

MSTA Three-Semester Course Plan



PREPROGRAM FOUNDATIONS REQUIREMENTS

These courses are over and above the 39 required credits. Grades count towards GPA calculation.

DAT 500V: Introduction to R Programming *.5 credit*

FALL 1 REQUIRED COURSES	SPRING REQUIRED COURSES	FALL 2 REQUIRED COURSES
<p>REQUIRED CREDITS: 15</p> <p>Core: MGT 560F: Professional Business Communication <i>1.5 credits</i> DAT 500S: Predictive Analytics for Business Decision-Making <i>3 credits</i> DAT 561: Introduction to Python & Data Science <i>3 credits</i></p> <p>Fall A 1.5 credits/course Fall B 1.5 credits/course</p> <p>Core: DAT 560G: Database Design & SQL</p> <p>Track: OB 527: Human Resource Strategies for General Managers</p> <p>Core: DAT 500N: Prescriptive Analytics DAT 560M: Big Data & Cloud Computing</p> <p>Track: OB 567E: Developing Human Resource Strategy</p>	<p>REQUIRED CREDITS: 12</p> <p>Core: DAT 500W: A/B Testing <i>3 credits</i></p> <p>Spring A 1.5 credits/course Spring B 1.5 credits/course</p> <p>Track: MEC 538: Economics of the Organization OB 500E: Talent Analytics</p> <p>Core: DAT 560E: Data Visualization for Business Insights DAT 562: Text Mining</p> <p>Track: OB 535: People Metrics MGT 538B: Compensation, Incentives & Organization</p>	<p>REQUIRED CREDITS: 3</p> <p>Track: MGT 502: Ethical Issues in Managerial Decision-Making <i>1.5 credits</i> OB 565: Leading Change <i>1.5 credits</i></p>
<p>FALL OR SPRING RECOMMENDED ELECTIVE COURSES</p>		<p>EXPERIENTIAL LEARNING REQUIREMENT</p>
<p>ELECTIVE CREDITS: 7.5+</p> <p>MKT 558: Pricing Strategies <i>1.5 credits*</i> NFO 558: Applications of Deep Neural Networks <i>3 credits*</i> CSE 502N: Data Structures & Algorithms <i>3 credits*</i> FIN 557E: Introduction to Blockchain & Cryptocurrencies <i>1.5 credits</i></p> <p>DAT 565E: Deep Learning for Prediction of Business Outcomes <i>1.5 credits</i> OB 523: Power & Politics in Organizations <i>3 credits*</i> OB 524: Negotiation <i>3 credits*</i></p>		<p>COMPLETE 1 COURSE: MGT 501T: Taylor Community Consulting Project <i>3 credits</i> MGT 551E: Internship, Business, & Application <i>1.5 credits</i> MGT 501P: CEL Practicum <i>3 credits</i> MGT 501V: Applied Problem Solving for Orgs <i>1.5 credits</i></p> <p>* Elective courses offered either in Fall or Spring semesters</p>
<p>TOTAL CREDITS: 39 MSA Common Core: <i>18</i> MSTA Track: <i>13.5</i> Elective: <i>7.5</i></p>		

Academic Year 2021-2022 The degree requirements in this document apply to students entering Washington University during the 2021-2022 academic year.

Under the flat tuition rate, students may take up to 18 credits per semester. Additional credits must be approved and are charged at the per credit rate. Every effort is made to ensure that the information is accurate and correct as of the date of publication (8/2/21). Washington University reserves the right to make changes at any time without prior notice. Therefore, this curriculum document may change from time to time without notice. The governing document at any given time is the then-current version, as published online.



MSA – Talent Analytics Course Descriptions

Summer Foundations Workshops

DAT 500V Introduction to R Programming

R has become the tool of choice for many data science and customer analytics professionals in every industry and field. It is not surprising to see a requirement for being familiar with R in job descriptions. R is very flexible in carry out data analysis. Part of the benefit of being open source is that many programmers/researchers are constantly introducing new statistical analysis tools into R through R packages. Given all the benefits, R does have a relatively steeper learning curve. To better prepare MSCA students, we introduce this 2 day introduction to R programming course. This class will help you master the basics of R. We will start from the very beginning - installation of the program. No prior knowledge in programming is required. Through in class demonstration and lots of hands-on practice, by the end of the second day, you will have the chance to undertake your own data analysis and solve relevant business problems using R. 0.5 Credits. Graded Pass/Fail.

Required Core Courses

DAT 500N Prescriptive Analytics

This course covers optimization models and tools as they apply to the design and analysis of supply chains. Production planning, distribution, network design, and revenue management problems are covered using the methods of linear, non-linear, and integer programming. Upon successful completion of this course, students will demonstrate competency in formulating and solving supply chain optimization models of real-life complexity using state-of-the-art software. They will become proficient with industrial strength software tools like AMPL and Gurobi alongside Excel's Solver. The course emphasizes proficiency in model-building and using software tools rather than theory. 1.5 credits

DAT 500S Machine Learning Tools for Prediction of Business Outcomes

Predictive Analytics deals with the employment of formal learning from business experience, using business data, to predict the future behavior of customers or other critical organizational elements in order to drive better business decisions. This course emphasizes data situations that students are likely to face in marketing, finance, manufacturing and consulting jobs. Students will analyze real-world business datasets using various advanced analytic techniques such as logistic regression, decision trees, neural networks, stochastic gradient boosting, MARSplines, Ensembles, Clustering, Associations etc. The focus of the course lies in the conversion of raw and messy business data in to robust actionable predictions for decision-making. 3 credits.

DAT 500W A/B Testing in Business and Social Science

This course introduces students to causal methods that are used to measure the impact of business and policy decisions. The key insight of the course is that correlation does not imply causation and therefore cannot measure impact. In this class, we will learn about A/B testing and other causal methods, as well as how to implement them in business, economic, and policy situations. 3 credits.

DAT 560E Data Visualization for Business Insights

Data Visualization has become a core skill set to derive business insights in the data rich business world. Organizations are expecting Business Analysts and Managers to create and disseminate insightful visualizations about the business. This course teaches students the necessary skill set to create insightful visualizations using Tableau to understand patterns prevalent in large datasets which are otherwise difficult to comprehend. In particular, students will learn how to choose and create appropriate visualization based on the following three criteria: 1. Who's the audience looking at the visualization? 2. What is the nature of the business goal (Descriptive, Predictive, or Prescriptive)? 3. What is the data (Categorical, Numerical, Time Series, etc.)? The course will expose students to prevalent business applications of data visualization in different domains (Customer Analytics, Supply Chain Analytics, Healthcare Analytics, Financial Technology Analytics, Accounting Analytics, Talent Analytics etc.). Upon completing this course, students will know how to create insightful dashboards and other visualizations for different audiences from the given data according to the specified goal. 1.5 credits.

DAT 560G Database Design and SQL

Databases are at the foundation of every organization's information strategy. Understanding the structure of databases and mastering the tools to analyze data are essential skills in any role. The tools developed in this course assist students in implementing a company's data management strategy and developing well-grounded analytical recommendations. In this course, we focus on understanding how data is structured in relational databases. With vast amounts of data available, from disparate sources, effective organization of the data is essential to its utilization. To complement this, we utilize SQL (Structured Query Language) as the primary tool to extract data for managerial reports and for advanced analytical models. Practical experience with current relational database software is developed throughout the course. This course is required for MS/CA students and priority will be given to SMP students. 1.5 credits.

DAT 560M Big Data and Cloud Computing

The growth in available data is a challenge to many companies. This presents an opportunity for companies to conquer the vast and various data available to them. The growth in data includes traditional structured data, as well as unstructured data created by both people and machines. It is essential for analysts to be comfortable in the new technologies and tools that are being developed to store, retrieve, analyze, and report, using the vast data resources available. This course introduces students to the technologies currently deployed to overcome the challenges of Big Data. Prerequisite: MGT 560G. 1.5 credits.

DAT 561 Introduction to Python and Data Science

This is a 3-credit course offered to MSBA students. It provides students the necessary skill set to extract reliable insights from large datasets prevalent in various business applications, such as supply chain management, marketplace operations, healthcare analytics and financial engineering, using Python. In this course, students will develop basic tools to understand Python programs and implement data processing pipelines using Python. In particular, students will learn how to acquire, clean, analyze and visualize data in Python, which they will then use to improve decision-making processes. Throughout the course, students will use the Python programming language, which is very effective for data manipulation, reporting, and complex optimization. Topics covered include introduction to Python programming, data acquisition and cleaning, data manipulation, current multi-source data collection technology used in practice, basic data visualization using Matplotlib, ggplot2 and Bokeh. 3 credits.

DAT 562 Text Mining

Consumers and companies constantly generate large amounts of unstructured or lightly structured texts on the web and offline: exchanges of consumer opinions on products and services on social media, transcripts of phone conversations with customer representatives, open-ended surveys, etc. By employing text analytics, businesses can derive at scale valuable insights into consumer attitudes to brands, competitive landscape, and customer relationships, among other applications. This course introduces students to the methods of mining, organizing, summarizing, and analyzing textual data with the objective of driving business decision-making. 1.5 credits.

MGT 560F Professional Business Communication

Communication is the process of sending and receiving messages, however, communication is effective only when the message is understood and when it stimulates action or encourages the receiver to think in a new way. This course will introduce students to fundamental best practices in business writing and business speaking that will ensure effective communication. Students will participate in activities that will develop professional business communication skills in both writing and speaking. These will include: preparing, writing and delivering presentations, composing clear concise business messages in a variety of formats, understanding emotional intelligence to reach the audience and utilizing critical thinking as a basis for communication strategies. 1.5 credits.

Required Track Courses

OB 567E Developing Human Resource Strategy

This course builds on the HR Strategy course, exploring topics more deeply and developing business applications. The course will begin with an overview of the role of the HR function and the components of an HR strategy. The course content will include workforce planning, talent management, employee engagement and performance, and compensation as key elements of an effective HR strategy. 1.5 credits.

MGT 502 Ethical Issues in Managerial Decision Making

This course consists of a seminar which focuses on ethical issues in management. This course is "team taught" and surveys a number of ethical standards or levels by which managers make decisions involving most functional areas of business. Course will emphasize discussion by students of cases and problem situations which confront managers and for which ethical dimensions are a significant part of the business choices. Course grade is determined by class participation and a written summary paper. See instructor for additional information. 1.5 credits.

MEC 538 Economics of the Organization

Business organizations are complex systems with mutually dependent parts. Understanding the economic factors that influence how the organizational pieces function together can be a daunting task. The goal of this course is to provide an economic framework for the analysis of a variety of challenges that face businesses, both at the organizational and individual employee levels. In this course we will consider what economics can say about the efficient organization of firms and businesses, and provides an economic approach to solving organizational and incentive problems. The aim of this mini is to describing general organizational issues facing firms, such as incentive problems arising from adverse selection, moral hazard, and agency. We consider alternative solutions to these problems and then apply these lessons to readings and cases. 1.5 credits.

MEC 538B Compensation, Incentives, and Organization

This course is the second in a linked sequence looking at the study of the economics and management of organizations, and focuses on issues at the individual employee level. We will use the tools developed in MEC 500D, Economics of the Organization, to examine how incentives and performance contracts should be combined in an organizational framework to motivate executive and employee performance. In this course we consider the economic incentive problems faced by a firm in recruiting, training, motivating, and retaining workers in the firm's internal labor market, as well as economic tools which may be used to construct compensation and non-compensation schemes to address these incentive problems and raise worker productivity. The format of the course is to present the underlying theory or framework for the topic at hand, and then to illustrate how a firm was able (or unable) to implement the recommended approaches for solving the incentive problem. 1.5 credits.

OB 500E Talent Analytics

Finding, developing, and retaining the best talent has always been the key to sustained success in business. Organizations today have potential access to far more useful information about people than ever before but most struggle to access and use it effectively. In a highly competitive global market, rigorously analyzing data to enable timely, strategic decisions about talent provides a critical edge. In this course you will learn how to use analytics to bring data and rigorous modelling to bear on people-related issues, such as recruiting, performance evaluation, leadership development and succession, job design, and compensation. Together, these can help organizations achieve long range strategic goals, rather than simply serving as an administrative support function. 1.5 credits.

OB 527 Human Resource Strategies for General Managers

This course will provide a basic understanding of how to gain competitive advantage through developing the right human resource strategy for the business. It will begin with a consideration of how to link the people strategy to the business strategy, move through a discussion of segmenting and analyzing the workforce, and then cover the contribution of human resource functions in creating the right environment to motivate the highest levels of performance. This course is designed for students with full-time work experience. 1.5 credits.

OB 535 People Metrics

Metrics are at the core of people analytics. The purpose of this course is to introduce you to the foundations of assessing behavior in organizations using novel measurement approaches and large datasets. Through classroom discussions and real-world applications, this course will enable you to add value to organizations through the development, use, and interpretation of innovative people metrics. Specifically, after taking this course, you will be able to: Develop a clear and logical conceptual measurement model. A conceptual measurement model is the foundation of creating novel and useful new approaches for assessing intrapersonal characteristics (e.g., personality) and interpersonal behavior (e.g., knowledge sharing, teamwork). Identify novel sources of data for innovative people metrics. Organizations are awash in the traces of individual behavior and social interactions. Decoding how data that already exist in an organization can be used to understand behavior is an essential skill for adding value in the field of people analytics. Apply a rigorous process for validating new people metrics. Developing a measurement model and finding sources of data are necessary, but insufficient for adding value through people metrics. New measures must be validated. 1.5 credits.

OB 565 Leading Change

At work and throughout life, change happens. It often happens in fits and starts, as organizations and their members resist it. It can also happen more smoothly. Rapidly, even. The purpose of this course is to help you learn how to reduce resistance to change and produce changes more effectively within organizations - and within yourself. This course integrates cutting-edge academic research with cases and activities designed to strengthen your understanding of the course concepts and help you practice putting them into action. By the end of this course, you should be equipped to navigate a wide range of change-related challenges you will encounter throughout your career. Students cannot take this course and OB 525B for credit. 1.5 credits.

Electives

FIN 557E Introduction to Blockchain & Cryptocurrencies

Blockchain is a revolutionary technology incorporating aspects of data science, economics, computer science, and law. The course allows students to obtain basic understanding of the blockchain technology and its applications to cryptocurrencies, smart contracts, and decentralized finance. 1.5 credits.

MGT 511A Law & Business Management

We will review different rules of substantive law which affect the conduct of individuals and businesses. We will analyze different legal theories and rules of substantive law which regulate the conduct of individuals and businesses and which impose liability for damages on individuals and business entities when those rules are violated. We will survey basic rules of criminal law, intentional torts, and negligence. We will next focus on the rules affecting the making and performance of contracts, and the liability which results from breach of contractual relationships. This will include general contract law, as well as specific rules that exist in the sale of goods and merchandise, and in the purchase, ownership and sale of real property. In addition, we will also analyze and compare the choices available for dispute resolution, including mediation, arbitration, and trial in court. 1.5 credits.

MKT 558 Pricing Strategies

This course is designed to equip you with some essential concepts and techniques needed to make profitable decisions about one of the most important marketing variables--price. The course is structured around four fundamental factors that firms need to consider in their pricing decisions: costs, customers, competitors and climate (legal environment). Through case studies, in-class discussions, and course project/presentations, this course will provide you with a conceptual framework, grounded in modern economics and consumer psychology, for analyzing a complex marketing environment and designing proactive pricing strategies that are most profitable for your business. Familiarity with basic statistical techniques and a spreadsheet package like Excel is desirable. 1.5 credits.

OB 523 Politics & Power in Organizations

The use of power and politics is inevitable in modern organizations - and the higher one goes the more of it one encounters. Therefore, the development of real competency in managing power and influence can materially enhance career progression. The objective of this course is to develop such competency through the use of learner - centered instruction, which includes actual application of concepts through class discussion of case histories and the use of a learning journal. The content of the course includes: why power and politics occur; when are they particularly prevalent; what are the sources of power; how to build power throughout ones career; common influence tactics; the importance of political "fit" in job search, and; how to avoid political mistakes in a new position. 3 credits.

OB 524 Negotiation

Managers spend the majority of their time negotiating - from negotiating schedules and vacation time to negotiating resource allocations to negotiating mergers and major policy decisions and their implementation. Skillful negotiation is a critical component of the tool box of the successful manager. The purpose of this course is to improve students' abilities to diagnose conflict situations, to analyze, plan, and conduct negotiations. The course material addresses negotiation as an effective means for implementing decisions and strategies and resolving conflict in a variety of settings. Course format will involve simulated negotiation and experiential exercises, cases, discussion, and lecture. Students will be evaluated on the basis of case analysis, negotiating performance, and a final project. Students may not take both this course and OB 561 for credit. This course covers topics in greater depth than the shorter OB 561 course, offers more opportunities for hands-on practice, learning, and feedback, and also covers a wider range of additional topics. 3 credits.

DAT 565E Deep Learning for Prediction of Business Outcomes

Deep learning has become a core skillset required to solve business problems in the unstructured, data-rich business world. Experts estimate approximately that 90% of the data in organizations is in the form of unstructured datasets, including images, texts, customer reviews, videos, and so on. Organizations would like to use these datasets to improve their business. Moreover, deep learning has a significant advantage over other machine learning algorithms in that it does not require extracting "features" manually prior to applying algorithms. Leading-edge organizations are also expecting business analysts and managers to be familiar with applying deep learning models to solve business problems using unstructured data. This course is recommended but is not required for MS-Business Analytics (MSA) students. It will teach students to build deep learning models for solving business problems using Python libraries (e.g., Keras, Tensorflow). We will cover a range of algorithms from neural networks foundations to convolutional and recurrent network structures; these will be applied in domains such as marketing, customer behavior, and predicting finance risks. Students will better understand the practical use of deep learning with the use of the following five questions: (1) How can unstructured datasets be visualized and analyzed? (2) What are neural networks, and how can they be optimized? (3) What is the deep learning model, and how can it be used in business? (4) Which deep learning structure should be used for a given business problem? (5) How can a deep learning model be developed to solve business problems? In summary, the course will expose students to prevalent business applications of deep learning in different domains (e.g., customer analytics, supply chain analytics, healthcare analytics, financial technology analytics, accounting analytics, talent analytics). Upon completing this course, students will know how to build and optimize deep learning models for different business applications. Prerequisites: DAT 500S and DAT 561. 1.5 credits.

CSE 502N Data Structures & Algorithms

Study of fundamental algorithms, data structures, and their effective use in a variety of applications. Emphasizes importance of data structure choice and implementation for obtaining the most efficient algorithm for solving a given problem. A key component of this course is worst-case asymptotic analysis, which provides a quick and simple method for determining the scalability and effectiveness of an algorithm. Online textbook purchase required. Prerequisite: CSE 131 and fluency with summations, derivatives, and proofs by induction. 3 credits.

INFO 558 Applications of Deep Neural Networks

Deep learning is a group of exciting new technologies for neural networks. Through a combination of advanced training techniques and neural network architectural components, it is now possible to create neural networks of much greater complexity. Deep learning allows a neural network to learn hierarchies of information in a way that is like the function of the human brain. This course will introduce the student to computer vision with Convolution Neural Networks (CNN), time series analysis with Long Short-Term Memory (LSTM), classic neural network structures and application to computer security. High Performance Computing (HPC) aspects will demonstrate how deep learning can be leveraged both on graphical processing units (GPUs), as well as grids. Focus is primarily upon the application of deep learning to problems, with some introduction mathematical foundations. Students will use the Python programming language to implement deep learning using Google TensorFlow and Keras. It is not necessary to know Python prior to this course; however, familiarity of at least one programming language is assumed. This course will be delivered in a hybrid format that includes both classroom and online instruction. 3 credits.