

Concept Paper: MS in Business Analytics (Online & Residential)

Saunders College of Business

Goals and Justification

Businesses are collecting data from their customers, suppliers, and equipment at an unprecedented rate. Activision, creator of the Call of Duty video game franchise, captures data “across the life cycle of a game: prior to launch, in-game, and after launch”. Caterpillar collects data from various sensors in their mining and earth-moving equipment. Lending Tree collects and discloses information from peer-to-peer loans. Stock exchanges collect trading data behind millions of trades each day. In fact, vastly more data of all kinds are collected than are used, and over a number of years, firms have been scrambling to use “analytical tools” in order to unearth relationships and to increase firm performance (increase sales, increase customer satisfaction, increase profits, etc.). For many firms, the use of data may lead to relatively simple solutions such as enabling customers who make service calls to know precisely when help will arrive. For others, data analytics may reveal new opportunities for products and services or for trading strategies, supplementing traditional research and development activities within an organization. We propose a graduate program in Business Analytics (hereafter, BA) to address the business-oriented niche in the data analytics space.

The set of tools, techniques and competencies encompassing data analytics is wide-ranging. Skills across a wide range of disciplines from computer science, artificial intelligence, statistics, data modeling and business are today actively involved in realizing the potential of this data asset. To address the needs of the marketplace, RIT is actively initiating programs in the “data” space. The Business and Science Colleges offer a Master of Science in Computational Finance starting in the Fall of 2015. Also, the Computing and Science colleges are planning to offer a Master of Science in Data Science. RIT will benefit from a constellation of programs in this space, as do Carnegie Mellon and other leading universities.

In their recent Magic Quadrant for Business intelligence and Analytics Platforms, the Gartner Research Group has identified “a fundamental shift” in the Analytics marketplace:

“They are increasingly shifting from using the installed base, traditional, IT-centric platforms that are the enterprise standard, to more decentralized data discovery deployments that are now spreading across the enterprise. The transition is to platforms that can be rapidly implemented and can be used by either analysts or business users, to find insights quickly...” - [Gartner Magic Quadrant for Business Intelligence and Analytics Platforms \(23 February 2015\)](#)

Consistent with this trend, the present proposal for an MS in Business Analytics emphasizes the technical and business knowledge to compete successfully in this “shifted” marketplace. The intent is to support the next generation of business users who will be empowered by this actively developing suite of tools. Rather than developing new algorithms or analyses, these business users and analysts will marry existing tools to business information. Relatively new firms like Spotfire and Tableau Software have emerged as leaders in the data-discovery space, helping business users to interactively visualize and interpret the vast data they own. Stalwarts like IBM, Oracle, and Microsoft are also making significant moves in the business analytics arena.

Not surprisingly, many AACSB-accredited Business Schools have begun to offer programs in Business Intelligence or Business Analytics. The enclosed Appendix lists a set of these programs along with course titles and program lengths. We believe our program will be differentiated based on the strengths of the core Business/Business Analytics knowledge as well as the ability for students to access RIT's growing list of courses in this area.

This content is well suited to a one year Master's of Science degree format. A well-known trend in graduate business programs is a shift away from the longer, more general MBA toward shorter, more focused MS programs. Among MS programs, schools traditionally launched programs in accounting, finance, and management. Entrepreneurial schools launch other programs based on market trends. A well-researched market trend is one indicating an ever-larger demand for business analytics education.

To benefit from and to contribute to RIT's initiatives in online education, we propose to deliver the program both in the traditional (residential) and online formats.

Program Goals

Through their experiences in MS-BA, students will achieve the following goals:

- **BUSINESS STRATEGY GOAL:** Identify and articulate business strategies concerning data
- **DATA MANAGEMENT GOAL:** Identify and implement techniques for data management in a business setting
- **ANALYTICS SKILLS GOAL:** Analyze structured and unstructured business data and demonstrate general competency in the use of industry standard tools for data visualization and analysis
- **DOMAIN KNOWLEDGE GOAL:** Demonstrate data analysis proficiency that meets the needs of specific business disciplines (finance, marketing, etc.)
- **INTERDISCIPLINARY KNOWLEDGE GOAL:** Demonstrate data analysis proficiency in an interdisciplinary setting

Program summary and curriculum

The one-year (either online or residential) 30 credit hour interdisciplinary curriculum will have a cohort structure with one new group beginning each Fall semester. The program features six components: (i) an introductory statistics and data analytics course, (ii) two required business analytics courses, (iii) two application courses in business disciplines, (iv) two interdisciplinary courses, (v) two free electives, and (vi) a capstone.

1. A required course (3 hours) that introduces students to the use of business analytics in a business setting and satisfies the business strategy goal:
 - a. MGIS 650 Introduction to Statistical Analysis and Data Analytics
2. Two required courses (6 hours) that provide the requisite knowledge to design and implement business analytics projects and satisfying the data management and analytics skills goals.
 - a. TIKS XXX Data Management for Business Analytics – organizing, manipulating, and visualizing data using tools such as R, Python, and Tableau; also provides an overview of BA processes and explores the business strategy aspect of data analytics.

- b. TIKS XXX Advanced Business Analytics – advanced analytics such as supervised and unsupervised machine learning of structured and unstructured data, and network analysis.
- 3. Two business Application courses (6 hours) as electives, initially directing students to take the following two courses as required courses but later to offer a choice to students (two of N) as new courses are developed. These courses satisfy the domain knowledge goal.
 - a. MKTG XXX Marketing Analytics – use of statistics and computational tools to capture and analyze user generated data to drive business strategy, inform product portfolios and discern customer insight.
 - b. FINC XXX Financial Analytics – use of data analytics methods and tools to solve investment management and corporate finance problems.
- 4. Two courses (6 hours) in related programs across the campus to satisfy the interdisciplinary knowledge goal. These are courses a student selects from a list compiled by the program director and may contain business-related as well as non-business courses.
- 5. Two free electives (6 hours) that allow a student to generate additional skills, again these courses could potentially be taken from outside the business college.
- 6. TIKS XXX A comprehensive Capstone course (3 hours) provides an opportunity to work on real business analytics problems by bringing together knowledge from the program’s coursework.

Similar to the new MS in Computational Finance, it is anticipated that this proposed program will attract a different kind of student to Saunders College of Business – students with a strong technical background that are interested in applying their technical skills to solve business problems. Before beginning the program, students are required to have baseline knowledge in English language, statistics, calculus, linear algebra, and programming. A standardized entrance exam (GRE or GMAT) will assess the prospective students' readiness for study and we will pay particular attention to the quantitative score in these exams. Bridge courses will be available for students who need additional coursework before beginning this program. A MOOC style class may be used to address specific deficiencies.

Fit with RIT Academic Portfolio Blueprint Characteristics

APB Characteristics	MS-BA
Scholarship, Research, and Creativity	<p>The program will enhance students’ ability to engage in innovative and creative activity. For example, in a marketing setting, students can use data to creatively design products and services.</p> <p>Saunders faculty is actively engaged in a number of Business Analytics-related research projects.</p>

Innovative Teaching and Learning	The program will use a variety of technological resources (a variety of software, data sources, etc.) to achieve program goals.
Experiential Learning	This will be a cornerstone of the program, with real data or stylized data used throughout. There will also be a capstone event that is highly experiential in nature.
International and Global Education	Data have no geographical boundary, neither do businesses dealing with data. As such the program will enable competencies that are international and global in nature.
Synergy and Interdisciplinarity	The BA program is highly synergistic with programs at Saunders as well as at the Institute overall. For example, at Saunders, the proposed program will combine well with the existing MIS, Finance, and Marketing programs that are quantitative in nature and focused on the use of data and analysis to solve business problems.
Inclusive Excellence	Data have no ideological boundaries. As such the program will sustain a diverse and inclusive environment.

Synergy with other programs

The program design includes linkages across business disciplines (MIS, Marketing, Finance for example), as well as linkages across RIT's Colleges. The interdisciplinary electives (6 hours) are designed to provide flexibility for students to pursue related study across campus. Initial conversations with Mark Smith/CQAS suggest an opportunity for courses in that area. The College of Liberal Arts Public Policy area has also indicated potential for courses emphasizing the ethical issues raised by data technologies and associated business practices.

Administrative structure:

The program will be administered through the Saunders College of Business. It will use the existing infrastructure for graduate programs within Saunders College. A program director will be selected from the faculty, with responsibility for advancing the program. This individual will receive a course load release for this service. The program will be supported by an advisory board of local and national industry professionals with expertise in the area of Business Analytics. As enrollment grows, a half-time Administrative Assistant will be added if needed.

Enrollment Management Statement (draft from original White Paper from Diane Ellison)

The proposed Business Analytics MS program offers the opportunity to integrate core SCB content and capitalize on the strengths and resources of a number of different departments at RIT toward what has become a high demand, interdisciplinary content area.

While research confirms growth in the field, there are a significant number of programs currently being offered by competitors, ranging from similar MS programs to MBA programs with concentrations in analytics, data science, and related areas. In addition a number of related programs are currently offered or being developed at RIT. It will be essential to marketing efforts that the final proposal clearly define and articulate a unique value proposition including academic and industry focus, career pathways and outcomes, and articulate distinctiveness both within RIT and across external competitors. Defining and articulating RIT and SCB strengths and focus in the individual program, as well across related programs being developed and offered will be essential to clarify and define target markets and to leverage resources and RIT brand in marketing efforts.

As we discussed previously, I encourage you to consider making the actual degree program 30 credits, with additional prerequisites required for students who do not have the appropriate background. Many of the competitor programs, and other masters degree programs at RIT are now 30 credits, and time to degree/number of credits will affect the competitiveness of the program if students cannot complete full-time in one year.

The program is proposed as a campus-based, cohort program requiring students to begin in Fall, with courses offered during the day (Fall and Spring semesters). We assume the majority of students will come from the full-time market, with demand similar to other SCB programs – attracting primarily local and international students. Our initial estimate is that the program as proposed could enroll 10 - 15 students per year. The timing of the approval process will affect projections for the first year.

This estimate is based on a 30-hour, campus based program that provides additional bridge courses for students who lack the prerequisites for admission to the program. Scholarship support would be limited to RIT central funding of 25% of overall tuition revenue redirected to scholarship through Institute Graduate Scholarship allocation. Any additional funding for graduate students will come from research grants and outside resources.

High demand in business and industry, and interest from target markets supports enrollment potential. However, evening courses, a flexible delivery model (online), and enabling students to commence studies in fall, spring, or summer would make the program accessible to a broader geographic market as well as working professionals and government and industry partners, and would contribute to increased enrollment.” – Diane Ellison email January 7, 2015

Impact on Resources

The proposed program requires 5 new MS courses, so resource needs are moderate. However, the online component will potentially require us to design and offer 8-10 new courses; for example, the elective courses (interdisciplinary and free electives) may not already exist in RIT’s course portfolio. To be conservative, we estimate 10 new online courses in addition to 5 new residential courses so the online component adds considerable cost.

The Concept Paper Budget Model Spreadsheet is attached. We provide two separate estimates, one assuming a residential model and the other assuming a residential plus online model.

Conclusion

Businesses today capture, analyze and interpret more data than ever before. New skills in Data Mining, Big Data, Data Analytics, Data Science, and Business Intelligence/Analytics are being sought more and more frequently by employers. RIT, with its focus on career-oriented education and reputation for technology stands to be a leader in this space.

Increasingly recognized as a top business school, particularly in the technology-focused business disciplines, Saunders College of Business is an ideal home for this program. The emerging importance of the business user and data discovery technologies deployed to business users support the proposed curriculum. These skills would serve as a complement to more technical/statistical content offered elsewhere on campus. This proposed MS in BA will further contribute to RIT's data analysis portfolio by connecting with strengths in this emerging area throughout the University.

APPENDIX: Existing Business Intelligence/Business Analytics programs at AACSB accredited schools

School	Courses	Program Length
Arizona State University	Data Mining Data-Driven Quality Management Business Analytics Strategy Analytical Decision Making Tools Applied Project	9-16 months
Bentley University	Advanced Data Mining Data Management and SQL Optimization and Simulation for Business Decisions Logistic Regression Decision Trees Factor & Cluster Analysis Customer Data Analysis Derivatives Web Applications Development Business Process Management	12-36 months
DePaul University	Database Processing Web Data Mining Knowledge Discover Data Visualization Mining Big Data Social Network Analysis Intelligent Information Retrieval Programming Data Mining Applications Machine Learning	24 months
Drexel University	Operations Research Data Mining for Business Analytics Statistics for Business Analytics Managerial Decision Models and Simulation Statistical Decision Theory	15 months
Fordham University	Business Analytics for Managers Web Analytics Database Management Data Mining for Business	12 months

	Data Warehousing Text Analytics	
George Mason University	Analytics: Big Data to Information Principles of Data Management Analytics & Decision Analysis Problem Foundation and Solving in Big Data Law & Ethics in Big Data	12-30 months
George Washington University	Data Warehousing Programming for Analytics Stochastic Foundations Data Mining Forecasting for Analytics Optimization Methods & Application	10-12 months
Harrisburg University	Data Mining and Engineering Simulation and Gamification Risk Modeling and Assessment	12-24 months
Illinois Institute of Technology	Data Preparation and Analysis Data Intensive Computing Applied Statistics Machine Learning/Statistical Learning Bayesian Computational Statistics	12-24 months
Louisiana State University	Web and Healthcare Analytics Supply Chain Analytics Database Management with SQL Data Mining Marketing Analytics Survival Analysis Operations Research Marketing Engineering Marketing Linear Models	12 months
Michigan State University	Computational Techniques for Large-Scale Data Analysis Communication Strategies for Analytics Applied Statistics Methods Marketing Technology & Analytics Data Mining Emerging Topics in Business	12 months

NC State University	<i>Single Integrated Curriculum</i> Covers: Cleaning, integration and data management to statistical and mathematical modeling, to data visualization and presentation	10 months
NYU	Social Media and Digital Marketing Analytics Data Science for Business Analytics Data Driven Decision Making Decision Models Data Visualization	12 months
Oakland University	Introduction to Databases and Data Warehouses Advanced Databases and Big Data Management Business Analytics Decision Support Systems Management Science	12 months
RPI	Technology Fundamentals for Analytics Predictive Analytics Using Social Media Introduction to Neural Networks Knowledge Discovery with Data Mining Data Resource Management Marketing Analytics Supply Chain Analytics	12 months
Rutgers	Analytics Database Systems Programming Finance & Accounting Leadership & Communication	12-36 months
SMU	Decision Models Business Metrics Data Mining Web and Social Media Analytics Data Visualization and Communications	12 months

St. Joseph's University	Predictive Analytics Business Analytics Database Management Data Mining Enterprise Data Critical Performance Management Management Issues in Business Intelligence	18 months
St. Peter's University	Introduction to Data Science Statistics for Data Analysis Database and Data Warehousing Statistical Programming Data Mining Big Data Analytics Machine Learning Predictive Analytics and Experimental Design Data Visualization Business Analytics Business Intelligence and Ethics	18 months
Texas A&M University	Predictive Modeling Applied Analytics Using SAS Enterprise Miner Financial Accounting Marketing	24 months
University of Cincinnati	Optimization Simulation Probability Statistics Statistical Computing Data Management Data Mining Forecasting Multivariate Methods Case Studies Data Visualization	12 months
University of Connecticut	Predictive Modeling Business Decision Modeling Data Mining and Business Intelligence Big Data Analytics with Hadoop Advanced Business Analytics and PM	12 months

University of Maryland	Advanced Marketing Analytics Statistical Programming Data Science Web Analytics Market Forecasting	9 months
University of Michigan	Decision Science Applied Forecasting Management Science System Simulation Applied Statistical Modeling	12 months
UNC Charlotte	Big Data Analytics for Competitive Advantage Business Intelligence and Analytics Database Systems Machine Learning Complex Adaptive Systems Cloud Computing for Data Analysis Information Visualization	15-24 months
University of Rochester	Business Analytics Information Systems Business Modeling Advanced Quantitative Marketing Database Marketing Data Structures	12 months
USC	Applied Managerial Statistics Business Analytics Statistical Computing and Data Visualization Foundations of Data Management Database Systems Foundations of Information Security	12 months
University of South Florida	Advanced Database Systems Data Warehousing Data Mining Statistical Data Mining	12-24 months
University of Tennessee	Statistical Methods and Data Mining Data Visualization Business Process Optimization	18 months

	Web Analytics Marketing Analytics Supply Chain Analytics	
The University of Texas	Predictive Modeling Stochastic Control and Optimization Database Management Social Media Analytics Marketing Analytics 1 & 2	12 months
University of Virginia	Linear Models for Data Science Design and Analysis of Algorithms for Data Science Applied Data Mining Ethics, Law & Policy of Big Data	11 months
VCU	Information Systems for Business Intelligence Statistical Analysis Data Mining Forecasting Methods for Business Text Mining and Unstructured Data Simulation Models Risk Analysis	12-18 months

**MS Business Analytics RESIDENTIAL PROGRAM
SUMMARY REPORT**

Fiscal Year	2017	2018	2019	2020	2021	Total
Avg Enrollment: Students (FT + PT)	12	15	15	20	25	87
Part-time Faculty expense	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Full-time faculty expense	\$ 157,617.48	\$ 321,539.66	\$ 327,970.46	\$ 334,529.86	\$ 341,220.46	\$ 1,482,877.93
Total Expenses	\$ 408,157.32	\$ 561,157.50	\$ 570,962.81	\$ 582,382.07	\$ 594,029.71	\$ 2,716,689.42
Revenue (Net of Aid)	\$ 372,991.98	\$ 482,558.37	\$ 499,447.91	\$ 689,238.12	\$ 861,547.65	\$ 2,905,784.02
CONTRIBUTION MARGIN Surplus/(Deficit)	\$ (35,165.35)	\$ (78,599.13)	\$ (71,514.90)	\$ 106,856.05	\$ 267,517.93	\$ 189,094.60

Note : This sheet is password protected to maintain the formulas.

