**Concept Paper: MS in Business Analytics**

**MS in Business Analytics is proposed by:**

**Saunders College of Business**

**MIS, Marketing and Digital Business and Accounting and Finance Departments**

**with designed collaboration with other units on campus**

**Goals and Justification**

Businesses are collecting data from their customers, suppliers, and equipment at an unprecedented rate. Riot Games, a leading gaming firm and maker of League of Legends, collects data on the experience of their gamers. Caterpillar collects data from various sensors in their mining and earth-moving equipment. 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, supplementing traditional research and development activities within an organization.

The set of tools, techniques and competencies for addressing the data is very 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 are scheduled to offer a Master of Science in Computational Finance starting in Fall 2015. Also, the Computing and Science colleges are actively vetting a concept paper to offer a Master of Science in Data Science. RIT will benefit from a constellation of programs in this space, much as Carnegie Mellon and other leading universities do.

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 and business users, to find insights quickly…” - [Gartner Magic Quadrant for Business Intelligence and Analytics Platforms (23 February 2015)](http://www.gartner.com/technology/reprints.do?id=1-2ACLP1P&ct=150220&st=sb)

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 Qlik 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 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.

**Program Goals**

Through their experiences in MS in Business Analytics, students will:

* Gather knowledge of how businesses collect and utilize data
* Learn how leading organizations are leveraging Business Analytics for market advantage
* Understand the challenges and underlying resource requirements associated with analytics
* Identify and practice a range of techniques for data capture
* Analyze structured and unstructured business data using BA methods
* Use interactive data discovery tools to dynamically interpret business data

**Program summary and curriculum**

The one-year 30 credit hour interdisciplinary curriculum will feature four main components: A set of foundation courses, elective concentrations (offered outside the business college), core business knowledge and a final capstone experience. While the present proposed courses are offered on campus, it would be consistent with the goals of the program for a subset of these courses to be offered online. With proven initial success, it would make sense to offer this curriculum entirely online.

1. Foundation courses (12 hours) will provide the requisite knowledge to design and implement business analytics projects.
   1. Two new courses will be created:
      * MGIS XXX Business Analytics I – an introduction to BA, including sources of data, techniques for business data capture and the introduction of interactive data discovery tools
      * MGIS XXX Business Analytics II – the second course in the BA sequence, providing additional analyses, addressing unstructured data and a focus on social media analysis
   2. Two existing courses will be used:
      * MKTG 761: Marketing Research
      * DECS 743: Operations and Supply Chain Management
2. Core business knowledge (6 hours) will include two existing courses.

* ACCT 603: Accounting for Decision Makers
* FINC 721: Financial Analysis for Managers

1. Interdisciplinary elective courses (9 hours) would allow students to take 3 course sequences in related programs across campus.
2. 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 and programming. A standardized entrance exam (GRE or GMAT) will assess the prospective students' readiness for study. Bridge courses will be available for students who need additional coursework before beginning this program.

**Fit with RIT Academic Portfolio Blueprint Characteristics**

|  |  |
| --- | --- |
| APB Characteristics | MS-BA |
| Scholarship, Research, and Creativity | 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.  Saunders faculty are actively engaged in a number of Business Analytics-related research projects. |
| 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 is includes linkages across business disciplines (MIS, Marketing, Finance for example), as well as linkages across RIT’s Colleges. The 3 courses (9 hours) of electives are designed to provide flexibility for students to pursue related study across campus. Initial conversations with Mark Smith/CQAS suggest an opportunity for a concentration 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 (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 is designed to require few incremental resources. Of the 30 credit hours, 21 correspond to existing courses already offered in support of other programs in SCB and elsewhere on campus. Three new courses (Business Analytics I & II and Capstone) will be offered once per year. Saunders College classrooms as well as physical and virtual labs will be sufficient for this program.

The Concept Paper Budget Model Spreadsheet is attached.

**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.

Increasing 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 Business Analytics 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**

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| **School** | **Courses** | **Program Length** |
|  |  |  |
| Arizona State University | Data Mining | 9-16 months |
|  | Data-Driven Quality Management |  |
|  | Business Analytics Strategy |  |
|  | Analytical Decision Making Tools |  |
|  | Applied Project |  |
|  |  |  |
| Bentley University | Advanced Data Mining | 12-36 months |
|  | 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 |  |
|  |  |  |
| DePaul University | Database Processing | 24 months |
|  | Web Data Mining |  |
|  | Knowledge Discover |  |
|  | Data Visualization |  |
|  | Mining Big Data |  |
|  | Social Network Analysis |  |
|  | Intelligent Information Retrieval |  |
|  | Programming Data Mining Applications |  |
|  | Machine Learning |  |
|  |  |  |
| Drexel University | Operations Research | 15 months |
|  | Data Mining for Business Analytics |  |
|  | Statistics for Business Analytics |  |
|  | Managerial Decision Models and Simulation Statistical Decision Theory |  |
|  |  |  |
| Fordham University | Business Analytics for Managers | 12 months |
|  | Web Analytics |  |
|  | Database Management |  |
|  | Data Mining for Business |  |
|  | Data Warehousing |  |
|  | Text Analytics |  |
|  |  |  |
| George Mason University | Analytics: Big Data to Information | 12-30 months |
|  | Principles of Data Management |  |
|  | Analytics & Decision Analysis |  |
|  | Problem Foundation and Solving in Big Data |  |
|  | Law & Ethics in Big Data |  |
|  |  |  |
| George Washington University | Data Warehousing | 10-12 months |
|  | Programming for Analytics |  |
|  | Stochastic Foundations |  |
|  | Data Mining |  |
|  | Forecasting for Analytics |  |
|  | Optimization Methods & Application |  |
|  |  |  |
| Harrisburg University | Data Mining and Engineering | 12-24 months |
|  | Simulation and Gamification |  |
|  | Risk Modeling and Assessment |  |
|  |  |  |
| Illinois Institute of Technology | Data Preparation and Analysis | 12-24 months |
|  | Data Intesive Computing |  |
|  | Applied Statistics |  |
|  | Machine Learning/Statistical Learning |  |
|  | Bayesian Computational Statistics |  |
|  |  |  |
| Louisiana State University | Web and Healthcare Analytics | 12 months |
|  | Supply Chain Analytics |  |
|  | Database Management with SQL |  |
|  | Data Mining |  |
|  | Marketing Analytics |  |
|  | Survival Analysis |  |
|  | Operations Research |  |
|  | Marketing Engineering |  |
|  | Marketing Linear Models |  |
|  |  |  |
| Michigan State University | Computational Techniques for Large-Scale Data Analysis | 12 months |
|  | Communication Strategies for Analytics |  |
|  | Applied Statistics Methods |  |
|  | Marketing Technology & Analytics |  |
|  | Data Mining |  |
|  | Emerging Topics in Business |  |
|  |  |  |
| NC State University | *Single Integrated Curriculum* | 10 months |
|  | Covers: Cleaning, integration and data management to statistical and mathematical modeling, to data visualization and presentation |  |
|  |  |  |
| NYU | Social Media and Digital Marketing Analytics | 12 months |
|  | Data Science for Business Analytics |  |
|  | Data Driven Decision Making |  |
|  | Decision Models |  |
|  | Data Visualization |  |
|  |  |  |
| Oakland University | Introduction to Databases and Data Warehouses | 12 months |
|  | Advanced Databases and Big Data Management |  |
|  | Business Analytics |  |
|  | Decision Support Systems |  |
|  | Management Science |  |
|  |  |  |
| RPI | Technology Fundamentals for Analytics | 12 months |
|  | Predictive Analytics Using Social Media |  |
|  | Introduction to Neural Networks |  |
|  | Knowledge Discovery with Data Mining |  |
|  | Data Resource Management |  |
|  | Marketing Analytics |  |
|  | Supply Chain Analytics |  |
|  |  |  |
| Rutgers | Analytics | 12-36 months |
|  | Database Systems |  |
|  | Programming |  |
|  | Finance & Accounting |  |
|  | Leadership & Communication |  |
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| SMU | Decision Models | 12 months |
|  | Business Metrics |  |
|  | Data Mining |  |
|  | Web and Social Media Analytics |  |
|  | Data Visualization and Communications |  |
|  |  |  |
| St. Joseph's University | Predictive Analytics | 18 months |
|  | Business Analytics |  |
|  | Database Management |  |
|  | Data Mining |  |
|  | Enterprise Data |  |
|  | Critical Performance Management |  |
|  | Management Issues in Business Intelligence |  |
|  |  |  |
| St. Peter's University | Introduction to Data Science | 18 months |
|  | 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 |  |
|  |  |  |
| Texas A&M University | Predictive Modeling | 24 months |
|  | Applied Analytics |  |
|  | Using SAS Enterprise Miner |  |
|  | Financial Accounting |  |
|  | Marketing |  |
|  |  |  |
|  |  |  |
| University of Cincinnati | Optimization | 12 months |
|  | Simulation |  |
|  | Probability |  |
|  | Statistics |  |
|  | Statistical Computing |  |
|  | Data Management |  |
|  | Data Mining |  |
|  | Forecasting |  |
|  | Multivariate Methods |  |
|  | Case Studies |  |
|  | Data Visualization |  |
|  |  |  |
| University of Connecticut | Predictive Modeling | 12 months |
|  | Business Decision Modeling |  |
|  | Data Mining and Business Intelligence |  |
|  | Big Data Analytics with Hadoop |  |
|  | Advanced Business Analytics and PM |  |
|  |  |  |
| University of Maryland | Advanced Marketing Analytics | 9 months |
|  | Statistical Programming |  |
|  | Data Science |  |
|  | Web Analytics |  |
|  | Market Forecasting |  |
|  |  |  |
| University of Michigan | Decision Science | 12 months |
|  | Applied Forecasting |  |
|  | Management Science |  |
|  | System Simulation |  |
|  | Applied Statistical Modeling |  |
|  |  |  |
| UNC Charlotte | Big Data Analytics for Competitive Advantage | 15-24 months |
|  | Business Intelligence and Analytics |  |
|  | Database Systems |  |
|  | Machine Learning |  |
|  | Complex Adaptive Systems |  |
|  | Cloud Computing for Data Analysis |  |
|  | Information Visualization |  |
|  |  |  |
| University of Rochester | Business Analytics | 12 months |
|  | Information Systems |  |
|  | Business Modeling |  |
|  | Advanced Quantitative Marketing |  |
|  | Database Marketing |  |
|  | Data Structures |  |
|  |  |  |
| USC | Applied Managerial Statistics | 12 months |
|  | Business Analytics |  |
|  | Statistical Computing and Data Visualization |  |
|  | Foundations of Data Management |  |
|  | Database Systems |  |
|  | Foundations of Information Security |  |
|  |  |  |
| University of South Florida | Advanced Database Systems | 12-24 months |
|  | Data Warehousing |  |
|  | Data Mining |  |
|  | Statistical Data Mining |  |
|  |  |  |
| University of Tennessee | Statistical Methods and Data Mining | 18 months |
|  | Data Visualization |  |
|  | Business Process Optimization |  |
|  | Web Analytics |  |
|  | Marketing Analytics |  |
|  | Supply Chain Analytics |  |
|  |  |  |
| The University of Texas | Predictive Modeling | 12 months |
|  | Stochastic Control and Optimization |  |
|  | Database Management |  |
|  | Social Media Analytics |  |
|  | Marketing Analytics 1 & 2 |  |
|  |  |  |
| University of Virginia | Linear Models for Data Science | 11 months |
|  | Design and Analysis of Algorithms  for Data Science |  |
|  | Applied Data Mining |  |
|  | Ethics, Law & Policy of Big Data |  |
|  |  |  |
| VCU | Information Systems for Business Intelligence | 12-18 months |
|  | Statistical Analysis |  |
|  | Data Mining |  |
|  | Forecasting Methods for Business |  |
|  | Text Mining and Unstructured Data |  |
|  | Simulation Models |  |
|  | Risk Analysis |  |