

MASTER OF SCIENCE IN DATA SCIENCE AND AI

The Master of Science in Data Science and AI (MSDS & AI) program includes 34 credits and is full-time and in-person. The program runs over the fall, spring, and summer sessions. The students complete the eight required data science and AI courses and choose three electives that fit their professional needs and interests with courses in fintech, global supply chain management, international business, healthcare, or general management. They may also opt to take a direct study, co-ops, or special topics in data science and AI with program director approval. Applicants who do not have the prerequisites for the MSDS & AI program, depending on their background, will be required to take specific bridge courses during the summer before the full-time program begins.

Modern organizations need professionals who not only understand data science and AI but also know how to apply and lead with these tools to optimize both business operations and the development of products and services. Our MSDS & AI program builds on Bryant's expertise in business education to provide all students with a strong foundation in business and feature a modern, open-source-focused curriculum for students who seek the technical expertise required to become data scientist, data engineers, AI Engineer, and AI Analyst, and the business skills to apply this knowledge in a business domain of their interest. The program trains students to utilize data management, data visualization, machine learning, natural language processing, deep learning, AI, cloud, and distributed processing to solve real-world business problems. The program focuses on topics such as reproducible data science experiments, collaborative problem solving, communication, security, and ethical issues that arise in data science and AI.

Upon graduation, students will be proficient programmers in Python, R, SQL, Spark, and Tableau/PowerBI. They will develop a good understanding of machine learning, deep learning, and Large Language Models. Additionally, they will have experience with an evolving array of cutting-edge big data management and cloud analysis tools like Microsoft Azure, Amazon Web Services, and Databricks.

Master of Science in Data Science and AI Program Requirements:

Required Introduction Course:

MSDS 515	Preparing for MSDS and AI Success	1
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Data Science Foundation Course Requirements:

ISA 510	Probability and Statistics for Data Analytics	3
ISA 520	Data Visualization and Communication	3
ISA 530	Fundamentals of AI and Machine Learning	3
ISA 540	Data Management in the Age of AI	3

Data Science Core Required Courses:

MSDS 610	AI I: Deep Learning	3
MSDS 620	AI II: Natural Language Processing	3
MSDS 630	Large Scale Data Analytics in the Age of AI	3
MSDS 640	Data Science and AI Capstone	3
or ISA 692	Data Science/Business Analytics Internship	

Students must pick 3 courses from the list below:

FIN 502	Fintech and Blockchain for Finance	3
FIN 503	Fintech and Digital Innovation Fund	3

GSCM 601	Corporate Social Responsibility in Global Supply Chain Management	3
GSCM 603	Advanced Supply Chain Integration	3
GSCM 604	Logistics of International Trade	3
HS 501	Introduction to Health Informatics and AI	3
HS 510	Population Health	3
HS 530	Healthcare Operations and Systems	3
HS 540	Advanced Applications of Artificial Intelligence in Healthcare	3
HS 610	Electronic Health Records and AI	3
HS 630	AI Health Analytics (R, Python, Tableau)	3
HS 640	Project Management	3
IB 601	International Business Management	3
IB 602	Global Human Resource Management	3
IB 603	International Marketing	3
MBA 520	Managing Corporate Enterprise	3
MBA 521	Leading Effective Organizations	3
MBA 522	Reporting and Controlling Resources	3
MBA 524	Managing Financial Resources	3
MBA 525	Marketing for Competitive Advantage	3
MBA 526	Value Formation Through Operations	3

**May opt to take a direct study, co-ops, or special topics in Data Science with program director approval

Finance Courses

FIN 501. Programming in Finance. 3 Credit Hours.

This course serves as an introduction to many aspects of Python programming, specifically as it applies to financial applications. Topics include data management, matrix operation, optimization, simulation, linear regression, portfolio management, time-series analysis, and textual analysis. Students will become familiar with and use Python to analyze and manipulate data and accomplish tasks with various financial topics. Prerequisites: Students need to have a basic understanding of time value of money calculation, valuation of financial assets, and portfolio theory. Corequisites: MBA 524

Session Cycle: Every Spring Semester.

FIN 502. Fintech and Blockchain for Finance. 3 Credit Hours.

New technological innovations are fundamentally transforming the financial industry. This course introduces students to the different ways in which new technologies have led to material changes in business models, products, and customer user interface. The course will explore the application of AI, deep learning, and open APIs in various sectors of finance like payments, credits, trading and risk management. The course will then shift focus towards cutting-edge topics including blockchain, cryptofinance and smart contracts, mobile payments, and applications of blockchains. Along the way the course will focus on the market regulations, security compliance and changes in law needed in this rapidly changing business environment.

Prerequisites: MBA 524

Session Cycle: Every Spring Semester.

FIN 503. Fintech and Digital Innovation Fund. 3 Credit Hours.

This course will focus on two main components to provide students with a deeper understanding of Fintech, Blockchain, and the investment world. The first component will explore the impact of Fintech on different parts of the financial market through the analysis of various case studies. The case studies will cover topics such as Payment, Credit and Lending, Trading, Risk management, Insurtech. In the second component, students will also act as fintech security analysts and manage a portfolio of fintech firms funded by Bryant Alumni in the industry.

Prerequisites: FIN 502

Session Cycle: Every Summer.

FIN 691. Directed Independent Study in Finance. 3 Credit Hours.

This course is designed to allow an individual academic program to be tailored to fit the unique interests of a graduate student. At the initiation of the graduate student, the faculty member and the student will develop an academic plan that is submitted to the College of Business for final approval.

Global Supply Chain Management Courses**GSCM 601. Corporate Social Responsibility in Global Supply Chain Management. 3 Credit Hours.**

This course will focus on the strategic impact of corporate social responsibility on the global supply chain. The goals of this course are to provide students with an in-depth knowledge of the various types of supply chain events that are connected to corporate social responsibility and the strategic best practices to mitigate these events. Lectures will provide a theoretical basis and illustrate the practical application of concepts. Cases, articles from academic journals, short videos, assignments, and one exam will be utilized to reinforce the subject matter and provide a variety of learning modes.

GSCM 603. Advanced Supply Chain Integration. 3 Credit Hours.

A key challenge to successful supply chain management is coordination of activities across the supply chain. This course will provide strategies for supply chain design by identifying the appropriate level of integration and coordination to improve the long-term performance of the individual companies and the supply chain as a whole. Topics include demand forecasting, integrated business management (sales and operations planning), demand management and CPFR, demand planning, and relationship management. Hands-on learning will take place within a global supply chain management simulation.

GSCM 604. Logistics of International Trade. 3 Credit Hours.

This course provides basic preparation in transportation economics and management as well as international transport and logistics. This course provides basic knowledge of import and export requirements for making contracts, payments, insurance, managing risk, arranging transportation, dealing with customs, and international trade law and theory. The course is taught in two modules: International Transport and Logistics, and Logistics Analysis. Attention is given to how transportation pricing and tradeoffs work, shipper and carrier strategies, and logistics processes for moving goods and people internationally. Students will quantitatively develop and assess strategies for transportation and network planning, inventory decision making, facility location planning, and vehicle routing. The course objectives are based on a partial list of the exam requirements for the Certification in Transportation and Logistics (CTL) professional credential offered by America's oldest logistics profession organization, The American Society of Transportation and Logistics (AST&L).

Prerequisites: MBA 526.

GSCM 691. Directed Independent Study in Global Supply Chain Management. 3 Credit Hours.

The course is designed to allow an individual academic program to be tailored to fit the unique interests of a graduate student. At the initiation of the graduate studies, the faculty member and student will develop an academic plan that is submitted to the director of the College of Business for final approval.

GSCM ST600. Warehouse Management: Processes, Inventory and Technology. 3 Credit Hours.

This course will take a systems approach and cover various aspects of warehouse operations including basic and best practices of warehouse processes; warehouse design and layout; inventory control: and technologies utilized. Learning Outcomes 1. Understand the role of warehousing operations in the global supply chain. 2. Demonstrate an understanding of the steps in the following warehouse operations: in bound order receiving; order stocking; order picking; order packing; order loading for out bound delivery. 3. Connect warehouse operations to inventory management concepts such as order tracking, cycle counting and 4. Design warehouse layouts to facilitate effective and efficient operations for various types of inventory handled within a warehouse. 5. Understand the role of current and future technologies in warehouse operations. These technologies include robotics, drones, material handling equipment, order picking walls, RFID, and optimization software.

Session Cycle: Spring.

Information Syst. Analytics Courses**ISA 500. Programming Foundations for Analytics. 0 Credit Hours.**

This course serves as a pre-requisite to MSDS/MABA programs for students who do not have sufficient background in programming. This course delves into the theory and pragmatics of programming with a special focus on the Python programming language. No previous experience in computer science or programming is required. You will learn basic computer programming concepts and terminologies in Python such as variables, constants, operators, expressions, conditional statements, loops, and functions. This course includes hands-on exercises to help you understand the components of Python programming while incrementally developing more significant programs, data structures and algorithms.

ISA 501. Math and Statistics Foundations for Analytics. 0 Credit Hours.

This course serves as a pre-requisite to MSDS/MABA programs for students who do not have sufficient background in math and statistics. It is for learners who have basic math skills but may not have taken algebra or pre-calculus. This course introduces the core math that data science/ analytics is built upon, with no extra complexity, introducing unfamiliar ideas and math symbols one-at-a-time. Students who complete this course will master the vocabulary, notation, concepts, and algebraic rules necessary before moving on to more advanced material. Topics covered in this course include linear algebra, basic probability, statistics, and calculus.

ISA 510. Probability and Statistics for Data Analytics. 3 Credit Hours.

Probability and statistics are at the foundation of data science and artificial intelligence. The objective of this course is to provide students with an understanding of how to analyze and understand data through statistics and probability. As such, this course provides an overview of more foundational probability and statistics topics, before delving into more advanced topics through projects. Students will work with data in Python Notebooks to demonstrate their analytical skills.

Session Cycle: Every Fall Term

Yearly Cycle: Annual.

ISA 520. Data Visualization and Communication. 3 Credit Hours.

This course examines the art and science of data visualization. It teaches how to visually explore data and how to criticize, design, and implement data visualizations. It teaches the fundamentals of human perception and data visualization, exploratory data analysis and the importance of interaction in exploration, techniques for data visualization of specific data sets (networks, temporal data, geographic data, business data, etc.), and storytelling. The course will enable students to describe a visualization problem, to explore the data using visualizations, to discuss and design appropriate visualization concepts, and to implement and critically reflect on them. We will learn multiple popular data visualization tools such as Power BI, Tableau, and Python to implement our data visualization projects throughout the course.

Session Cycle: Every Fall Term

Yearly Cycle: Annual.

ISA 530. Fundamentals of AI and Machine Learning. 3 Credit Hours.

This course provides a comprehensive introduction to AI through the machine learning pipeline, covering the entire process of building, evaluating, optimizing, and deploying ML models. Core machine learning techniques in both supervised and unsupervised learning will be introduced, covering regression and classification models for labeled data, as well as clustering and dimensionality reduction methods for discovering hidden structures in unlabeled datasets. Time series forecasting will be covered to analyze sequential trends and predict future outcomes, along with reinforcement learning as a framework for decision-making in dynamic and interactive environments. With the increasing role of AI in automating and scaling ML workflows, this course will also incorporate AI tools, large language models (LLMs) and AI-assisted development platforms, to enhance the understanding, deployment, and expansion of ML models.

Session Cycle: Every Semester.

ISA 540. Data Management in the Age of AI. 3 Credit Hours.

In the era of artificial intelligence, traditional database management is evolving to support large-scale machine learning, big data processing, and AI-driven applications. This course explores the fundamentals of database management while integrating modern approaches for handling structured, semi-structured, and unstructured data in AI environments. Students will gain a solid understanding of the relational model and Structured Query Language (SQL), exploring both foundational and advanced SQL functions for various types of data analysis. In addition, students will learn how AI impacts data storage, retrieval, governance, and optimization, with a focus on NoSQL databases, vector databases, and real-time data pipelines. By the end of the course, students will be equipped to design and manage data systems that support AI applications, ensuring efficiency, compliance, and ethical considerations in AI-driven decision-making.

Session Cycle: Every Semester.

ISA 691. Directed Independent Study. 3 Credit Hours.

Students interested in exploring an idea, contributing to research, or developing a project may do so under the guidance of an affiliated faculty member in the Data Science/Business Analytics program. At the initiation of the graduate student, the faculty member and the student will develop an academic plan that is submitted to the Chair of the ISA department for approval.

ISA 692. Data Science/Business Analytics Internship. 3 Credit Hours.

ISA internships give students the opportunity for supervised employment in an area where they can apply the Data Science and/or Business Analytics skills they have studied through our curriculum. Interns work at least ten hours per week, meet periodically with a supervising faculty member, and prepare a substantive report on their work experience. Prerequisites: ISA 510, ISA 520, ISA 530, and ISA 540.

Master of Business Admin. Courses**MBA 506. Microeconomics for Business. 0 Credit Hours.**

This course serves as a pre-requisite to all on-campus MBA programs for students that do not have sufficient background in the subject. The course provides an overview of microeconomics with an emphasis on understanding key concepts and principles used in business management today. The objective of the course is to teach students how to analyze an organization's performance by applying economic analysis to an array of business situations.

MBA 507. Macroeconomics for Business. 0 Credit Hours.

This course serves as a pre-requisite to all on-campus MBA programs for students that do not have sufficient background in the subject. The course provides an overview of macroeconomics with an emphasis on understanding key concepts and principles used in business management today. The objective of the course is to examine the economy in the long run (when prices are flexible) before examining the economy in the short run (when prices are sticky).

MBA 508. Statistics for Business. 0 Credit Hours.

This course serves as a pre-requisite to all on-campus MBA programs for students that do not have sufficient background in the subject. The course provides a basic background in statistics for students without prior knowledge of statistical analysis and important mathematical ratios which will be utilized throughout the MBA program.

MBA 509. Accounting for Business. 0 Credit Hours.

This course serves as a pre-requisite to all on-campus MBA programs for students that do not have sufficient background in the subject. The course provides an overview of accounting with an emphasis on understanding key concepts and principles used in business management today. The objective of the course is to teach students how to analyze an organization's performance by applying accounting principles to an array of business situations.

MBA 514. Finance for Business. 0 Credit Hours.

This course serves as a pre-requisite to all on-campus MBA programs for students that do not have sufficient background in the subject. The course provides an overview of finance with an emphasis on understanding key concepts and principles used in business management today. The objective of the course is to teach students how to analyze an organization's performance by applying finance principles to an array of business situations.

MBA 515. Management Concepts and Skills. 1 Credit Hour.

This course provides all entering MBA students with a foundation of key management perspectives and skills that will heighten student opportunity for successful program completion. During an intensive, multi-day course, MBA students will be exposed to and participate in instructional sessions addressing technology, research resources, team-building, leadership, communication skills, and case analysis exercises.

MBA 520. Managing Corporate Enterprise. 3 Credit Hours.

Successful management of a corporate enterprise begins with a coherent, well-defined strategy. This course develops the knowledge and skills necessary to analyze, formulate and implement strategy effectively. The course will address the complexity of leading a business in this era of globalization, social and technological change, and dynamic firm and industry boundaries.

MBA 521. Leading Effective Organizations. 3 Credit Hours.

This course emphasizes the importance of understanding the diverse ways that people interpret and respond to situations, emphasizing the complexity of organizational problems, especially in project-oriented, team-based environments. It discusses ways to align individual behavior with the organizations mission and objectives and encourages decision making that is consistent with established models of effective leadership and standards of ethical behavior. It equires students to create personal leadership development profiles and self-improvement plans for their professional practice to aid in the career development.

MBA 522. Reporting and Controlling Resources. 3 Credit Hours.

This course emphasizes the role of accounting in controlling the operations of an organization and the relationship between cost, profits and volume, decision making techniques using accounting data, and the use of programmed budgets as a control mechanism.

MBA 523. Managing Information Resources. 3 Credit Hours.

This course emphasizes knowledgeable and effective use of information systems, IS decision making, knowledge management, and information systems as an element of corporate strategy development.

MBA 524. Managing Financial Resources. 3 Credit Hours.

This course emphasizes the tools and techniques necessary for sound financial decision making including the time value of money, risk and return, capital budgeting, working capital management, and acquisition of long-term capital.

MBA 525. Marketing for Competitive Advantage. 3 Credit Hours.

This course emphasizes markets, innovation and opportunities, consumer characteristics affecting demand, marketing institutions, ethics and government business relations, product planning and pricing problems, distribution channels, promotion, and competitive strategy.

MBA 526. Value Formation Through Operations. 3 Credit Hours.

This course emphasizes the theories and techniques used to manage world class operations for competitive advantage including: operations strategy, process design, quality, inventory control, and project management.

MBA 528. Global Immersion Experience. 3 Credit Hours.

The Global Immersion Experience has been designed to embed the knowledge and skills needed for today's managers to operate effectively in a globalized world. The course typically encourages students to explore a given country or region in depth and in the process become aware of the economic opportunities and pitfalls in doing business in that country/region. Students will be able to take this experience and apply it to a different country. An important aspect of GIE is a student project with an overseas firm in the destination country that builds on the first semester of academic study covering areas of strategy/ leadership, supply chain management and accounting/finance. The Global Immersion Experience is required for the One Year MBA program and optional but highly recommended for the Two Year MBA. While class meetings for MBA 528 begin in the fall term, the GIE takes place during the winter term and entails travelling to a foreign country for approximately ten days.

MBA 621. Business Consulting. 3 Credit Hours.

The central idea is that consulting services, both internal and external to business organizations are useful, are in high demand, and are lucrative. The course is intended for students who wish to understand and use consulting principles and practices for competitive advantage, whether as an intrapreneur, entrepreneur, or a traditional consultant. The course introduces the taxonomy and nature of consulting, provider models and business forms such as feasibility studies, proposals, contracts, reports, and billing practices. It includes the strategic application of technology for improved productivity and performance. It helps students to understand and apply methods of thinking, process analysis, client relations, and reporting that are essential to effective consulting.

MBA 641. Long Term Career Planning. 1 Credit Hour.**MBA 645. MBA Business Practicum. 3 Credit Hours.**

Students will work with a corporation or non-profit organization to develop and implement solutions to business problems or plans to exploit business opportunities. Teams will work closely with company executives to develop a project that adds value to the firm and provides students with hands-on experience working with a company.

MBA 651. Mastering Strategic Analysis. 3 Credit Hours.

This MBA Capstone course emphasizes managerial decision-making that involves all aspects of a firm and crosses all functional lines, focusing on the integration of acquired knowledge for strategy development.

MBA 691. Directed Independent Study in Business. 3 Credit Hours.

This course is designed to allow an individual academic program to be tailored to fit the unique interests of a graduate student. At the initiation of the graduate student, the faculty member and the student will develop an academic plan that is submitted to the College of Business for final approval.

Master of Science Data Science Courses**MSDS 515. Preparing for MSDS and AI Success. 1 Credit Hour.**

This course is designed to provide entering MSDS students with the skills necessary to be successful in a graduate data science program. Spanning two full days, it focuses on foundational knowledge in statistics, programming, data visualization, and communication. Moreover, the course offers insights into program expectations and introduces students to the available computing resources.
Session Cycle: Every Semester.

MSDS 610. AI I: Deep Learning. 3 Credit Hours.

This course introduces the basic concepts of Neural Networks and Deep Learning. Students will learn the fundamental principles, formulations, underlying mathematics and deep learning implementation details in Pytorch. The course will also explore different deep learning model suitability for different data domains such as text, images and videos to deal with different tasks such as Natural Language Processing, Computer Vision, Decision Making, Healthcare and Financial Applications.
Prerequisites: ISA 510 and ISA 530
Session Cycle: Spring
Yearly Cycle: Yearly.

MSDS 620. AI II: Natural Language Processing. 3 Credit Hours.

There are many business and artificial intelligence applications that need to process unstructured text data. This course teaches students how to overcome the unique challenges of working with unstructured text in machine learning and deep learning models. Students learn about how to create text representations, embeddings, and features for modeling purposes. Natural language processing applications include sentiment classification, topic modeling, text generation, and named entity recognition. Students in this course will implement these artificial intelligence models in Python, gaining experience with libraries such as NLTK and Hugging Face.

Prerequisites: ISA 530

Session Cycle: Spring

Yearly Cycle: Yearly.

MSDS 630. Large Scale Data Analytics in the Age of AI. 3 Credit Hours.

The rise of social media, IoT, and digital transformation has generated vast amounts of structured and unstructured data. Advances in AI, computing power, and cloud storage have transformed data processing and analytics. This course equips students with the skills to manipulate, store, analyze, and visualize big data using AI-driven techniques. A key focus is mastering Apache Spark and PySpark for large-scale data processing. Students will learn data pre-processing, exploratory analysis, feature engineering, and model building. The course also covers tuning and managing machine learning/AI models. As part of the course, students will have the opportunity to work with real-world datasets and implement machine learning/AI algorithms on a cloud computing platform. This hands-on experience provides a practical understanding of leveraging big data analytics for decision-making and innovation.

Prerequisites: ISA 530, ISA 540

Session Cycle: Summer Term 1

Yearly Cycle: Yearly.

MSDS 640. Data Science and AI Capstone. 3 Credit Hours.

Students will execute a full data science/AI project, developing their skills as data scientists with a focus on real-world applications and situations. The final project provides an opportunity to integrate all of the core skills and concepts learned throughout the program and prepares students for long-term professional success in the field. It provides experience in formulating and carrying out a sustained, coherent, and influential course of work resulting in a tangible data science/AI project using real-world data. This capstone project will test student skills in data pre-processing, data preparation, data transformation, feature engineering, machine learning/deep learning, data visualization, data communication, and presentation. Projects will be drawn from real-world problems and will be conducted with industry, government, and academic partners. Emphasis will be placed on problem-solving via state-of-the-art data science pipelines and practices and on the ability to "tell a story" using verbal, analytical, written, and visualization skills.

Prerequisites: ISA 530 and MSDS 630

Session Cycle: Summer Term II

Yearly Cycle: Yearly.

MSDS 691. Directed Independent Study in Data Science. 3 Credit Hours.

This course is designed to allow an individual academic program to be tailored to fit the unique interests of a graduate student. At the initiation of the graduate student, the faculty member and the student will develop an academic plan that is submitted to the College of Business for final approval.