing on data driven decision making in marketing. As most of this data is multivariate, an understanding of statistical techniques used to analyze it gains paramount importance. The objective of this course is to develop skills with a range of procedures for multivariate data analysis involving dimension reduction, pattern recognition, classification, and prediction. Students will engage in experiential exercises that require utilizing statistical software to organize and analyze data, interpreting the results, and presenting actionable conclusions for decision making. Previously MK 0580.

MKTG 6583 Pricing Strategies and Analytics   **3 Credits**
Pricing is the only element of the marketing mix that generates revenue. The other marketing instruments typically drive cost in the process of creating customer value, which is recaptured through effective pricing. This course establishes a foundation for effective pricing decisions by teaching key economic, analytical, and behavioral concepts associated with costs, customer behavior, and competition; introduces students to advanced pricing techniques that aim to create additional value, including dynamic pricing, segmented pricing, pricing structures, and promotions; and highlights practical applications of these approaches within specific industry contexts. Through a mixture of lectures, case studies, and analytical techniques, the course will prepare students to address strategic and tactical issues related to pricing.

MKTG 6590 Experimental Research   **3 Credits**
Prerequisites: MKTG 5400, MKTG 6520.
Experiments are widely used in marketing research to investigate cause and effect relationships, such as the impact of a price change on sales, or the impact of a new promotional campaign on brand awareness, or the impact of a change in the ingredients of a product on brand acceptance. This course is intended to acquaint the student with the basic topics of experimental design and analysis. It is intended to provide an understanding of the components of an experiment, the various types of experimental designs, the analysis of experimental results, and when experiments are indicated as a research option. Previously MK 0590.

MKTG 6900 Contemporary Topics   **3 Credits**
This course examines recent practitioner and academic literature in various areas of marketing, incorporating guest speakers as appropriate. Topics vary each semester to fit the interests of the seminar participants. Previously MK 0585.

MKTG 6990 Independent Study   **3 Credits**

MKTG 6999A Capstone Project: Marketing Analytics and Strategy   **3 Credits**
Prerequisites: Four courses from: MKTG 6510, MKTG 6520, MKTG 6550, MKTG 6570, MKTG 6580, MKTG 6583.
In this course, students demonstrate how the knowledge and skills learned in the MS in Marketing Strategy and Analytics program can be applied to business problems. Students will demonstrate this competence by providing professional consulting advice to a local organization to solve a business problem in order to gain competitive advantage. Students undertake a major research project as a central activity in this course drawing on the expertise and research methodologies they have developed in the program. Previously MK 0599A.

Software Engineering

SWEG 5301 Software Engineering Methods   **3 Credits**
This course explores the requirements gathering, system analysis, software design methods and prototyping of software application following the software processes required for the production of high quality software. Techniques for creating documentation and using software development tools will be presented. Students will gain experience in software project management; requirements, analysis, and design; procedural maturity; social, ethical, cultural, and safety issues in software development; interpersonal skills for management and team membership; and the software engineering discernment of systems architecture. Undergraduate equivalent: SWEG 3301. Previously SW 0400.

SWEG 5302 Software Design Methods   **3 Credits**
This course is designed to introduce fundamental concepts of object orientation techniques.Through the use of case studies and project work that has the student gradually building a large design specification, students will achieve an understanding of how complex applications are designed and built. Undergraduate equivalent: SWEG 3302. Previously SW 0401.

SWEG 5304 Web Development I   **3 Credits**
This course introduces the student to developing browser applications for use on the web. Students learn client side concepts including the display of static information. The course topics include designing and authoring web pages, usability, search engine optimization, markup languages, style sheets, the client side document object model, and making web pages dynamic on the client side. Undergraduate equivalent: CPSC 2304. Previously SW 0406.

SWEG 5305 Mobile Application Development   **3 Credits**
This project-oriented course examines the fundamental aspects of mobile computing, application architecture, and mobile application design and development. Students will learn application development on the Android platform. Students will complete a hands-on project building a prototype mobile application. Topics include user interface design and building, input and data handling, and network techniques and GPS and motion sensing. Students are expected to work on a project that produces a professional-quality mobile application. Projects will be deployed in real-world applications. Undergraduate equivalent: CPSC 4305. Previously SW 0416.

SWEG 5312 Agile Software Engineering   **3 Credits**
Prerequisite: SWEG 5301.
In this course, students apply in-depth techniques and experience various roles incorporated into one of the main approaches to software development which is agile methodology. It uses detailed knowledge about each of the major traditional software engineering phases to explore a more iterative approach for development of faster and more adaptable software. Proficiency in programming is expected of the students entering this course. Undergraduate equivalent: SWEG 4312. Previously SW 0412.

SWEG 5315 Computational Biology   **3 Credits**
This course is designed to benefit computational and experimental biologists to understand the principles of analyzing biological data, building models and testing hypotheses using computer science paradigms. Students will learn how to build computational tools that are used to analyze DNA content, identify protein binding patterns, compare sequences, and discover variation within genomes. Undergraduate equivalent: CPSC 4315. Previously SW 0415.

SWEG 5317 Computational Statistics for Biomedical Sciences   **3 Credits**
This course will provide a practical introduction to analysis of biological and biomedical data. Basic statistical and machine learning techniques will be covered, including descriptive statistics, linear regression, non-linear regression, classification/prediction, and biomedical data visualization. Emphasis will be on how to choose appropriate data analysis models and how to assess statistical significance. This course will benefit data scientists to apply data science techniques to analyze biomedical data or clinical data. In addition, this course is also designed to benefit computational and experimental biologists to understand the principles of analyzing biological data, building models and testing hypotheses using computer science paradigms. To visualize data and carry out data analysis, students will learn R or Python, and other programming languages for statistical computing and graphics. The class will be a combination of lecture and computer lab. Undergraduate equivalent: CPSC 4317. Previously SW 0417.

SWEG 5320 Software Testing and Maintenance   **3 Credits**
Prerequisite: SWEG 5301.
This course will cover in-depth methods for software testing, reliability and maintenance of software. Students will learn the principles of software testing and how to apply software testing techniques to the development of quality software and how to deploy software systems, maintain, enhance and reuse software systems. Undergraduate equivalent: SWEG 4320. Previously SW 0420.

SWEG 5321 Software Project Management   **3 Credits**
This course explores software project activities from conception to completion based on best practices. Topics include software systems engineering, personal/team software process management and control, and project planning and management. Through group and individual activities, students apply project management tools and techniques, and address typical problems that occur during the life cycle of the software project. Undergraduate equivalent: SWEG 4321. Previously SW 0421.

SWEG 5322 Visual Analytics   **3 Credits**
In this course, students investigate visual analytics tools and techniques used to synthesize information and derive insight from massive, dynamic, ambiguous, and often conflicting data and to communicate the findings effectively for decision-making. Extensive use of case studies based on real-world events will be used to illustrate course concepts. Students will apply visual analytics techniques toward a focused research problem in a real-world application or a domain of interest. Undergraduate equivalent: CPSC 4322. Previously SW 0422.

SWEG 5333 Introduction to Cybersecurity   **3 Credits**
In this course, students will be given an extensive overview of the various components of cybersecurity including software development, operating systems, databases, and networks. They will learn cybersecurity concepts, issues, and tools that are critical in solving problems in the computing security domain. The course will use lectures, reading assignments, and interactive lab exercises to re-enforce the concepts that are introduced. Undergraduate equivalent: CPSC 3333. Previously SW 0433.

SWEG 5335 Digital Forensics   **3 Credits**
In this course students will be given the basic notions and theory of digital forensics. For file systems and operating systems, the class covers investigative techniques and legal and technical considerations that the examiner should make. They will learn concepts, challenges, and tools in applying digital forensics examinations. The course includes, but not limited to, topics in the suggested curriculum of CDFE certification. The course will use lectures, reading assignments, and interactive lab exercises to reinforce the concepts that are introduced. Undergraduate equivalent: CPSC 4335.

SWEG 5349 Cloud Computing   **3 Credits**
This course will introduce the foundations of cloud computing, and familiarize students with the core concepts needed to build, deploy and manage applications in a cloud. Besides the theoretical underpinnings, emphasis will be put on practical experience of using cloud resources and services. Concepts like microservices and containers will be discussed in depth, as well as best practices for building successful cloud native applications and implications for development and operational processes. The course will be a combination of lectures and hands-on experience of a public cloud. Undergraduate equivalent: CPSC 3349. Previously SW 0449.

SWEG 5355 Artificial Intelligence   **3 Credits**
This course, which examines computational and theoretical accounts of human intelligence, includes knowledge representation, commonsense reasoning, planning, natural language understanding, machine learning, and deep learning. Undergraduate equivalent: CPSC 4355. Previously SW 0455.

SWEG 5357 Database Management Systems   **3 Credits**
This course focuses on the steps required to build and maintain relational database infrastructure for modern n-tiered applications. It covers logical and physical design, implementation of the database, the use of the database to meet the informational needs of a software system, and the installation, operation and maintenance of the software. Specific topics include database design, SQL, interacting with the DBMS, and backup and recovery of data security. Students perform a number of hands-on exercises using the Oracle Database Server running on the Microsoft Windows platform. Undergraduate equivalent: CPSC 4357. Previously SW 0402.

SWEG 5360 Machine Learning   **3 Credits**
This course will provide a practical introduction to machine learning applications such as face recognition, clinical diagnosis, speech recognition, natural language processing, or image classification. Topics such as regression, classification, neural networks, deep learning, and ensemble methods will be discussed. Emphasis will be on how to choose appropriate machine learning and deep learning models and how to evaluate their performance. The class will be a combination of lecture and computer lab. Undergraduate equivalent: CPSC 4360.

SWEG 5407 Java for Programmers   **3 Credits**
This course is a study of object oriented software component design. This course introduces object oriented programming and its use in problem solving with abstract data types such as lists, linked lists, stacks, queues, graphs, and trees. Previously SW 0407.

SWEG 5417 Security Management   **3 Credits**
This course will introduce the foundations of security program management and familiarize students with the core concepts needed to build, deploy, and manage security controls and policy to protect against today's cyber threats and regulations. Besides the theoretical underpinnings, emphasis will be put on practical experience of using security governance resources. Concepts like security policy/standards, governance, risk management, and program management will be key to ensuring effective security program management. The course will be a combination of lectures and hands-on collaborative working experience in building a security program.

SWEG 5420 Systems Security   **3 Credits**
This course will introduce the core concepts of detective and preventative security and the venues that threat agents use to compromise and breach systems. Students will learn to evaluate their environment for potential attacker entry points physical, virtual, and electronic, and come up with solutions to deploy to prevent intrusions. Emphasis will be placed on theoretical occurrences, but will also include practical experience of using prevention applications. Additionally, research on methodologies used by attackers will be required from outside resources (internet) which will be shared with the class as a whole. The course provides a current status of what is prevalent in the evolving cybersecurity domain.

SWEG 5427 Operating Systems and Programming   3 Credits
This course introduces the internal operations of modern operating systems. Students will learn how to program on non-Windows OS platforms. The topics cover a brief history of operating systems, the major components of modern operating systems, and the object-oriented methodology on UNIX-like platforms. Various UNIX tools will be used in the course and students will study examples using object-oriented programs as well as large system integration by object-oriented methodology. Previously SW 0427.

SWEG 5440 Vulnerability Management   3 Credits
This course will introduce the foundations of vulnerability program management and familiarize students with the core concepts needed to build, deploy, and manage vulnerability management controls that help identify risk and help prioritize remediation and determine risk to protect against today's cyber threats. Besides the theoretical underpinnings, emphasis will be put on practical vulnerability management experience. Concepts like vulnerability discovery, reporting and assessing risk, threat modeling, and security testing are key to managing a vulnerability management program's risk posture. The course will be a combination of lectures and hands-on a collaborative working experience in building a vulnerability management program.

SWEG 5521 Information Visualization   3 Credits
Topics covered include graphics programming, information visualization general principles, visualization techniques for one-dimensional, two-dimensional, and N-dimensional information, graph visualization, information visualization lifecycle: representation, presentation, interaction, perception, and interpretation, as well as theories behind information visualization, and focus+context techniques. This course also includes the implementation of techniques presented in lecture. Students are encouraged to devise new techniques, implement them, and determine their effectiveness. Students will be required to complete in-depth assignments, read, summarize, and present recent journal papers from the information visualization literature, and prepare term papers with regard to an information visualization research topic. Students will also be required to specify, design, implement, and document a semester-long software project related to information visualization. Undergraduate equivalent: CPSC 4521. Previously SW 0521.

SWEG 5525 Human Computer Interaction   3 Credits
This course introduces students to the foundations of Human Computer Interaction and how it applies in software engineering and research settings. Students will learn how to design user interfaces based on the capabilities of computer technology and the needs of human factors. They will design user interfaces and learn how to implement a prototype from a list of informal requirements. It will also introduce students to issues related to human subject research as well as ethical implications of human computer interaction.

SWEG 5530 Introduction to Information Security   3 Credits
This course gives students a fundamental understanding of current social engineering methods in the information security arena. Deception and human behavior is exploited to gain valuable information, which is very relevant to today's growing security concerns. This course is another key class in the information security track within the software engineering program, and builds upon the weaknesses in the human factor. Areas of discussion will be methods, current trends, and most of all countermeasures. Instruction includes lectures and discussion assignments which involve analyzing current work places and social gatherings coupled with scenarios of exploitation. Previously SW 0530.

SWEG 5900 Special Topics (Shell)   3 Credits
This course provides an in-depth study of selected topics in software engineering of particular interest to the students and instructor. The course is counted as a major elective/specialization course. The topics and prerequisites will be announced when this course is offered. Previously SW 0482.

SWEG 5990 Independent Study   3 Credits
This course is an individualized study under the supervision of the faculty member. The course emphasizes individual creativity. Students work with a faculty mentor in studying and investigating topics of current interest in software engineering. Enrollment by permission only. Previously SW 0483.

SWEG 6404 Network Security   3 Credits
This course is intended for individuals who need an understanding of the client-server environment, with any emphasis on network security. The OSI Model, network concepts and network architecture are discussed. The components that make up a network, including cabling, wiring hubs, file servers, bridges, switches, routers, network interface cards, network operating systems, and network software and hardware configurations are discussed. Network architectural concepts, wide area networks, remote access, and segmentation are discussed. Operating systems will be discussed and demonstrated. Featured is the seven-layer OSI model, the foundation of today's communication protocols. Students will work with various security protocols and configure routers and switches with security methods. Previously SW 0404.

SWEG 6409 Advanced Programming in Java   3 Credits
This course covers advanced topic of Java programming. Topic covers multithreading, networking, nested references, design patterns, JDBC, persistence, I/O and advanced GUI such as swing. Data structure concepts such as linked list, tree and basic searching and sorting algorithms will be covered. Lab component included. Previously SW 0409.

SWEG 6410 Enterprise Java   3 Credits
Prerequisite: SWEG 6409.
Advanced server-side Java technologies. Coverage includes state-of-the-art explorations into server-side technologies such as JDBC, Google Web Toolkit, Enterprise JavaBeans (EJB), Android, XML, etc., as time permits. Lab component included. Previously SW 0410.

SWEG 6411 JavaScript Web Development   3 Credits
This course teaches software engineers how to produce robust, scalable, data driven JavaScript web applications. JavaScript is currently the most popular general-purpose programming language for web development. In this course students learn a wide range of JavaScript concepts. Topics covered in the course include web application architecture and organization; information management across distributed computing systems; connectivity to parallel and distributed database / web service systems; custom and dynamic web controls; web forms; and best practices. Towards the end of the course, students will engage in a major project that will require application of acquired course knowledge and skill. Students will also be able to articulate the complexities involved in creating and publishing an interactive JavaScript based web site. Programming will be part of this course. Finally, students will be able to implement best principles and practices for securing their web application.

SWEG 6448 Server Management   3 Credits
This is a course designed to provide the student with the tools necessary to manage Windows servers. The topics include user management, installation and configuration of web servers, mail servers, FTP servers, LDAP and backup, and other routine systems and network administration. Previously SW 0448.

SWEG 6461 Pattern Recognition   **3 Credits**
This course introduces the student to the techniques used and capabilities of modern pattern recognition systems with an emphasis on those that can learn and improve their performance as they are used. After a short review of some necessary mathematical concepts (probability, stochastic processes, and vector spaces), the student is introduced to the problem of representing real-world problems to a system. Selected real world applications are used to show examples of some valid representations (e.g. speech and handwriting) to provide insight and experience in the application of recognition systems. Several important recognition engines are then described and analyzed for their effectiveness in recognition/synthesis/learning systems. The use of additional knowledge bases dealing with the problem environment is then introduced to increase system performance and overall recognition system structures are discussed. Previously SW 0461.

SWEG 6499 Algorithms   **3 Credits**
This course explores the development and evaluation of algorithms. This class covers classic algorithms, algorithm analysis, searching and sorting algorithms, dynamic programming, heuristics, and graphic algorithms. Algorithm efficiency and performance is a focus as the student gains experiences through problems and programming projects. Previously SW 0499.

SWEG 6505 Advanced Database Concepts   **3 Credits**
This course covers topics in database implementation designed to provide software engineers with a wide variety of server-side problem solving techniques. Topics include cursors, query and index optimization, advanced SQL programming, distributed databases, object-oriented databases, clustering, partitioning, and working with XML and other unstructured data. While Microsoft SQL Server is primarily used for demonstration, the topics covered are applicable to any database platform, and the different approaches of the major database vendors are frequently contrasted. The format consists of lecture and lab components. Previously SW 0505.

SWEG 6508 Data Warehouse Systems   **3 Credits**
This course examines the tools, techniques, and processes used in the design and development of data warehouses. As such we will examine how to successfully gather structure, analyze, and understand the data to be stored in the data warehouse, discuss techniques for modeling the data in the data warehouse, discuss the ETL process, and describe techniques for presenting and analyzing the data in the warehouse. We will also discuss capacity planning and performance monitoring. Microsoft Analysis Services and Sybase ASIQ will be examined as approaches for implementing a data warehouse. Previously SW 0508.

SWEG 6512 Web Development II with ASP.NET   **3 Credits**
This course teaches site developers how to create robust, scalable, data-driven ASP.NET Web. Students learn how to create ASP.NET applications using a text editor and the command-line tools, as well as using Visual Studio. Topics include the .NET framework, web forms, validation controls, database connectivity, web services, component development, user controls, custom server controls, and best practices, etc. At the end of the course, students will be able to describe the issues involved in creating an enterprise web site, creating and publishing a web site, creating interactive content for a website, adding server scripting to a web page using ASP.NET, implementing security in a website, and reading and writing information to a database from ASP.NET. Previously SW 0512.

SWEG 6516 PHP and MySQL   **3 Credits**
Prerequisite: SWEG 5304.
This course is an introduction to the PHP programming language. Topics include installation and configuration with the Apache HTTP server, variables and data types, language syntax, control structures, functions, strategies and tools for handling input and generating output, error handling, sending email, manipulating dates and times, string manipulation and regular expressions, SQL and MySQL database access. The course also covers advanced topics such as MVC model-based web application development using framework and packages from the PHP Extension and Application Repository (PEAR). At the conclusion of the course, students will be able to design and implement scalable data-driven web applications. Previously SW 0516.

SWEG 6518 Data Mining and Business Intelligence   **3 Credits**
This course examines business intelligence concepts, methods and processes used to improve data-centric business decision support solutions with a particular focus on data mining techniques. Students will first examine the principles and practices of gathering and retrieving large volumes of data for analysis and synthesis. Next, students will examine analytical techniques for extracting information from large data sets. In particular, the course examines the following data mining techniques: classification, estimation, prediction, and clustering. During the course, students will also discuss knowledge management, how organizations manage and use the knowledge that they acquire, and presentation of data. Previously SW 0518.

SWEG 6530 Applications and Data Security   **3 Credits**
This course is structured around enterprise and web applications and the data security associated with these applications. It encompasses the encryption schemes of transmission to execution of code and complete flight of an execution. Common countermeasure and best business practices that help ensure a solid security understanding are the objectives of the course. Previously SW 0531.

SWEG 6596 Network Routing and Switching   **3 Credits**
This course presents concepts and develops skills needed in designing, implementing, and troubleshooting local and wide area networks. Students design and configure LAN and WAN using routers and switches, learn the components of wireless networks, and how to configure and troubleshoot a network and optimize its performance. The course also provides numerous lab opportunities to configure and troubleshoot networks with Cisco routers and switches. Previously SW 0596.

SWEG 6599 Ethical Hacking   **3 Credits**
This course covers current information security practices and countermeasures put in place to safeguard against security breaches. The course reviews internet infrastructures such as firewalls, IDS systems, and honey pots. Additional areas include risk analysis, computer-use policies, physical security, internet/intranet security, malware, firewall infrastructure, and current information security issues. Previously SW 0599.

SWEG 6961 Capstone Professional Project I   **3 Credits**
Prerequisite: MATH 5417 or SWEG 5301 or SWEG 5322 or SWEG 5530 or SWEG 6518.
In this two-semester capstone sequence, students form teams, perform a technical study, and design software systems based on either their customer's requirements, develop, test, and deploy software systems. The results of these projects provide a library of case studies, designs, and software development techniques, and project management skills that are of general interest to local information technology professionals. A capstone prospectus, approved by your advisor, must be submitted to and accepted by the director of the program prior to starting the capstone sequence. Previously SW 0550.

SWEG 6962 Capstone Professional Project II   **3 Credits**
Prerequisite: SWEG 6961.
In this two-semester capstone sequence, students form teams, perform a technical study, and design software systems based on either their customer's requirements, develop, test, and deploy software systems. The results of these projects provide a library of case studies, designs, and software development techniques, and project management skills that are of general interest to local information technology professionals. A capstone prospectus, approved by your advisor, must be submitted to and accepted by the director of the program prior to starting the capstone sequence. Previously SW 0551.

SWEG 6971 Thesis I   **3 Credits**
Prerequisites: SWEG 5302; at least 18 credits of software engineering courses.
In this two-semester sequence of thesis courses, students will work on an individual research project that they should formulate as a problem, solve under the guidance of a faculty member, and communicate the results. Work involves literature search, writing a proposal, analysis and/or implementation with critical thinking, and writing convincingly. The student must also submit a final paper for possible publication in a refereed journal appropriate to the topic. Previously SW 0560.

SWEG 6972 Thesis II   **3 Credits**
Prerequisite: SWEG 6971.
In this two-semester sequence of thesis courses, students will work on an individual research project that they should formulate as a problem, solve under the guidance of a faculty member, and communicate the results. Work involves literature search, writing a proposal, analysis and/or implementation with critical thinking, and writing convincingly. The student must also submit a final paper for possible publication in a refereed journal appropriate to the topic. Previously SW 0561.