Curriculum & Courses

36 points for degree completion* On-campus and online instruction

Part-time or full-time program** Fall and spring intake

3-6 consecutive terms to complete

* Non-native English speakers may be required to complete a one-credit oral communication course during their first semester, raising the point total for degree completion to 37 points.

** International students are responsible for ensuring they have read and understand the University's student visa application eligibility and requirements. Please note that it is not permissible to enroll while in B-1/B-2 status. In addition, if studying on a student visa, you must enroll full-time (12 credits per term) and study on campus.

The program consists of required courses in two core areas. The Leadership, Management, and Communication Core develops an enterprise-wide perspective on data and the knowledge, skills, and abilities needed to inspire, create, and foster an analytical culture within an organization. The Applied Analytics Core develops a broad understanding of the frameworks for the use of data to inform real-life business problems from data collection to application in decision-making. This core introduces you to the methods and range of tools and systems that organizations use to conceptualize, collect, manage, and analyze data to produce information to make it actionable across their enterprise.

For your elective study, you will align the foundational skills you've developed in the two core areas with three courses you choose that are pertinent to your academic and professional goals. Elective courses in a wide range of subjects, including business, finance, marketing, information visualization, collaboration, communication, and negotiation, let you obtain in-depth knowledge in a particular industry or functional area within an organization.

Completing your Integrated Capstone Project, you will apply what you have learned in the two core components to a real-world analytics project sponsored by a leading organization.

Students requiring an F1 visa must enroll full-time (12 credits) and study on campus. Students on an F1 visa are permitted to complete no more than one online class each semester. Students not on an F1 visa have the flexibility to enroll in courses online or on-campus. For these students, if desired, 68% of the coursework can be completed online.

Required Full-Time Sequence

Fall or Spring Intake

SEMESTER 1

Applied Analytics in the Organizational Context

Analytics and Leading Change
Master of Science in Applied Analytics Pre Fall-2018 Curriculum

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<th>Course</th>
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<tr>
<td>Research Design</td>
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<tr>
<td>Applied Analytics Frameworks and Methods</td>
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<tr>
<td>Oral Communication (if required*)</td>
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<td><strong>SEMESTER 2</strong></td>
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<tr>
<td>Strategic Leadership in Analytics-Focused Organizations</td>
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<td>Modern Database Architecture</td>
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<td>Strategic Communications</td>
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<td>Elective</td>
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<td><strong>SEMESTER 3</strong></td>
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<td>Data Visualization &amp; Design</td>
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**Required Part-Time Sequence**

**Fall Intake or Spring Intake**

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<td>Applied Analytics and Leading Change</td>
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<tr>
<td>Research Design</td>
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Master of Science in Applied Analytics Pre Fall-2018 Curriculum

**SEMESTER 3**

- Strategic Leadership in Analytics-Focused Organizations
- Modern Database Architecture

**SEMESTER 4**

- Strategic Communication
- Elective

**SEMESTER 5**

- Data Visualization & Design
- Elective

**SEMESTER 6**

- Capstone
- Elective

*Non-native English speakers may be required to complete a one-credit oral communication course during their first semester, raising the point total for degree completion to 37 points.

### Core Courses

**Leadership, Management, and Communication Core**

- Applied Analytics in the Organizational Context
- Analytics and Leading Change
- Strategic Communications
- Strategic Leadership in Analytics-Focused Organizations

**Applied Analytics Core**

- Applied Analytics Frameworks and Methods
- Research Design
- Modern Database Architecture
- Data Visualization & Design

**Capstone Project**
Elective Courses

The following approved electives are available both face-to-face and online.

- BUSI PS5001. Introduction to Finance. 3 pts.
- BUSI PS5003. Corporate Finance. 3 pts.
- BUSI PS5009. Financial Accounting. 3 pts.
- BUSI PS5010. Managing Human Behavior in the Organization. 3 pts.
- BUSI PS5020. Introduction to Marketing. 3 pts.
- BUSI PS5025. Marketing Strategy. 3 pts.
- TMGT PS5124. Knowledge Management. 3 pts.

The following approved electives are currently offered only in online format.

- IKNS PS5336. Collaboration at Scale. 3 pts.

The following approved electives are currently offered only in face-to-face format.

- APAN K4337. Analytical Applications and Data Driven UX. 3 pts.
- APAN K5150. Systems Biology. 3 pts.
- APAN PS5410. Managing Data Assets and Liabilities. 3 pts.
- APAN PS5510. Data Analytics Using SQL and Relational Databases. 3 pts.
- BUSI PS4007. Introduction to Computer Science, Programming in JAVA. 3 pts.
- BUSI PS6014. Underwriting. 3 pts.
- ERMC PS5580. Bayesian Data Analysis. 3 pts.
- LAW PS5010. Introduction to Business Law. 3 pts.
- LAW PS5020. Introduction to Intellectual Property Law. 3 pts.
- NECR PS5105. Introduction to Negotiation. 3 pts.
- NECR PS5124. Intrapersonal Dynamics and Conflict. 3 pts.
- SUMA PS5169. Sustainability Metrics. 3 pts.
- SUMA PS5193. Statistics for Sustainability Management. 3 pts.

The following approved electives in actuarial science are available online for Applied Analytics master’s students.

- ACTU PS5619. Pensions. 3 pts.
- ACTU PS5030. Introduction to Life Insurance. 3 pts.
- ACTU PS5630. Property/Casualty. 3 pts.
- ACTU PS5621. Investment & ALM for Actuaries. 3 pts.
Applied Analytics in the Organizational Context

Description

Applied analytics is about bringing science to human inductive reasoning. It’s therefore important to consider first all the elements of the business framework: trends that impact the business (economic, technological, social, demographic), innovation, strategy creation and business models. Applied analytics integrate and amplify, in turn, the impact of all of them.

This course aims first at providing the context in which analytics and business intelligence play a strategic role in the organization; then, and most importantly, how to turn data into information, then into knowledge, and finally into actionable insights and business decisions. The course illustrates the importance of rapidly moving beyond “what” is happening in the business to invest time in “why” it is happening, and better understand the options available for “how” to react.

Analytics and Leading Change

Description

This course provides a hands-on guide to harnessing the insights and persuasiveness of analytics to create change in organizations. Students learn how to build an analytics strategy where analytics are indispensable to the organization's success and both build and manage an analytics team and lead analytics projects. They explore the motivations, obstacles and interventions of change, and learn to build alliances, facilitate difficult meetings and develop a transformation plan. The course focuses on practical skills as they are being developed at organizations with pioneering analytics capabilities today, and will bring in academic research as appropriate.

Strategic Communications

Description

This course develops students’ awareness of the vital role communication plays in organizational leadership and strengthens their strategic communicative competence in order to execute strategy, build and sustain critical relationships, and achieve business aims through successful and strategic communication.

Students examine some of the fundamental components of strategic communications and learn how to analyze audiences and structure contextually and socially appropriate, persuasive, ethical, and compelling messages. Students get ample practice in strategic interactions in relevant social and professional contexts (e.g., business meetings, team projects, etc.); active listening; strategic storytelling; data visualization to describe complex analyses; creating compelling professional spoken and written messages, reports, and presentations; and negotiation and conflict resolution practice.

Strategic Leadership in Analytics-Focused Organizations

Description

This course provides students with the knowledge and skills to cultivate analytics as a strategic capability and leverage it to strengthen business decisions, create value and generate solutions in an ever-changing global market. The course focuses on three key areas: interaction skills in a business environment; human behavior in the organization; and core principles and practices of adaptive leadership.
Master of Science in Applied Analytics Pre Fall-2018 Curriculum

Students learn how to analyze the organizational environment, assess readiness for analytics, and maximize the effectiveness of positive influence to drive greater performance and value creation. They develop a broad-based understanding of human behavior from an interdisciplinary perspective (psychology, sociology, ethics, and the applied fields of management and organizational behavior). Students learn how to apply those theories and concepts to foster innovation across the enterprise, and build agility to drive the adoption of analytics. This includes how to transform the organization into data-savvy, analytical decision-making culture, and achieve and measure success in a consistent way.

Oral Communication

Requirement
This course may be taken by invitation only.

Description
This course is a workshop for international students to develop enhanced communication skills and greater fluency in English in order to communicate with increased confidence. Students will:

- develop presentation skills
- practice and improve pronunciation
- explore and enhance the nuances of discourse strategies

Course activities will include a mix of mini-lectures, student generated oral presentations and discussions.

Applied Analytics Frameworks and Methods

Description
This course provides a broad overview of applied analytics frameworks and methods to help organizations turn data into informative insights. The chain of inferences leading from data collection to utilization for decision-making represents a comprehensive and coherent validation framework for the use of data to inform real life problems. The course covers tools for addressing a set of claims about a problem based on data, such as exploratory data analysis, regression, causal inference, network analysis, and predictive analytics. It also introduces modern, computational methods in natural language processing and machine learning and how these methods are integrated and deployed within modern database frameworks to turn organizations in data-savvy organizations.

AAFM helps students recognize which applied analytic frameworks and methods to use to make smarter and better decisions and produce better results for their organizations. Students learn how different analytic methods are used to address critical data issues facing an organization and how best to apply those methods. Students learn how to conduct in-depth strategic analyses of business problems and communicate those results to all levels of an organization - both technical and non-technical audiences. Students have the opportunity to apply these analytic methods to real problems in specific industries associated with their area of interest.

Research Design

Description
This course provides a comprehensive introduction to various approaches to research design, such as survey research, observational studies, qualitative research, and experiments. Students study evidence-centered design theory as well as how practitioners from various disciplines (psychology, sociology, and economics) apply that theory to answering social research questions. Students learn both to recognize the relationships between variables and, more importantly, the mechanisms that drive those relationships.

Modern Database Architecture

Description

The objective of the course is to provide professionals with a broad understanding of the (big) data challenges confronted by any modern data-savvy organization. In this course, we define “big” along three dimensions: (1) volume; (2) variety, e.g. search queries, blog posts, social networks; (3) velocity, i.e., need to process, analyze and make decisions in real-time. The course also covers the multifaceted solutions used by leading organizations to not only tackle but also excel in this “big and bigger” data world.

Course topics include major (modern) database types; database systems architecture, such as relational, federated, map/reduce, etc.; systems design and architecture considerations such as storage engines, transactions engines, query languages, concurrency, etc.; and physical database systems component/architecture considerations, such as disks, memory, network, distributed architectures, shared architectures, and controllers.

Data Visualization & Design

Description

This course provides an overview of modern data visualization and design theories, methods and techniques and gives students the tools for creating effective visual interpretations of data to achieve the following objectives: to simplify complex data and analytics, and improve comprehension, communication, and decision-making.

Students study the principles governing visual representations of data and analysis from graphic design, visual art, perceptual psychology, and cognitive science and they create effective visualizations based on those principles. Students learn how to assess an organization's data visualization needs and tailor a successful data visualization strategy to heterogeneous audiences. Techniques of visual analytics are introduced to discover compelling insights from data. Throughout the course, students create and receive feedback on data visualizations while sharpening their ability to tell complex stories in a visual medium. Students have the opportunity to use modern tools, such as R, Tableau, and d3.

Capstone Project: Building Data-Savvy Organizations

Description

The course serves as the capstone project for the MSAA degree. As an industry-driven project, the capstone requires synthesis of program content applied to real-world challenges to apply the leadership, strategic management, communication and modern analytics core coursework to industry-sponsored analytics projects. Students critically assess a company’s real-world data challenges and opportunities and develop an integrated data-savvy analytics plan and solution. The project helps students develop and apply the technical, leadership, and communication skills required to identify and implement solutions/approaches across multiple divisions within an organization.
BUSI PS5001. Introduction to Finance. 3 pts.

Students will be introduced to the fundamental financial issues of the modern corporation. By the end of this course, students will understand the basic concepts of financial planning, managing growth; debt and equity sources of financing and valuation; capital budgeting methods; and risk analysis, cost of capital, and the process of securities issuance.

BUSI PS5003. Corporate Finance. 3 pts.

Prerequisite

BUSI PS5001 Introduction to Finance/or Professor Approval is required

Description

Students will learn the critical corporate finance concepts including: financial statement analysis; performance metrics; valuation of stocks and bonds; project and firm valuation; cost of capital; capital investment strategies and sources of capital, and firm growth strategies. At the end of this course students will understand how to apply these concepts to current business problems.

BUSI PS5009. Financial Accounting. 3 pts.

Students will examine the generally accepted account principles (GAAP) underlying financial statements and their implementation in practice. The perspective and main focus of the course is from the users of the information contained in the statements, including investors, financial analysts, creditors and, management. By the end of this class students will be able to construct a cash flow statement, balance sheet and decipher a 10K report.

BUSI PS5010. Managing Human Behavior in the Organization. 3 pts.

Students will gain an overview of major concepts of management and organization theory, concentrating on understanding human behavior in organizational contexts, with heavy emphasis on the application of concepts to solve managerial problems. By the end of this course students will have developed the skills to motivate employees, establish professional interpersonal relationships, take a leadership role, and conduct performance appraisal.

BUSI PS5020. Introduction to Marketing. 3 pts.

Students will learn fundamental marketing concepts and their application. By the end of this class you will know: the elements of a market, company strategy, how to identify customers and competition, the fundamental elements of the marketing mix (product, price, placement and promotion) how to research consumer behavior, and pricing strategies. Students will have extensive use of case study projects.

BUSI PS5025. Marketing Strategy. 3 pts.

Prerequisite

BUSI PS5020 Introduction to Marketing/or Professor Approval is required
Description
Students will develop analytical skills used to formulate and implement marketing driven strategies for an organization. Students will develop a deeper understanding of marketing strategies and how to implement tactics to achieve desired goals. Students will work on case study projects in both individual and a team based projects. By the end of this course you will be able to develop a marketing strategy based market assessments and company needs.

IKNS PS5336. Collaboration at Scale. 3 pts.
Description
This course is about leading boundary-spanning coalitions. An old African proverb tells us that, "If you want to go fast, go alone. If you want to go far, go together." While this advice is especially relevant in our interconnected 21st-century world, we have learned that working together is not always easy to do well.

“Collaboration at Scale: Leading Boundary-Spanning Coalitions” takes the study of collaboration into an even wider realm by examining the potential and complexity of large-scale, cross-organizational collaboration, and how to lead it.

The concept of scalability is common in the business world and this course demonstrates what it takes to make collaboration scalable and suitable for a variety of challenging contexts larger than a single organization. Inherent in the concept of scalability are the notions of "appropriate scale" and also "at scale." Both of these notions raise valid questions that we will address in this course. (Though our interpretations of scale have evolved with the advent of social media, specific technology selection is not the focus of the course.)

Students will learn the characteristics, conditions and dynamics of various large-scale collaborations, as well as how to design and lead them effectively. Course materials will be drawn from the for-profit and nonprofit worlds. Using a balance of practice and theory of networks and large system facilitation, students will demonstrate their mastery of course materials through an assignment in which they diagnose and (re)design a “collaboration at scale.” This could be in the business, scientific, religious, political, or humanitarian domains.

TMGT PS5124. Knowledge Management. 3 pts.
Description
This course explores key knowledge management and organizational learning concepts and techniques that are critical to business, individual, and organizational performance. As technology and the network economy drive businesses to compete under continuously accelerating rates of change in technology, business leaders must incorporate knowledge management and learning into their organization’s activities in ways that support and propel their business goals. They must also be proactive in recognizing and responding to the influence of technology on these goals and environment(s) in which they are accomplished. Class sessions encompass a set of topics including purpose, planning, success measurement, and implementation of knowledge management initiatives and organizational learning techniques. Through lectures and individual and collaborative work, students explore how they can use these techniques to improve business performance and strengthen their leadership and management capabilities.

Description
Exponential growth of information and data—combined with software that can understand and learn from analytic experience—provides entrepreneurs with tremendous opportunities to bring innovative customer-focused solutions to market. While there are no direct paths to bring a new product idea to market, there are easily identifiable milestones that can guide the way from idea generation to product profitability. This course will explore the process of early stage development of knowledge-driven, data intensive digital products like Pandora, Netflix, Watson and Trip Advisor. The goal is to create an entrepreneurial experience at its most elemental and visceral level—ideation, brainstorming, interacting with customers, building a founding team, developing a business model, managing risk, investigating competitors, and pitching the business to potential investors. Students will be exposed to all the pressures and demands of real world start-ups by participating on teams tasked with creating deliverables required to launch a new business.


Description
In this hands-on class, students will learn the theoretical and practical fundamentals of research-based digital product design through the creation of an interactive mobile app prototype and a process case study.

This class will focus specifically on ideating, researching, defining, designing and testing a mobile app idea of your choice through an iterative user-centered design process. Outside of this course, these same methods can be applied to creating any type of product, not just mobile apps. If you’ve taken Ralph Poole’s “Knowledge-Driven Digital Product Innovation” course (IKNS K5338), this course will create a tangible design proof of concept for your business idea (Ralph’s class is preferred, but not required as a prerequisite).

The course has three components:

1. Prototype: A realistic, interactive mobile app prototype that students create and refine through multiple iterations in industry-standard free prototyping software

2. A Case Study that incorporates comprehensive documentation of the industry, audience, problem, solution, research and iterative design and testing process used to create the prototype

3. Research and Testing: Peer and external user research, testing, evaluations and feedback during the course

The user experience skills and methods that are taught in this class are in demand by employers and startups across nearly every industry, and reflect the latest best practices used to create today’s most widely used and award-winning digital products.

Description

In recent years, machine learning techniques have made significant impact in a wide range of application areas in various industries. This course provides an introduction to machine learning concepts and algorithms, as well as the application areas. Topics will include supervised and unsupervised learning, learning theory etc. Basic computer science, linear algebra and quantitative skills are recommended as prerequisites.

APAN K4336. R Programming for Applied Analytics. 3 pts.

Description

R has gained significant interest in research, business analytics and data science communities, for data preparation, analysis (including statistical analysis) and graphical outputs. This course provides an Introduction on R programming with an application focus. Students are recommended to have an understanding of basic statistics.

APAN K4337. Analytical Applications and Data Driven UX. 3 pts.

Description

“We have more data than we know what to do with!” is a common refrain being heard more and more within the enterprise. How can companies take all that data and liberate it, so that anyone in the enterprise can leverage it to do amazing things? You will take a deep dive into the research, design and prototyping of analytic applications – programs that empower non-technical people to take advantage of the huge reserves of data in the modern enterprise. Within the class you will learn how to make three kinds of analytical applications: Exploratory Apps that allow users to make sense of trillions of rows of data, Task-Specific Apps that help people make informed decisions, and Monitoring Apps that can track live streaming data as it comes in through the internet of things.

APAN K5150. Systems Biology. 3 pts.

Description

Systems Biology is a scientific endeavor that combines principles from a wide range of disciplines — biology, engineering, mathematics, physics, and computer science — and applies them to the analysis of biological Big Data. It aims to reinvigorate and expand the potential of genomic information for accelerated progress in biomedicine. This course will provide perspectives of 1) how Systems Biology is addressing the biomedical grand challenges of our time, 2) what Systems Biology may realistically be expected to achieve, and 3) where Systems Biology will have major impact. The material is accessible to students of any background with a foundational understanding of undergraduate molecular biology. Readings, tutorials, and in-class presentations that will refresh this knowledge.

APAN PS5410. Managing Data Assets and Liabilities. 3 pts.

Description

Data is a representation of “real things” within organizations (i.e. customers, business obligations, supply chain participants, purchase behavior). It is the primary factor of input into regulatory reporting, business
analytics, product innovation and process automation. But the challenges of properly managing data are significant. There are many legacy repositories and business functions to unravel. There are social and political barriers to overcome. Data ownership and accountability are hard to implement. And many organizations are challenged to stay the course in the face of operational disruption and conflicting stakeholder requirements. This course will expose you to the data principles, governance processes and organizational prerequisites needed to manage data as a strategic asset – so that it can be leveraged and used with confidence.

**APAN PS5510. Data Analytics Using SQL and Relational Databases. 3 pts.**

**Description**

This is a hands-on, learning by doing, course on data preparation and analysis using SQL. In all analysis projects, managing and manipulating data is often the most challenging component. During this course, we will tackle using SQL as a tool to solve real-world problems, such as understanding customer tenure, segmenting customers, understanding purchasing patterns, and building basic predictive models.

Working with data and working with people who use data is fundamental throughout business. For instance, how can you estimate the number of customers that you will have next year? How can a business prioritize acquisition based on the long-term value of customers? What products sell well together? How can we discover new patterns about customers, products, and markets to help the business? The challenge is not only having the required data, but also being able to carefully analyze that data to meet our business needs.

This is an intensive course that will cover the following topics:

- The basics of relational databases for storing and accessing data.
- The value of scalable, parallel systems for managing big data.
- The SQL language, including joins, aggregations, window functions, and subqueries.
- Answering business questions by querying databases.
- General purpose approaches for writing more efficient queries.
- RFM (recency, frequency, monetary) analysis.
- Association rules and market basket analysis.
- Survival analysis
- Naïve Bayesian models.

**BUSI PS4007. Introduction to Computer Science, Programming in JAVA. 3 pts.**

**Description**

This course is a foundation course for learning software programming using the Java language. The course will introduce the student to programming concepts, programming techniques, and other software development fundamentals. Students will learn the concepts of Object Oriented programming using Java. The course will present an extensive coverage of the Java programming language including how to write, compile and run Java applications.
The purpose of this course is to learn programming concept and Object Oriented fundamentals using Java. Students will receive a solid understanding of the Java language syntax and semantics including Java program structure, data types, program control flow, defining classes and instantiating objects, information hiding and encapsulations, inheritance, exception handling, input/output data streams, memory management, Applets and Swing window components.

BUSI PS6014. Underwriting. 3 pts.
ERMC PS5580. Bayesian Data Analysis. 3 pts.

Description
An introduction to Bayesian data analysis. Includes a concise introduction to required concepts in probability and computing with R. Focuses on hands-on use of Bayesian methods. Specific topics include: Introduction to the Bayesian statistics; Elementary Bayesian Computation; Bayesian Hierarchical Models; Bayes Factors; Monte Carlo; Markov chain Monte Carlo MCMC Diagnostics; Sequential Monte Carlo; Bayesian Networks; Bayesian Causal Modeling. In order to gain entry, your resume should reflect a math/statistics background and familiarity with R programming.

LAW PS5010. Introduction to Business Law. 3 pts.

Description
How do businesses and their employees navigate the rules and regulations that govern their operation? No matter what the industry, understanding the legal landscape is essential in today’s business environment. This course introduces the fundamental laws and principles governing businesses in the U.S. today. The effect of recent developments in case law and legislation on these topics will be discussed and debated in class.

At the end of the course, students will have a solid understanding of the role the law plays in doing business across industries.

Among the topics to be discussed are:

- Sources of laws and legal principles
- Business organizations
- Corporate governance, compliance and ethics
- Contracts, mergers and acquisitions and business transactions
- Corporate finance - capital raising, IPOs
- Employment law
- Intellectual property
- International business transactions
- Litigation and dispute resolution

LAW PS5020. Introduction to Intellectual Property Law. 3 pts.

Description
How are ideas, products, and innovations protected? Every industry must ask these questions and understanding how the law works to answer them is an invaluable tool in today’s marketplace. This
The course introduces the fundamental principles of U.S. intellectual property law. The course will explore the basic concepts of copyright law including the requirements for copyright protection and the types of works protected, what rights and limitations come with copyright protection, and how the law is enforced. The course will also cover the main tenets of trademark law, including discussion of the Lanham Act, dilution, and unfair competition. Recent developments and controversies, including intellectual property protection for new technologies and the difficulty of enforcing protections on the Internet will also be discussed.

**NECR PS5105. Introduction to Negotiation. 3 pts.**

**Description**

Negotiation is one of the most important strategies in conflict resolution and is used routinely by all humans to resolve conflict and potential conflict successfully. This course examines both theoretical and practical implications of diverse assumptions and strategies. Students develop a deeper self-awareness of their role in the creation, perpetuation, escalation and resolution of conflicts, as well as in relationship with the other party.

**NECR PS4124. Intrapersonal Dynamics and Conflict. 3 pts.**

**Description**

When we understand our cognitive, personality, temperament, motivational, learning, and communication styles, we can blend and capitalize on our strengths and manage our weaknesses. This course reviews the body of work that studies essential influences and the dimension of the intrapersonal dynamics that contribute to who we are and how we work. The course emphasizes a systems approach to understanding self and will be highly interactive, incorporating the participants' personal experiences and self-assessments (MBTI, The Bar-On Emotional Quotient Index, Communication Skills Assessment, Learning Styles Inventory).

The course will be a blend of concepts and skills, theory and practical application. You will have opportunities to practice developing your skills throughout the course, and develop and implement an individualized plan for guiding strengths and managing weaknesses.

**SUMA PS5169. Sustainability Metrics. 3 pts.**

**Description**

The course will focus on sustainability indicators, the process through which they were developed, and how they are used to shape policy and track progress. This course will examine the science and history of our current environmental crisis with a focus on the various policy initiatives and actions being taken globally and locally including the specific efforts of the C40 Cities (40 largest cities) to both mitigate greenhouse gas emissions and prepare for the impacts of climate change. The class will look at case studies from different cities around the world as well as New York City's efforts through PlaNYC while introducing the principles underlying sustainability indicators-including greenhouse gas inventory protocols-and how they are used to influence and shape policies and decisions, and will offer students hands-on experience with these tools.

The goal of this is to make students acquainted with the debate, challenges, and opportunities of a changing climate. The course will focus on the solutions and responses to the climate change challenges facing cities using real world and current examples. The course will survey a broad range of responses to
climate change from international frameworks and global treaties to specific actions at the local level. Students will be required to critically evaluate what they have read and heard. In addition, the course will give students an opportunity to learn how to express their ideas verbally and in written form and conduct critical analysis of environmental data to develop and implement public policy.

Assignments will give students the opportunity to use their technical and analytical skills while understanding the real world applications that will be important to their future professional work as planners, policymakers, advocates, architects, designers, and/or environmentalists. This course satisfies the M.S. in Sustainability Management's quantitative analysis requirement.

SUMA PS5193. Statistics for Sustainability Management. 3 pts.
Description
The course introduces practitioner to environmental science and sustainability management to the data analysis techniques and statistical methods which are indispensable to their work. The class teaches how to build statistical substantiation and to critically evaluate it in the context of environmental problems. The statistics topics and examples have been chosen for their special relevance to environmental problems, including applications in environmental monitoring, impact assessment, environmental valuation techniques and econometric analyses of sustainable development. Students are assumed to have had no previous exposure to statistics.

ACTU PS5619. Pensions. 3 pts.
Description
This course is a workshop in ERISA and Taxation Rules for Actuaries. Actuarial science can be applied and cover a number of welfare benefit arrangements (such as life insurance, medical, disability, severance etc.), qualified plans and nonqualified deferred compensation plans. The services and products that are developed in the actuarial field may be governed by certain federal laws. In the U.S., these arrangements are governed by the Employee Retirement Income Security Act ("ERISA"). In addition, certain federal taxation and reporting rules may apply. To be successful in the field will require an understanding of these rules, reporting requirements, taxation rules and the government agencies (Internal Revenue Service, Department of Labor and Pension Benefit Guarantee Corporation) responsible for oversight of such arrangements. Other topics covered will include SEPs, Simple Plans, 403(b) plans, 457 plans and Nonqualified Deferred Compensation Plans.

ACTU PS5030. Introduction to Life Insurance. 3 pts.
Description
This course will provide an overview of insurance company investments and the regulations and liabilities that drive the insurance company investment decisions. All life insurance actuaries must master the concepts of financial mathematics and how to apply those concepts to calculate projected present values and accumulated cash flows. You will study these concepts and apply them to calculate Life Insurance and Annuity reserves, new business pricing, and profitability metrics. This will include exploring various types of product designs. Actuaries play an important part in development and interpretation of the various financial statements that insurance companies are required to provide to the public.
The course will illustrate the content of these statements, exhibits, and schedules and provide a description of their purpose. Insurance cash flows are unique in that there are many uncertainties and those cash flows stretch out into the future over a considerable amount of time.

This leads to another important aspect of actuarial science, which is risk analysis and risk management. This course will study how companies map risks and set aside capital to provide for the uncertainties above and beyond those provided for by standard reserves. With the recent economic events of 2008 and their continuing effects, Enterprise Risk Management (ERM) has become more focused and we will explore ERM and the role actuaries play as part of overall insurance company risk management.

**ACTU PS5630. Property and Casualty. 3 pts.**

**Description**

This course introduces the general principles of ratemaking and reserving as they relate to P&C insurance products. Students will analyze data, select appropriate techniques, and develop solutions to problems. This course addresses the advantages and disadvantages of the various ratemaking and reserving techniques as they are applied to specific situations and different lines of business. Classification of insureds for the purpose of risk stratification and other important ratemaking topics are also examined.

**ACTU PS5621. Investment & ALM for Actuaries. 3 pts.**

**Description**

This course develops an understanding of the fundamental concepts of Investment and Asset Liability Management (ALM) for actuaries. A basic knowledge of financial mathematics is assumed. This course provides students with the knowledge to apply in a practical sense the theoretical framework that they learned from the foundational actuarial examinations. The objective of this course is to provide students with an overview of the tools and techniques mostly used by insurance companies and to a lesser extent by other financial intermediaries (such as pension plans or foundations and endowments) for Asset Liability Management. The course will be aimed at providing a practical insight into the investment process within the insurance industry and other financial intermediaries.