

The MSA Curriculum

The Villanova MSA is expertly designed to expand students' proficiency in the latest analytics technologies, applications and practices that are actively reshaping the business world. All of the classes at VSB emphasize a practical, real-world education and promote work across disciplines.

The MSA curriculum is composed of three components: the Fundamentals, the Core and the Practicum. Consisting of 12 three-credit courses taken over six semesters — each of which is divided into two sessions — the 36-credit-hour program is designed to be completed in 24 months.

A brief overview of each course is provided below.

Fundamentals

Course #	Course Name	Description
MSA 8100	Introduction to Business Analytics	Provides an overview of the business analytics process and important analytic techniques: data visualization, data mining, optimization and simulation. Students will model and analyze complex business decisions with various tools on spreadsheets to improve decision making across business functions.
MSA 8105	Programming in R and Python	The fundamentals of the usage of R and Python as programming languages, with emphasis on applications in business. Students will learn fundamentals of both languages and will be exposed to cutting-edge packages and libraries to execute essential analytic tasks. <i>Prerequisite: MSA 8100 with concurrency</i>
MSA 8110	Data Models and Structured Analysis	Covers the concepts and techniques used to analyze and report structured data. Students will learn tools and methods for understanding the data models supporting various business processes and for analyzing data from structured databases. <i>Prerequisites: MSA 8100 and 8105</i>
MSA 8115	Multivariate Data Analysis	Focuses on the skills students need to be able to analyze and interpret multivariate data sets. Through real-world applications, students will learn to analyze data and interpret results using a variety of methods including data visualizations, multiple linear regression, analysis of variance models and Chi-square models. <i>Prerequisites: MSA 8100, 8105, and 8110 with concurrency</i>

Core

MSA 8220	Analytical Methods for Data Mining	Explores how (and when) various techniques can be used for mining data to uncover previously unknown patterns and gain insights. Students will mine large datasets from a variety of business areas and use their findings to support managerial decision-making. <i>Prerequisites: MSA 8100, 8105, 8110, 8115</i>
----------	------------------------------------	--

Core

Course #	Course Name	Description
MSA 8225	Analytical Methods for Text and Web Mining	This course provides an advanced coverage of the concepts, techniques and applications for mining text/web data to improve business decision-making. Topics include text mining applications, software and methodologies, e.g., information extraction, classification, clustering, sentiment analysis, data visualization and social network analysis. RapidMiner, R and Python will be used in this course. <i>Prerequisites: MSA 8100, 8105, 8110, 8115</i>
MSA 8240	Business Intelligence	Examines the concepts and approaches in business intelligence (BI) from a business user/analyst perspective. Students will learn to use BI tools for creating applications and dashboards in the context of fact-based decision-making. <i>Prerequisites: MSA 8100, 8105, 8110, 8115</i>
MSA 8245	Analytical Methods for Optimization and Simulation	This course builds on the material from earlier courses in the program. It provides students with a chance to dive deeper into critical optimization, probability and simulation modeling techniques useful in today's business environment. This course begins with a review of modeling basics, expands the students' exposure to optimization modeling techniques for both linear and nonlinear problems, and introduces simulation modeling using an industry-leading simulation software package. Students are exposed to a variety of business problems in analytics (marketing, finance, operations). Throughout the course, students will learn to model and analyze complex business decisions with various tools to improve decision-making across business functions. <i>Prerequisites: MSA 8100, 8105, 8110, 8115</i>
MSA 8260	Machine Learning and Artificial Intelligence Applications with Python	Machine learning is pervasive, with high-stakes applications spanning all business sectors, including fraud detection, high-frequency trading, and highly personalized and relevant marketing campaigns. Machine learning requires interdisciplinary techniques to create algorithms that sift through large volumes of data to support business decision-making. This class will equip students with the analytical techniques and skills to build and evaluate machine learning models using Python. In addition, students will use Python for a hands-on exploration of a broad crosssection of algorithms for machine learning, including linear models and dimensionality reduction. Students will gain additional familiarity with deep learning models such as artificial, recurrent and long short-term memory neural networks. Cloud-based resources and the open-source frameworks TensorFlow and Keras will be leveraged. At the end of the course, students will be prepared for accurate, effective and ethical research or industry application of machine learning techniques. <i>Prerequisites: MSA 8100, 8105, 8110, 8115, and 8220</i>
MSA 8265	Enterprise Data Management	Explores how the data warehouse provides the foundation for analytics within the enterprise. Topics include: dimensional models, design and creation of data warehouses and data marts, ETL process and the extension of the data warehouse concept to big data. <i>Prerequisites: MSA 8100, 8105, 8110, 8115</i>

Capstones

Course #	Course Name	Description
MSA 8310	Advanced Business Applications	Exposes student to advanced and diverse applications of analytics in business. A combination of lecture, case discussion, problem solving, group projects and completion of exercises will be used to further the knowledge and skills of students. <i>Prerequisites: MSA 8200, 8205, 8220, 8225, 8240, 8245</i>
MSA 8350	Analytics Practicum	Capstone course for the MSA program. Students will partner with an organization to complete an application-based practicum project, using skills learned throughout the program. The course blends lectures and assignments to help students build requisite communication and project management skills. <i>Prerequisite: MSA 8310 with concurrency</i>

Course Progression

As a supplement to the above, the following table shows the course progression for the MSA program. Students progress through the curriculum by completing two courses per semester, the order of which is determined by whether they begin the program in the fall or spring.

MSA PROGRAM CURRICULUM PROGRESSION GUIDE							
	YEAR 1			YEAR 2			
SEMESTER	1st	2nd	3rd OR 4th	3rd OR 5th	4th OR 5th	6th	
SESSION A	Introduction to Business Analytics MSA 8100	Data Models & Structured Analysis MSA 8110	Analytical Methods for Data Mining MSA 8220	Business Intelligence MSA 8240	Machine Learning & Artificial Intelligence Applications with Python MSA 8260	Advanced Business Applications MSA 8310	Analytics Practicum MSA 8350
SESSION B	Programming in R & Python MSA 8105	Multivariate Data Analysis MSA 8115	Analytical Methods for Text Web Mining MSA 8225	Analytical Methods for Optimization & Simulation MSA 8245	Enterprise Data Management MSA 8265		
CREDITS	6.0	6.0	6.0	6.0	6.0	6.0	

Curriculum Component Key

Fundamentals	Core	Capstones
--------------	------	-----------

6 TERMS

36 CREDITS

12 COURSES

Course progression can vary depending on your start term. Your Program Coordinator will assist you with your final course progression plan.