University Senate
TRANSMITTAL FORM

Senate Document #:	15-16-16
PCC ID #:	15038
Title:	PCC Proposal to Establish a Master of Science in Business Analytics
Presenter:	Andrew Harris, Chair, Senate Programs, Curricula, and Courses Committee
Date of SEC Review:	January 21, 2016
Date of Senate Review:	February 11, 2016
Voting (highlight one):	1. On resolutions or recommendations one by one, or 2. In a single vote 3. To endorse entire report
Statement of Issue:	The Robert H. Smith School of Business proposes to offer a new Master of Science degree program in Business Analytics. Students in this program will develop significant mathematical, statistical, and computational capabilities needed to understand, manage, and use large amounts of data for optimal business and organizational decision-making. This program is structured both to develop mathematical and statistical skills such as quantitative modeling, operations management, data mining and simulation, and to develop technical and computational skills such big data, network, and infrastructure management. In the past decade, Business Analytics has gained enormously in prominence with businesses and other organizations using large amounts of data in forecasting, prediction, and managerial decision-making. This increasing use of big data has led to a shortage of capable analysts, a shortage which this program is designed to alleviate. The proposed program will require 30 credits composed of required courses, electives, and a capstone project. Required courses include the following: BUSI630 Data, Models, and Decisions (3 Credits); BUDT732 Decision Analytics (3 Credits); BUDT733 Data Analytics (3 Credits); and BUDT 704 Database Management Systems (3 Credits). The elective courses (15 credits) will be offered in a manner that will allow students to focus in one particular area, take a set of courses that will allow

	them to broaden their knowledge, or combine both approaches. The capstone course will require students to apply the modeling and optimization knowledge and skills they have learned in the program to real world operational data. The Robert H. Smith School of Business will be able to offer the new program using existing resources. This proposal was approved by the Graduate School Programs, Curricula, and Courses committee on November 23, 2015, and was approved by the Senate Programs, Curricula, and Courses committee at its meeting on December 4, 2015.
Relevant Policy # & URL:	NA
Recommendation:	The Senate Committee on Programs, Curricula, and Courses recommends that the Senate approve this new degree program.
Committee Work:	The committee considered this proposal at its meeting on December 4, 2015. Tunay Tunca, Professor of Management Science and Operations Management, and Mike Marcellino, Assistant Dean of M.B.A. and M.S. programs for the Smith School, presented the proposal and responded to questions from the committee. After discussion, the committee voted unanimously to recommend the proposal.
Alternatives:	The Senate could decline to approve this new program.
Risks:	If the Senate declines to approve this new program, the University will lose an opportunity to use existing resources to create an academic program that meets a growing need in business analytics.
Financial Implications:	There are no significant financial implications with this proposal.
Further Approvals Required:	If the Senate approves this proposal, it would still require further approval by the President, the Board of Regents, and the Maryland Higher Education Commission.

THE UNIVERSITY OF MARYLAND, COLLEGE PARK
PROGRAM/CURRICULUM/UNIT PROPOSAL

- Please email the rest of the proposal as an MSWord attachment to pcc-submissions@umd.edu.

- Please submit the signed form to the Office of the Associate Provost for Academic Planning and Programs. 1119 Main Administration Building. Campus.

College/School: Robert H. Smith School of Business
Please also add College/School Unit Code-First 8 digits: **01202900**

Department/Program:
Please also add Department/Program Unit Code-Last 7 digits:

Type of Action (choose one):

☐ Curriculum change (including informal specializations)   X *New academic degree/award program*
　☐ Curriculum change for an LEP Program   ☐ New Professional Studies award iteration
☐ *Renaming of program or formal Area of Concentration*   ☐ New Minor
☐ *Addition/deletion of formal Area of Concentration*   ☐ Request to create an online version of an existing
☐ *Suspend/delete program*   program

Italics indicate that the proposed program action must be presented to the full University Senate for consideration.

Summary of Proposed Action:

The Robert H. Smith School of Business proposes launching a Master of Science in Business Analytics (MSBA) program designed to provide students with an understanding of Business Analytics. and its techniques and methods. In the past decade, Business Analytics has gained enormously in prominence with business and government institutions and entities understanding its importance and power in forecasting. prediction and managerial decision making. There is a high demand for managers with Business Analytics skills and we anticipate that this demand will grow and continue. The graduates of the program will develop skills needed to serve the many business analytics and big data related tasks and jobs by providing them with strong quantitative skills and in-depth knowledge of computational applications and information technology.

Departmental/Unit Contact Person for Proposal: _____

APPROVAL SIGNATURES - *Please print name, sign, and date. Use additional lines for multi-unit programs.*

1. Department Committee Chair   Tuna Tunca _____

2. Department Chair   Hank Lucas _____

3. College/School PCC Chair   Michael Faulkender _____

4. Dean   Alexander J. Triantis _____

5. Dean of the Graduate School (if required) _____

6. Chair, Senate PCC   Andrew Harris _____ 12/4/2015

7. University Senate Chair (if required) _____

8. Senior Vice President and Provost _____

PROPOSAL FOR
NEW INSTRUCTIONAL PROGRAM
UNIVERSITY OF MARYLAND, COLLEGE PARK
Master of Science in Business Analytics

ROBERT H. SMITH SCHOOL OF BUSINESS

DEAN ALEXANDER J. TRIANTIS

Master of Science in Business Analytics (MSBA)
Award to be offered Fall 2016

Master of Science in Business Analytics (MSBA)

I. OVERVIEW AND RATIONALE

A. Briefly describe the nature of the proposed program and explain why the institution should offer it.

Goal and Contribution to the Strategic Plan and Market Demand

The Robert H. Smith School of Business (School) proposes launching a Master of Science in Business Analytics (MSBA) program designed to provide students with an understanding of Business Analytics, and its techniques and methods. In the past decade, Business Analytics has gained enormously in prominence with business and government institutions and entities understanding its importance and power in forecasting, prediction and managerial decision making. There is a high demand for managers with Business Analytics skills. A McKinsey report on Business Analytics and Big Data states: "The United States alone faces a shortage of 140,000 to 190,000 people with analytical expertise and 1.5 million managers and analysts with the skills to understand and make decisions based on the analysis of big data." In the past decade, many management professionals with analytics skills have found jobs in a wide range of industries and tasks, including Healthcare Analytics, Fraud Detection, Airline and Transportation Analytics, Operational Analytics, and Purchasing and Procurement Analytics. We anticipate that this demand will grow and continue.

The strategic plan of the Robert H. Smith School of Business states as its first objective the goal of "Growing future leaders to address global issues." The University of Maryland, College Park mission statement sets a goal to "continue to build a strong, university-wide culture of graduate and professional education" and to provide knowledge-based programs and services that are responsive to the needs of the citizens of the state

and the nation. We believe a Master of Science Degree offering in Business Analytics serves to satisfy these goals by producing future leaders skilled in rigorous quantitative analysis and data based managerial decision making.

The graduates will develop skills needed to serve for many business analytics and big data related tasks and jobs. Some examples include personnel scheduling (e.g., for hospitals and healthcare organizations, airlines, Transportation Security Organization), data-based disease detection and control, data-mining for fraud detection (e.g., credit card fraud screening for online retailers, claims fraud detection for IRS, selecting audit cases for SEC), data and optimization-based emergency and disaster response (e.g., as employed by FEMA), simulation and optimization based operations planning (e.g., manufacturing, event planning, security screening for transportation), data-mining for Human Resources Planning and hiring, optimization-based planning for transportation (e.g., airlines, rail, parcel services), and data and simulation based supply chain and procurement risk management. Notably, the program will aim to train the students for skills and jobs distinctly different than the current MS in Marketing Analytics program offered by the Smith School since the MS in Marketing Analytics program specifically targets marketing tasks and jobs in training and placement.

The MSBA degree by itself will be very different than the MBA degree offered by the Smith School since it will be highly oriented towards technical skills such as statistical and mathematical skills, and advanced computer applications, and sharply focused on analytics. In contrast, the MBA program aims to give more managerial skills to students and has much less focus on deeper statistical and data analysis knowledge and sophisticated technical applications. Those said, the Smith School also offers joint MS-MBA degrees in several fields. We also seek to offer an option for a joint MSBA-MSBA degree. This program is also an ideal path for students who are interested in continuing on to pursue PhD programs in Management Science, Operations Management, and Information Systems.

Graduates from this program will have strong quantitative skills and in-depth knowledge of computational applications and information technology that will position them to meet the increasing need for employees trained in STEM (Science,

Technology, Engineering, and Math) disciplines. The modern management professionals and business data analysts increasingly need significant mathematical, statistical and computational knowledge to understand and manage data available to business and government enterprises, and to utilize that understanding in making optimal quantitative decisions using mathematical models. The MSBA program is structured to provide and build not only mathematical and statistical skills such as quantitative modeling, operations management, data mining and simulation, but also technical computational skills such as big data, network and infrastructure management. The Master of Science in Business Analytics (MSBA) should qualify to be assigned an approved STEM Classification of Instructional Programs (CIP) code of 52.1399, Management Science and Quantitative Methods.

II. CURRICULUM

A.   Provide a full catalog description of the proposed program, including educational objectives and any areas of concentration.

The Master of Science in Business Analytics (MSBA) degree is a professional degree for students wishing to pursue careers management with a strong quantitative and data analysis training.

The proposed MSBA program offered by the Robert H. Smith School of Business will provide students with:

   a) comprehensive training in foundations and methodology of quantitative managerial analysis;

   b) comprehensive training in data analysis and data-based managerial decision making;

   c) an in-depth training on methods and tools of contemporary data analytics and big data;

   d) strong background on spreadsheet based modeling and optimization fundamentals and techniques;

   e) good understanding of modern computational data analysis techniques such as data mining, Monte Carlo and discrete event simulation, and network analytics;

   f) strong hands-on training in data handling and data base management;

g) mastery of the contemporary software used for managerial quantitative and data analysis including web based software and tools.

List the courses (number, title, semester credit hours) that would constitute the requirements and other components of the proposed program. Provide a catalog description for any courses that will be newly developed or substantially modified for the program.

Students will enter the MSBA program in the Fall term and will follow the curriculum in a cohort basis through the core portion of the program. The proposed MSBA program requires 30 credit hours comprised of required core courses (12 credits), electives and a capstone project (18 credits total). Completion of the degree is feasible within one calendar year, though students may choose to spread their coursework over sixteen months.

Required Courses

Course descriptions are provided below. We propose that a new prefix for the MSBA be used.

BUSI 630 Data, Models, and Decisions (3): Introduces students to analytical techniques that establish the optimality of managerial decisions via empirical ("data models") and logical ("decisions") means. The course may be viewed as consisting of two integrated parts. In the first part, various methods of analyzing data, including regression analysis are studied. The second part covers models for making optimal decisions in situations characterized by either an absence of uncertainty or where the uncertainty arises from non-competitive sources.

BUDT 732 Decision Analytics (3): This course explores basic analytical principles that can guide a manager in making complex decisions. It focuses on two advanced analytics techniques: optimization, dealing with design and operating decisions for complex systems, and simulation, dealing with the analysis of operating decisions of complex systems in an uncertain environment. The course provides students with a collection of optimization and simulation modeling and solution tools that can be useful in a variety of industries and functions. The main topics covered are linear, integer, and nonlinear optimization applications in a wide variety of industry segments, and Monte-Carlo Simulation and risk

assessment. Application-oriented cases are used for developing modeling and analytical skills, and to simulate decision-making in a real-world environment.

BUDT 733 Data Analytics (3): Increasingly, governments and businesses are collecting more and more data. Examples include the Internet, point-of-sale devices, medical databases, search engines, and social networks. The increased data availability coupled with cheap computing power provides us with an unprecedented opportunity to use sophisticated data-driven mathematical models to achieve many important goals and/or gain a competitive edge. This course gives an overview of the data-mining process, from data collection, through data modeling and analytical algorithms, to data-driven decision making. The focus is on introducing data-mining algorithms such as logistic regression, classification trees and clustering, and their application to real-world data, as well as introducing some of the more recent developments in the field such as ensemble methods.

BUDT 704 Database Management Systems (3): Provides fundamental concepts and skills necessary for designing, building, and managing business applications which incorporate database management systems as their foundation. Topics covered include the fundamentals of database management (DBMS) technology, alternative methods for modeling organizational data, the application of delivering data through Web-based and other graphical interfaces. Non-majors should review their registration eligibility in the statement preceding the BUDT courses.

Elective and Capstone Project Courses

The elective courses will be offered in a manner that will allow students to focus in one particular area (for a depth of knowledge), to take a set of courses that will allow them to broaden their knowledge, or a combination of both. While many of the sections being offered will be new, we will also give students flexibility in taking courses within other relevant programs. These will be approved by the academic director of the program on a case by case basis as necessary. The initial set of electives that are being planned will include the following.

BUDT 758K Computer Simulation for Business Applications (3): This course covers the basic techniques for computer simulation modeling and analysis of discrete-event systems. Course emphasis is on conceptualizing abstract models of real-world systems (for example, inventory and queuing systems), implementing simulations in special purpose software, planning simulation studies, and analyzing simulation output. Some mathematical theory will be covered.

BUDT 706 Social Media and Online Analytics (3): Over the past years, social computing technologies such as online communities, blogs, wikis, and social networking systems have become important tools for individuals to seek information, socialize with others, get support, collaborate on work, and express themselves. Increasingly, businesses are trying to leverage web 2.0 by using social computing technologies to communicate with customers, employees, and other business partners or to build new business models. This course will review concepts and principles related to web 2.0 and examine issues and strategies associated with business use of social computing technologies.

BUDT 758X Big Data: Strategy, Management and Applications (3): Digitization is occurring in every aspect of business and our daily lives, generating a huge amount of data. Big data represents unprecedented opportunities for companies to generate insights to improve products and services and contribute to the bottom line. At the same time, much of the big data is unstructured, in real time and only loosely connected. It defies the traditional ways of managing databases. This creates challenges even to tech-savvy companies on how to leverage the big data to gain competitive advantage. This course provides cutting edge knowledge about various aspects of big data, including: how to identify strategic values of big data, major types of big data, methods to capture and store big data, analytical tools for big data, and pitfalls to avoid in formulating a big data strategy. In the end of the course, students will have a comprehensive understanding of important business issues related to big data, and be able to successfully design and implement big data strategy.

BUDT 758X Price Optimization and Revenue Management (3): Revenue (or yield) management (RM) first emerged in the post-deregulation US airline industry, and hit the jackpot in the mid 90's with American Airlines RM scoring $1 billion annual incremental revenues. The business strategy reformed the entire transportation and tourism industry, as well as

telecommunications, broadcasting, ticketing, healthcare, fashion, manufacturing etc. Recently RM evolved to a new dimension with internet companies practicing dynamic and targeted pricing or auctions for products, services or advertisement slots. This course that specializes on dynamic price optimization and revenue management is meant to provide students with the right bundle of tools and principles, drawn from several disciplines in order to maximize profits. The RM solution integrates pricing with sales and inventory management strategies. The first part of the course addresses pricing issues such as pricing under various constraints, non-linear pricing, markdown pricing. The second part of the course provides tools and methods for combined pricing and capacity management decisions from an operational perspective.

BUDT 758F Google Online Challenge Analytics (3): This course is a hands-on learning-by-doing course. Students will design, develop, and implement sponsored search strategies for real-world clients are part of the Google Online Challenge. Students will work in teams of 4 or 5, spend real advertising dollars to run a sponsored-search advertising campaign for their client. In conjunction with the client, students will also develop digital and social media strategies that complement and support their sponsored search advertising campaigns on Google. The teams will also learn to use analytical tools to analyze the performance of their campaigns and provide guidelines to the client for future campaigns. This "real-time, real-business, real-money" challenge provides a valuable opportunity for students to gain a first-hand experience with online advertising and benefit from the immediate campaign performance feedback. At the end of this course, a student should feel comfortable developing and implementing digital strategies and executing online campaigns for firms. They should know all the key terminology and theories of the field and have a good idea of how things work below the surface.

BUDT 758X Healthcare Analytics (3): This class will focus on some of the key aspects of conducting analysis and applying the results in the health care system. The course will a) discuss the business of health care, payment systems and insurance b) discuss health care data, privacy and HIPAA, and c) explore successful implementations of analytics in healthcare settings. Various applications of healthcare analytics will be discussed, focusing on costs, operations, quality, equity, and access.

BUDT 758X Operations Analytics (3): This course explores analytical methods, tools and strategies that can enable firms to achieve effective and sustainable operations. The course covers a mix of qualitative and quantitative problems and issues confronting operations managers. The first part of the course focuses on analytics that measure the performances of business operations, explaining how to measure key process parameters like capacity and lead time and analyze the impact of variability on business processes. The second part of the course focuses on analytics that improve the performances of business operations, examining analytics in quality management as well as recent moves toward lean operations. The course also includes a module on inventory analytics with applications in pricing and revenue management. Throughout the course various operations analytics applied to real operational challenges are illustrated. The aim is to provide both tactical knowledge and high-level insights of operations analytics needed by general managers and management consultants. It is also demonstrated how companies can use operational principles from to significantly enhance their competitiveness.

BUDT 758X Capstone Project in Operations Analytics (3): This course gives students an opportunity to apply the knowledge and skills they learned in the program on real world operational data through quantitative analysis with use of statistical models and the application of modeling and optimization techniques. Students form teams of 4-5 members and pursue an operational improvement project under the supervision of the instructor. The project groups are expected to suggest operational and business improvements and solutions based on analytical techniques and methods for the case they are analyzing.

Typical Student Schedule for MSBA (Master of Science in Business Analytics) completed in one year

Year 1		
Fall	Spring	Summer
BUSI 630: Data, Models, and Decisions	Elective	Elective
BUDT 704: Database Management	Elective	Elective
BUDT 732: Decision Analytics BUDT 733: Data Analytics	Elective	Capstone

Typical Student Schedule for MSBA (Master of Science in Business Analytics) completed in 16 months

Year 1		Year 2
Fall	Spring	Fall
BUSI 630: Data, Models, and Decisions	BUDT 733: Data Analytics	Elective
BUDT 704: Database Management	Elective	Elective
BUDT 732: Decision Analytics	Elective Elective	Capstone

C. Describe any selective admissions policy or special criteria for students selecting this field of study.

Applicants to the MSBA program must have completed all of the requirements for a baccalaureate degree prior to their acceptance into the program, with particular emphasis on the student having strong quantitative background. Recent graduates in quantitative and mathematical fields such as engineering, computer science, mathematics, statistics, physics and physical sciences are ideally suited for the program and will be given preference to. All applicants must submit: Transcripts from all undergraduate and graduate institutions that have been previously attended; Graduate Record Examination (GRE) scores or the Graduate Management Admissions Test (GMAT) scores; a complete online application form that includes a written essay articulating qualifications and motivation for pursuing advanced education; two letters of recommendation from supervisors or from professors competent to judge the applicant's probability of success in graduate school. Another standardized test in lieu of the GRE or GMAT can be substituted at the discretion of the Academic Director.

In addition, an admissions interview may be required. After initial screening, the Admissions Office may select candidates for interview which may be done in person, by telephone, or via the Internet (e.g., by Skype). Proof of English language proficiency (TOEFL or IELTS official scores) is also required unless the applicant has received an undergraduate or graduate degree from a select list of countries. For international student needing an F1 visa, a completed certification of finance form and supporting financial documentation are required.

In addition to Graduate School requirements, admission decisions for the MSBA program will be based on the quality of previous undergraduate and graduate coursework (if applicable), the strength of Graduate Record Examination scores, the Graduate Management Admissions Test scores, or another standardized test, the relevance of prior work and research experience, and the congruence of professional goals with those of the program. Students should submit application materials for the Fall semester by April 1. This program does not accept applications for Spring semester admission.

We anticipate an enrollment of 40 students per cohort as we launch the program but we have the ability to accept a lower total in the first year as we begin to market the program. Ultimately we would like to expand the cohort size to 50 but will only do so if we can attract highly qualified students.

III. STUDENT LEARNING OUTCOMES AND ASSESSMENT

A. **List the program's learning outcomes and explain how they will be measured.**

Learning Outcome 1: Students will demonstrate a clear understanding of the fundamental concepts of Statistics, Data Analysis, Quantitative Modeling, Simulation, and Optimization.

Measure: Students will be required to pass a set of classes in each of these areas.

Criterion: At least 90% of students will receive a rating of "Satisfactory" or better from the Academic Director, who will review their performance in the core classes. The Academic Director will meet with students rated below "Satisfactory" to help improve their performance or determine their continued participation in the program. In addition, students must maintain a 3.0 GPA to remain in good academic standing. Failure to maintain a 3.0 jeopardizes continued enrollment in the program.

Assessment: Every Year, starting in the 2017-2018 academic year.

Learning Outcome 2: Students will demonstrate proficiency in the practical tools and techniques of modern

Business Analytics

Measure: Students must take and succeed in classes that teach the practical techniques of Business

Analytics and their implementation with contemporary software applications

Criterion: At least 90% of students will receive a rating of "Satisfactory" or better from

the course instructor.

Assessment: Every Year, starting in the 2017-2018 academic year.

Learning Outcome 3: Students will demonstrate written and oral communication skills through class

participation and group presentations.

Measure: All students must take the required courses that will include oral class participation and written

case assignments to test these skills.

Criterion: At least 90% of students will receive a rating of "Satisfactory" or better from the course

instructor.

Assessment: Every Year, starting in the 2017-2018 academic year.

Learning Outcome 4: Students will demonstrate their ability to work effectively with other

members of a team in the preparation of a group project.

Measure: Students must prepare group projects as part of a class.

Criterion: At least 90% of students will receive a rating of "Satisfactory" or better from

the course instructor.

Assessment: Every Year, starting in the 2017-2018 academic year.

Learning Outcome 5: Students will demonstrate a deeper understanding of one or more areas of Business Analytics, related to their chosen career path or specialized plan of study

Measure: Students will be required to pass elective classes related to their educational

plan.

Criterion: At least 90% of students will receive a rating of "Satisfactory" or better from

the Academic Director, who will review their performance in the core

classes.

Assessment: Every Year, starting in the 2017-2018 academic year.

IV. FACULTY AND ORGANIZATION

A. Who will provide academic direction and oversight for the program? [This might be a department, a departmental subgroup, a list of faculty members, or some other defined group.]

Primary oversight of this program will be provided by a faculty member assigned as the academic director of the program. Program oversight would also include the chair of the Decision, Operations, and Information Technologies Area (DOIT), a DOIT area oversight committee, and the Dean's office.

The DOIT area of the Robert H. Smith School of Business currently has 31 FTE faculty. 22 of these are tenure/tenure track and nine are teaching faculty (full-time lecturers). These 31 full-time equivalent faculty have doctoral degrees in operations management, management science, statistics, information systems, or business. In addition, there are several adjunct instructors currently employed by the department.

DOIT Faculty Expected to Teach in the Proposed MSBA Program

Ritu Agarwal, Ph.D., Professor & Robert H. Smith Dean's Chair of Information Systems, Department Chair

Teaching/research focus: Management of Information Systems, Health Care Information Systems

Courses: To be determined

Pamela K. Armstrong, Ph.D., Clinical Associate Professor of Management Science

Teaching/research focus: Service operations, quality, and performance management

Courses: BUDT 732 Decision Analytics (3)

BUDT 758X Operations Analytics (3)

Michael O. Ball, Ph.D., Senior Associate Dean & Dean's Chair in Management Science

Teaching/research focus: Network optimization and integer programming particularly as applied to problems

in transportation systems and supply chain management.

Courses: BUDT 758X Pricing and Revenue Management (3)

Sean Barnes, PhD, Assistant Professor of Operations Management

Teaching/research focus: Modeling, simulation, and complex systems

Courses: BUDT 630 Data, Models, and Decisions (3)

BUDT 758K Computer Simulation for Business Applications (3)

BUDT 758X Healthcare Analytics (3)

Margret Bjarnadottir, PhD, Assistant Professor of Management Science and Statistics

Teaching/research focus: Operations research methods using large scale data

Courses: BUDT 733 Data Analytics (3)

BUDT 758X Healthcare Analytics (3)

Zhi-Long Chen, PhD, Professor of Operations Management

Teaching/research focus: optimization, logistics, scheduling, supply chain management, and operations

management

Courses: BUDT 758X Operations Analytics (3)

BUDT 758X Capstone Project in Operations Analytics (3)

Wedad J. Elmaghraby, Ph.D., Associate Professor of Management Science & Operations Management

Teaching/research focus: Design of competitive procurement auctions in business-to-business

markets and pricing in markets where buyers behave strategically

Courses: BUDT 758X Operations Analytics (3)

Gordon Gao, Ph.D., Associate Professor of Information Systems

Teaching/research focus: IT's impact on Health care and innovation, and transparency in service

quality

Courses: BUDT 758X Big Data: Strategy, Management, and Applications (3)

Bruce Golden, Ph.D., Frank Merrick Chair in Management Science

Teaching/research focus: Heuristic search, combinatorial optimization, networks, and applied

operations research; Healthcare Operations.

Courses: BUDT 758X Healthcare Analytics (3)

Il-Horn Hann, Ph. D., Associate Professor & Co-Director of DIGITS

Teaching/research focus: Price competition in electronic markets, Pricing in Name-Your-Own-Price markets, online privacy, open-source software.

Courses: BUDT 706 Social Media and Web Analytics (3)

BUDT 758F Google Online Challenge Analytics (3)

Shawn Mankad, Ph. D., Assistant Professor of Business Analytics

Teaching/research focus: Visualization and pattern extraction within vast quantities of data with applications in network analysis, and financial and health care analytics.

Courses: BUDT 733 Data Analytics (3)

BUDT 758K Computer Simulation for Business Applications (3)

Sunil Mithas, Ph.D., Professor of Information Systems

Teaching/research focus: Strategies for managing innovation and excellence for corporate transformation, focusing on the role of technology and other intangibles, such as customer satisfaction, human capital, and organizational capabilities.

Course: BUDT 706 Social Media and Web Analytics (3)

Kislaya Prasad, PhD, Director, Center for International Business Education and Research, and Research Professor

Teaching/research focus: Computability and complexity of individual decisions and economic equilibrium, innovation and diffusion of technology, and social influences on economic behavior

Courses: BUDT 630 Data, Models, and Decisions (3)

BUDT 733 Data Analytics (3)

Louiqa Raschid, PhD, Professor of Information Systems

Teaching/research focus: Solving the challenges of data management, data integration, and performance for applications in the life sciences, Web data delivery, health information, financial information systems, humanitarian IT applications and Grid computing

Course: BUDT 704 Database Management (3)

Raghu Raghavan, PhD, Professor of Management Science and Operations Management

Teaching/research focus: quantitative methods (in particular optimization models) for better decision making

Courses: BUSI 630 Data, Models, and Decisions (3)

BUDT 732 Decision Analytics (3)

Tunay Tunca, PhD, Professor of Management Science and Operations Management

Teaching/research focus: economics of operations and technology management, theoretical and empirical analysis of procurement contracts and processes, economics of security, and the role of information and forecasting in supply chains

Courses: BUSI 630 Data, Models, and Decisions (3)

BUDT 732 Decision Analytics (3)

Siva Viswanathan, PhD, Associate Professor of Information Systems and Co-director of DIGITS

Teaching/research focus: emerging issues related to online firms and markets, and on analyzing the competitive and strategic implications of new information and communication technologies

Courses: BUDT 706 Social Media and Web Analytics (3)

BUDT 758F Google Online Challenge Analytics (3)

Yi Xu, PhD, Associate Professor of Operations Management

Teaching/research focus: Product assortment optimization, pricing, innovation and new product development, supply chain management, and Marketing and Operations Interface

Courses: BUDT 758X Pricing and Revenue Management (3)

BUDT 758X Operations Analytics (3)

BUDT 758X Capstone Project in Operations Analytics (3)

B. If the program is not to be housed and administered within a single academic unit, provide details of its administrative structure.

Not applicable. All classes will be housed and administered within the Robert H. Smith School of Business.

V. OFF CAMPUS PROGRAMS

A. If the program is to be offered to students at an off-campus location, with instructors in classrooms and/or via distance education modalities, indicate how student access to the full range of services (including advising, financial aid, and career services) and facilities (including library and information facilities, and computer and laboratory facilities if needed) will be assured.

All courses are planned to be offered at the College Park campus.

B. If the program is to be offered mostly or completely via distance education, you must describe in detail how the concerns in Principles and Guidelines for Online Programs are to be addressed.

Not applicable. No part of the program will be offered via distance education.

VI. OTHER ISSUES

A.   Describe any cooperative arrangements with other institutions or organizations that will be important for the success of this program.

Not applicable. All aspects of the program from admissions to academic programming to career advising will be provided by the Robert H. Smith School of Business. While the program will reach out to local companies and institutions for guest speakers, internship opportunities, experiential learning projects, and job placement, no particular relationship is pivotal to the success of the program.

B. Will the program require or seek accreditation? Is it intended to provide certification or licensure for its graduates? Are there academic or administrative constraints as a consequence?

The University of Maryland's Robert H. Smith School of Business is already accredited by the AACSB (American Association of Collegiate Schools of Business). No additional accreditation is sought for this individual program.

VII. COMMITMENT TO DIVERSITY

Identify specific actions and strategies that will be utilized to recruit and retain a diverse student body.

The Robert H. Smith School of Business community is multifaceted at every level – students, staff and faculty represent the spectrum of diversity. With a large population of international students and a diverse blend of backgrounds, nationalities, ethnicities and experiences, Smith students have an opportunity to make connections with those who share their interests, and to grow and learn by making new friends and sharing new experiences.

The School engages in recruiting and outreach events across the globe to generate a diverse student body.

VIII. REQUIRED PHYSICAL RESOURCES

A. Additional library and other information resources required to support the proposed program. You must include a formal evaluation by Library staff.

No additional library resources will be needed.

B. Additional facilities, facility modifications, and equipment that will be required. This is to include faculty and staff office space, laboratories, special classrooms, computers, etc.

The implementation of the new program will require some additional classroom usage in the Van Munching Hall. There will be a need for office space for the two new tenure-track faculty proposed to be hired.

C. Impact, if any, on the use of existing facilities and equipment. Examples are laboratories, computer labs, specially equipped classrooms, and access to computer servers.

There will be some need of additional computer lab and equipment (such as printers and copiers) that will be required by approximately 40 new students. We do not believe the additional burden will be too high on university computer servers.

IX. RESOURCE NEEDS AND SOURCES

Describe the resources that are required to offer this program, and the source of these resources. Project this for five years. In particular:

A. List new courses to be taught and needed additional sections of existing courses. Describe the anticipated advising and administrative loads. Indicate the personnel resources (faculty, staff, and teaching assistants) that will be needed to cover all these responsibilities.

New courses that will be designed for the MS in Analytics Program are:

BUDT 758X Healthcare Analytics (3)

BUDT 758X Operations Analytics (3)

BUDT 758X Capstone Project in Operations Analytics (3)

The new program will need one section per year on average for each of these courses. In addition, a new course, BUDT 758X Big Data: Strategy, Management, and Applications (3 credits) is already being designed for other programs. This course, as well as all the other required and elective courses can be mostly shared with other programs. Overall we expect on average an additional load of 18-21 credits per year to be generated by the new program. This will also bring an additional 18-21 credit hour grading assistance by GAs.

Advising will be done by the program director.   One part time career coach and one part time administrative support staff will be needed.

B. List new faculty, staff and teaching assistants needed for the responsibilities in A, and indicate the source of the resources for hiring them.

Two new tenure track faculty in DOIT will be needed to cover additional 18 credits. One part time career coach and one part time administrative support staff may be needed to be hired. Smith School's general funds as well as the additional tuition revenue generated by the MS in Business Analytics program are expected to be used to cover the costs for these hires.

C. Some of these teaching, advising, and administrative duties may be covered by existing faculty and staff. Describe your expectations for this, and indicate how the current duties of these individuals will be covered, and the source of any needed resources.

Some of the expected 30 credit teaching load per year increase can be covered by existing faculty in teaching other programs by combining sections. One of the existing career coaches for the MS students may be used and only part time new career coaching support may be needed. Similarly one of the existing staff members can be utilized to help part time with the administrative assistance needed. Advising of the students will be done mainly by the program director with the help of the existing program advisors from the Smith MS program office. That is, the school has adequate resources for the advising of the students.

D. Identify the source to pay for the required physical resources identified in Section VIII above.

General Smith School funds and resources as well as additional tuition generated by the MS in Business Analytics students are expected to cover these costs.

E. List any other required resources and the anticipated source for them.

There are no other required resources expected at this point.

F. Provide the information requested about peer programs.

See Appendices 1, 2 and 3.

Conclusion about peer Business Analytics Masters programs

Most peer programs appear to offer similar curriculum as proposed in this document. Some programs tend to have a stronger focus on theory and less of practically applicable skills. Our proposed program balances between these two dimensions assuring students will have the necessary hands on skills sought after by the employers. Regarding other classroom-based programs in Maryland that contain some similar content on data

analytics, the MS in Marketing Analytics program offered by the Smith School is different in orientation and

content, as detailed earlier in this proposal. The College of Information Studies at the University of Maryland

has a Masters in Information Management program with a Data Analytics specialization. Appendix 1 details

the differences between this program and our proposed MS in Business Analytics program.

Appendix 1: Peer Comparisons - Comparison of the proposed Smith School Master of Science in Business Analytics Program (MSBA) and the University of Maryland iSchool's Master of Information Management (MIM) Program's Data Analytics specialization

The following is a list of courses from the iSchool's webpage on their Masters of Information Management (MIM) program, Data Analytics specialization (one of the eight specializations offered in the MIM program):

- **Four Core courses (12 cr,)** [Required of all MIM students]
    - INFM 600 Information Environments
    - INFM 603 Information Technology and Organizational Context
    - INFM 605 Users and Use Context
    - INFM 612 Management of Information Programs and Services

- **Two Project courses (6 cr.)** [Required of all MIM students]
    - INFM 736 Information Management Experience
    - INFM 737 Information Management Capstone Experience

- **Three Core Specialization Courses (9 cr.)** [Required for MIM Data Analytics students]
    - INST 733 Database Design
    - INST 627 Data Analytics for Information Professionals
    - INST 737 Digging into Data: Data Mining, Machine Learning & Advanced Analytics

- **Two Specialization Electives (6 cr.)**
    - INST 633 Analyzing Social Networks and Social Media
    - INFM 714 Principles of Competitive Intelligence
    - INFM 732 Information Audits and Environmental Scans
    - INFM 747 Web-Enabled Databases
    - INFM 750 From Data to Insights
    - INST 714 Information for Decision Making
    - INST 760 Data Visualization
    - INST 767 Big Data Infrastructure
    - INST 728Q Visual Analytics
    - INST 728R Data Management
    - INST 728T Analyzing Social Networks in Times of Crisis (1 credit)

- **One General Elective (3 cr.)**

Below is a list of currently proposed courses for MS in Business Analytics (MSBA) Program:

- **Four Required Courses (12 credits)**
    - BUSI 630 Data, Models, and Decisions
    - BUDT 732 Decision Analytics
    - BUDT 733 Data Analytics
    - BUDT 704 Database Management Systems

- **Six Electives from the following (18 credits)**
    - BUDT 758K Computer Simulation for Business Applications
    - BUDT 706 Social Media and Online Analytics
    - BUDT 758X Big Data: Strategy, Management and Applications

- o BUDT 758X Price Optimization and Revenue Management
- o BUDT 758F Google Online Challenge Analytics
- o BUDT 758X Healthcare Analytics
- o BUDT 758X Operations Analytics
- o BUDT 758X Capstone Project in Operations Analytics

The descriptions for these courses are given in the MSBA proposal. The differences in the designs and clienteles for the two programs are described below:

1- **Curriculum differences:** The proposed Smith School Master of Science in Business Analytics program is focused on business strategic and operations applications of data analytics, such as operations management, operations research, applied simulation analysis, price and revenue management, and healthcare analytics. In contrast, the Masters in Information Management specialization in Data Analytics also provides distinct courses in the area of information management, including data visualization, information audits, web-enabled databases, big data infrastructure, management of information programs and services, information environments, and both user and organizational contexts of IT. There are naturally common elements to both programs, including fundamental topics related to statistical analysis, data mining, social media analytics and strategy, database design, decision making and models, and data management.

2- **Differences in Target Student Population and Placement:** The graduates of the MSBA program will be primarily interested in positions as business analysts, business consultants, operations managers, revenue managers, healthcare management consultants and supply chain managers, where they would apply their skills in optimization, simulation, decision modeling, data mining, pricing, and analytics-based business strategy. Graduates of the MIM Data Analytics specialization take positions as data analysts, information analysts, data scientists, consultants, and project managers in a broader set of organizations, including businesses, government agencies, universities, non-profits, and multi-lateral organizations, leveraging their deep knowledge in information management, analytics, and information technology.

Appendix 2: Peer Comparisons - MBA Ranked Peer Schools Offering MS in Business Analytics Programs

School	US News & World Report 2015 MBA Rank
NYU	10
UT Austin	15
Arizona State	27
Minnesota	33
Michigan State	35
Rochester	37
Univ. of Connecticut	52
SMU	55
University of Cincinnati	60
George Washington Univ.	65

Appendix 3: Peer Comparisons - Curriculum Content Comparisons of MS in Business Analytics Programs offered by MBA Ranked Peers

University MBA Ranking Degree	Curriculum/ Required Classes	Prerequisites	Comments
New York University **#10** **Master of Science in Business Analytics**	Social Media and Digital Marketing Analytics Foundations of Statistics Using R Practical Data Science Prediction Data Mining for Business Analytics Data Driven Decision Making Network Analytics Decision Models Operations Analytics Advanced Decision Models Data Visualization Special Topics in Analytics: Revenue Management & Pricing Strategy, Change and Analytics Market Modeling Strategic Capstone	A bachelor's degree and strong Grade Point Average, demonstrated high aptitude for quantitative analysis and academic success as evidenced by undergraduate and graduate coursework as applicable. A minimum of five years of professional, full-time work experience is required.	One year duration. Five Residential Modules totaling to seven weeks of face-to-face education. Online work supplements traditional classroom work.

University MBA Ranking Degree	Curriculum/ Required Classes	Prerequisites	Comments
University of Texas at Austin **#15** **Master of Science in Business Analytics**	**Required Courses:** Data Analytics Programming Optimization and Decision Analysis Financial Management Introduction to Data Management Introduction to Business Data Analytics Advanced Data Analytics I: Predictive Modeling Advanced Data Analytics II: Unsupervised Learning and Time Series Business Intelligence Capstone **Electives:** Advanced Data Mining and Web Analytics Marketing Analytics I Computational Finance Data-intensive Computing for Text Analysis Marketing Analytics II Pricing and Revenue Optimization Social Media Analytics Supply Chain Analytics	An undergraduate degree from an accredited institution Mathematical aptitude and quantitative and/or technical training in coursework Strong communication skills and motivation	36 Credits offered completed in 10 months. The program is designed for undergraduate degree holders in business, engineering, mathematics, economics, computer science, and other technical or quantitative areas.

University MBA Ranking Degree	Curriculum/ Required Classes	Prerequisites	Comments
Arizona State University #27 **Master of Science in Business Analytics**	**Required (Full lockstep program):** Introduction to Enterprise Analytics Introduction to Applied Analytics Data Mining I Applied Regression Models Data-Driven Quality Management Analytical Decision Making Tools I Data Mining II Analytical Decision Making Tools II Business Analytics Strategy Applied Project	Bachelor's Degree GMAT or GRE	30 Credits Two Options: On Campus: 9 months Online (all online): 16 months Five-week sessions, one course at a time.

University MBA Ranking Degree	Curriculum/ Required Classes	Prerequisites	Comments
University of Minnesota #33 **Master of Science in Business Analytics**	**Required Courses (Full lockstep program):** Financial Accounting Introduction to Statistics for Data Scientists Analytics for Competitive Advantage Programming and Application Development Marketing Management Data Management, Databases, and Data Warehousing Harvesting Big Data Project Management, Leadership, Communications, and Team Dynamics Exploratory Data Analytics and Visualization Predictive Analytics Advanced Issues in Business Analytics Data-Driven Experimentation and Measurement Modeling and Heuristics for Decision Making and Support Experiential Learning	At least one-semester college level calculus course with a grade "C" or better GMAT or GRE	45 Credits in 1 Year.

University MBA Ranking Degree	Curriculum/ Required Classes	Prerequisites	Comments
Michigan State University **#35** **Master of Science in Business Analytics**	Introduction to Business Analytics Project Management Computational Techniques for Large-Scale Data Analysis Communications Strategies for Analytics Applied Statistics Methods Marketing Technology and Analytics Statistical Problems Data Mining Emerging Topics in Business Capstone: Business Analytics Ethics and Intellectual Property Issues	A completed bachelor's degree from a recognized educational institution. A cumulative grade-point average of at least a 3.00 in undergraduate course work. Completed, with a grade of 3.0 or higher, college-level courses in introductory calculus and statistics. A working knowledge of personal computers. Knowledge of programming languages such as C, C++, Python, Java, HTML, as well as experience in using statistical packages, and use of statistical software programs. GMAT or GRE	31.5 Credits in One Academic Year. Requires a strong technical background.

University MBA Ranking Degree	Curriculum/ Required Classes	Prerequisites	Comments
University of Rochester #37 **Master of Science in Business Analytics**	**Required Courses:** Data Structures (May be waived out, no credits, charge at review course rate) Information Systems Introduction to Business Analytics Framing and Analyzing Business Problems I Core Economics for MS Students Core Statistics for MS Students	GMAT or GRE	41-42 Credits. Can be finished in 1 year (three quarters). Variety of tracks. Offers a number of "selective" (either-or) course options.

University MBA Ranking Degree	Curriculum/ Required Classes	Prerequisites	Comments
University of Connecticut **#52** **Master of Science in Business Analytics and Project Management**	**Required Courses:** Business Process Modeling and Data Management Predictive Modeling Business Decision Modeling Data Mining and Business Intelligence Introduction to Project Management Project Leadership and Communications Project Risk and Cost Management Advanced Business Analytics and Project Management **Other Courses:** Real-time Enterprise Data Integration and Audit Data Analytics with R Adaptive Business Intelligence Big Data Analytics with Hadoop Gamification Ethical and Legal Issues in Project Management Managing International Development Projects Agile Project Management	Completion of a one-semester college-level calculus course with a grade of "C" or better. An undergraduate degree (B.S. or B.A.) from a 4-year program at an accredited university or college. A minimum undergraduate grade-point average (GPA) of 3.0 for either all 4 years or for the last 2 years. GMAT or GRE.	33 Credits A joint degree in Business Analytics and Project Management Allows students to take MBA courses as electives

University MBA Ranking Degree	Curriculum/ Required Classes	Prerequisites	Comments
Southern Methodist University **#55** **Master of Science in Business Analytics**	**Required Courses:** Managing Your Career (1 credit) Applied Predictive Analytics I Decision Models Business Process Consulting Business Metrics Database Design for Business Applications Data Mining Applied Predictive Analytics II Web and Social Media Analytics Business Research Methods Data Visualization and Communications **Electives (six courses from the below list):** Consumer Behavior Advanced Decision Models Retailing Analytics Understanding What Customers Value Revenue Management Business Forecasting Operations Analytics Consumer Loyalty Management Database Marketing using Multivariate Analysis Pricing Analytics	At the discretion of the admissions committee, a student may be required to take the following courses before entry: Applied Statistics SAS Training GMAT or GRE.	33 Credits over one year schedule (four half semesters).

	Project Management		
	Managing Big Data		
	Supply Chain Analytics		

University MBA Ranking Degree	Curriculum/ Required Classes	Prerequisites	Comments
University of Cincinnati **#60** **Master of Science in** **Business Analytics**	**Required Courses (21 Credits):** Optimization Simulation Modeling Probability Modeling Statistical Methods Statistical Modeling Research Project In addition **14 credits of electives** from Business Analytics, Information Systems or Operations Management fields.	Before starting the program, students must have completed courses in calculus and linear algebra and demonstrate computer programming skills in a computer language such as Ruby, Python, C++, FORTRAN etc. Basic Business Knowledge Requirement: In addition, students are required to have taken before they start (or take during the program) a course in four of the following seven subjects: Operations management Information systems Finance Accounting Marketing Economics Management Bachelor's Degree and GMAT or GRE are required.	35 Credits Full Time (1 year) or Part Time (2 year) options available.

University MBA Ranking Degree	Curriculum/ Required Classes	Prerequisites	Comments
George Washington University **#65** **Master of Science in Business Analytics**	**Required Courses:** Introduction to Business Analytics Data Warehousing Computational Analytics Stochastic Foundations: Probability Models Statistics for Analytics Data Mining Forecasting for Analytics Optimization Methods & Applications Decision Analysis Risk Analytics Computational Optimization **Electives:** Marketing Analytics Supply Chain Analytics Pricing & Revenue Management Investment Analysis/Portfolio Management Social Network Analytics Healthcare Analytics Business Process Analytics Sports Analytics Visualization for Analytics Business Analytics Skills Workshops	Statistics: applicants should have taken and obtained a B or higher in an undergraduate or graduate statistics within the last 5 years, be able to demonstrate regular use of statistics in a current or past professional position, or be able to demonstrate an adequate understanding of statistics in another way. Higher Level Mathematics (Calculus and Linear Algebra): applicants should have taken and obtained a B or higher in an undergraduate or graduate higher level math class, such as calculus or linear algebra, within the last 5 years, be able to demonstrate regular use of mathematic principles and methods in a current or past professional position, or be able to demonstrate an adequate understanding of higher level math in another way. Computer Programming: applicants should be able to demonstrate regular use of computer programming and software skills in a current or past professional position such as with SAS, SPSS, R Language, Python, Java, CPlex, etc., or be able to demonstrate adequate exposure to and understanding of basic computer programming and software principles. Applicants need not have a	33 Credits Can be completed between 10 months and 2 years.

		specific understanding of multiple analytics-based computer programs and software. Instead, the goal is for applicants to demonstrate that they are capable of learning the specific programs emphasized in the MSBA program. GMAT or GRE.	

Resources Categories	Year 1	Year 2	Year 3
1.Reallocated Funds	None	None	None
2. Tuition/Fee Revenue (add below)	$1,384,200	$1,384,200	$1,845,600
a. FT Students	30	30	40
b. Credit Hour Rate	$1,538	$1,538	$1,538
c. Annual Credit Hours	30	30	30
d. Annual Fee Rate[1]	$46,140	$46,140	$46,140
3. Grants, Contracts, & Other External Sources	None	None	None
4. Other Sources[2]	None	None	None
TOTAL (Add 1 - 4)	$1,384,200	$1,384,200	$1,845,600

FY16 tuition rates approved by the BOR		
in-state grad tuition	$1,538	per credit

Expenditure Categories	Year 1	Year 2	Year 3
1.Total Faculty* (b+c below)	$496,800	$511,704	$595,801
a. #FTE	2	2	2
b. Total Salary	$414,000	$426,420	$496,501
c. Total Benefits	$82,800	$85,284	$99,300
2.Total Administrative(b+c below)	$116,415	$119,908	$123,505
a. #FTE	1	1	1
b. Total Salary	$97,013	$99,923	$102,921
c. Total Benefits	$19,403	$19,985	$20,584
3.Total Support Staff (b+c below)	$192,590	$198,368	$204,319
a. #FTE	3	3	3
b. Total Salary	$160,492	$165,307	$170,266
c. Total Benefits	$32,098	$33,061	$34,053
4. New or Renovated Space	$0	$0	$0
5. Student Services	$20,000	$40,000	$60,000
6. Marketing	$50,000	$75,000	$75,000
7. Recruiting & Admissions	$50,000	$75,000	$75,000
8. Career Services	$50,000	$75,000	$100,000
9. Student Aid	$50,000	$100,000	$100,000
10. Other Expenses	$0	$0	$0
TOTAL (Add 1 - 10)	$1,025,806	$1,194,980	$1,333,625

From:	Elizabeth Jane Beise
Sent:	Monday, November 16, 2015 2:58 PM
To:	Donald R. Riley
Cc:	hlucas-contact; Tunay Tunca; Michael D Colson; mmarcell-contact
Subject:	Re: MS in Business Analytics program propoal

Thank you, Don. Tunay, it would be helpful to have a paragraph in the proposal that articulates the differences, but this email will be enough for us to ask for the proposal to be put onto next week's Grad PCC agenda. Betsy

On 11/16/2015 1:29 PM, Don Riley wrote:
> Dear Betsy,
> I am writing as Academic Director of our MS IS program regarding the
> MSBA proposal.
> While there is some overlap between the two, the MSBA program was
> designed to be complementary to the MSIS program. The MSBA is
> designed to be more focused toward operational management issues and
> careers.
> Sincerely,
> Don Riley
>

--

Prof. Elizabeth Beise
Associate Provost, Academic Planning and Programs
1124 Main Administration, University of Maryland College Park, MD 20742
phone: 301-405-6836
fax: 301-405-8195
email: beise@umd.edu

From:	Elizabeth Jane Beise
Sent:	Monday, November 16, 2015 2:56 PM
To:	Brian Butler
Cc:	Alexander J. Triantis; Michael D Colson; mmarcell-contact
Subject:	Re: MS-BA Proposal

Thanks Brian. This will be enough for us to move forward (once we get the revised proposal). Alex, I have asked to put this onto the Grad PCC agenda next week.   Betsy

On 11/16/2015 2:21 PM, Brian Butler wrote:

> Betsy,
>
> Alex and others over at Smith have added materials that clarifies the intended positioning of the MS-BA. It also identifies the MIM and provides information about how the proposed degree differs from our offerings.
> With these changes, the iSchool has no objection to the MS-BA proposal.
>
> Please let me know if there is anything else you need from me to move this effort forward.
>
> Brian B.
>
> _____
>
> Brian S. Butler, Ph.D.
> Professor and Interim Dean, UMD iSchool
> University of Maryland
> College Park, MD USA
> _____

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Prof. Elizabeth Beise
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1124 Main Administration, University of Maryland
College Park, MD 20742
phone:   301-405-6836
fax:     301-405-8195
email:   beise@umd.edu
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DATE: December 6, 2015

TO: Dr. Alexander J. Triantis
          Dean, Robert H. Smith School of Business

FROM: On behalf of the University of Maryland Libraries:

          Zaida M. Díaz, Interim Head, Humanities Social Sciences Librarians and Business and Economics Librarian
          Maggie Saponaro, Interim Head of Collection Development
          Daniel Mack, Associate Dean, Collection Strategies & Services

RE: Library Collection Assessment

We are providing this assessment in response to a proposal by the Robert H. Smith School of Business to create the Master of Science in Business Analytics (MSBA). The MSBA program asked that we at the University of Maryland Libraries assess our collection resources to determine how well the Libraries support the curriculum of this proposed program.

Serial Publications

The University of Maryland Libraries currently subscribe to a large number of scholarly journals—almost all in online format. Many of these are top ranked journals by the *Social Science Citation Index,* in terms of impact and are widely recognized in the fields of strategy, management, organization theory, computation, etc., which would be relevant to the subject or program areas within business analytics, and the intersection of operations research, computing and data analysis. Among these, 14 scholarly journals published by the highly regarded Institute for Operations Research and the Management Sciences (INFORMS) that cover the latest research in Operations Research (O.R.) and analytics methods and applications, including: *INFORMS Transactions on Education* (an Open Access peer-reviewed journal), *Decision Analysis*, *Information Systems Research* (ISR), *INFORMS Journal on Computing*, *Interfaces*, *Management Science*, *Operations Research*, *Manufacturing & Service Operations Management* (M&SOM), *Marketing Science*, *Mathematics of Operations Research*, *Organization Science* and *Transportation Science*.

In cases in which the Libraries do not subscribe to highly ranked journals, for example: *Service Science* and *Strategy Science* (new in 2015), both also published by the INFORMS, or any other articles in journals that we do not own, they likely will be available through Interlibrary Loan/Document Delivery.

*Note: *Journal Citation Reports* is a tool for evaluating scholarly journals. It computes these evaluations from the relative number of citations compiled in the *Science Citation Index* and *Social Sciences Citation Index* database tools.

Databases

The Libraries' *Database Finder* (http://www.lib.umd.edu/dbfinder) resource offers online access to databases that provide indexing and access to scholarly journal articles and other information sources. Many of these databases cover subject areas that would be relevant to proposed Master of Science in Business Analytics (MSBA) program. Among the core databases to find business literature review,

statistics and data analysis that would be useful in the study and research areas covered by the MSBA program are:

1. Business Source Complete (EBSCO) – Major scholarly business database providing a collection of bibliographic and full text content in all disciplines of business, including marketing, management, MIS, POM, accounting, finance, economics, including business analytics topics, etc. Additional full text, non-journal content includes financial data, books, monographs, major reference works, book digests, conference proceedings, case studies, investment research reports, industry reports, market research reports, country reports, company profiles, and SWOT analyses. Indexing and abstracts for scholarly business journals back to 1886 are included.
2. IBIS World – Database that provides research, statistics and analysis reports on industries in the United States, the United Kingdom, Australia and China.
3. Passport – Provides global statistics for 205 countries on economic indicators, health, foreign trade, environment, lifestyle, industrial and agriculture output, communications and more. It also includes market size data for over 300 consumer products and services, including reports covering analysis of drivers of the industry, industry risk, market data and segments, competitors and industry performance. It provides demographic trends, economic indicators, finance, foreign trade, health, labor force, industrial and agricultural production, environmental data, consumer expenditure patterns, retail sales, advertising and media patterns, consumer prices, household patterns, literacy rates, telecommunications, automotive and transport figures, travel and tourism, income and earnings potential.
4. Data-Planet Statistical Datasets (formerly Statistical Datasets (Proquest) – Provides easy access to statistics produced by the U.S. government, major international and intergovernmental organizations, professional and trade organizations, state government agencies, and universities.

Some of the other subject databases that would be relevant to this curriculum include:

1. Science Direct (Elsevier) – Peer-reviewed, full text database containing electronic book and journal titles covering the fields of science, technology and medicine. In addition to keyword searches, the image search and value added content associated with the publication can be found in the form of audio, video and datasets.
2. Computers & Applied Sciences Complete – Covers the research and development spectrum of the computing and applied sciences disciplines. CASC provides indexing and abstracts for nearly 2,200 academic journals, professional publications, and other reference sources from a diverse collection. Full text is also available for more than 1,000 periodicals.
3. MathSciNet via EBSCOhost – An electronic publication of the American Mathematical Society (AMS) offering access to a carefully maintained and easily searchable database of reviews, abstracts and bibliographic information for much of the mathematical sciences literature. Over 100,000 new items are added each year, most of them classified according to the Mathematics Subject Classification.
4. Scopus (Elsevier) – Largest abstract and citation database of peer-reviewed literature and quality web sources with smart tools to track, analyze, and visualize research from your region and from the rest of world. It contains more than 18,000+ titles from more than 5,000 international publishers; over 1,200 Open Access journals; 520 conference proceedings; over 650 trade publications; 315 book series; 33 million abstracts; results from 386 million scientific web pages;

23 million patent records from 5 patent offices; 37 million records—of which 18 million records include references going back to 1996 and 19 million pre-1996 records go back as far as 1823.

5. IEEE Xplore (IEEE) – Provides full-text access to IEEE transactions, journals, magazines and conference proceedings published since 1988 and all current IEEE Standards. Includes access to Bell Labs Technical journal Archive (BLTJA) 1922-2015.

6. Inspec Archive – Science Abstracts 1898-1968 – Created by the Institution of Engineering and Technology, is the leading bibliographic database providing abstracts and indexing to the world's scientific and technical papers in physics, electrical engineering, electronics, and computing and control engineering.

Also there are some general/multidisciplinary databases, such as: Academic Search Premier, MasterFILE Premier, JSTOR and ProjectMUSE that are good sources of articles relevant to for this new program.

In many, likely in most cases, these indexes offer full text copies of the relevant journal articles. In those instances in which the journal articles are available only in print format, the Libraries can make copies available to graduate students through either the Libraries' Article Express Program (http://www.lib.umd.edu/access/article-express) or via Interlibrary Loan. (Note: see below.)

Monographs

The Libraries regularly acquire scholarly monographs in business and related subject disciplines. Monographs not already part of the collection can usually be added upon request.

Even though most library research for this course/program likely will rely upon online journal articles, students may wish to supplement this research with monographs. Fortunately, more and more monographs are available as e-books. Even in instances when the books are only available in print, graduate students will be able to request specific chapters for online delivery through the Libraries' Article Express service.

A search of the University of Maryland Libraries' WorldCat UMD catalog was conducted, using a variety of relevant subject terms. This investigation yielded sizable lists of citations of books that we own. Searching *business analytics* as a topic, resulted in 114,491 titles, among them:

- Advanced business analytics creating business value from your data (2013)
- Big data, big innovation: enabling competitive differentiation through business analytics (2014)
- Predictive business analytics: forward looking capabilities to improve business performance (2014)
- RapidMiner : data mining use cases and business analytics applications (2014)
- Business analytics : data analysis and decision making (2015)
- Modern analytics methodologies : driving business value with analytics (2015)
- Business intelligence and analytics : systems for decision support (2015)

A further similar search revealed that the Libraries' membership in the Committee on Institutional Cooperation (CIC) dramatically increases these holdings and citations with additional new 44,015 titles. As with our own materials, graduate students can request that chapters be copied from these CIC books if the books are not available electronically.

Article Express and Interlibrary Loan

These services offer online delivery of bibliographic materials that otherwise would not be available online. As a result, remote users who take online courses may find these services to be helpful. Article Express and Interlibrary Loan are available free of charge.

A special amenity for graduate students and faculty, the Article Express service scans and delivers journal articles and book chapters within three business days of the request--provided that the items are available in print on the UM Libraries' shelves or in microform. In the event that the requested article or chapter is not available on campus, Article Express will automatically refer the request to Interlibrary Loan (ILL). Interlibrary Loan is a service that enables borrowers to obtain online articles and book chapters from materials not held in the University System of Maryland.

Additional Materials and Resources

In addition to serials, monographs and databases available through the University Libraries, students in the proposed MSBA program will have access to a wide range of media, datasets, software, and technology. Library Media Services (http://www.lib.umd.edu/lms) houses media in a variety of formats that can be utilized both on-site and via ELMS/Canvas course media. GIS Datasets are available through the GIS Data Repository (http://www.lib.umd.edu/gis/dataset) while Statistical consulting and additional research support is available through the Research Commons (http://www.lib.umd.edu/rc) while technology support and services are available through the Terrapin Learning Commons (http://www.lib.umd.edu/tlc) .

The subject specialist librarian/s for business, Zaida Díaz zdiaz@umd.edu and Lily Griner griner@umd.edu serve as important resource to the MSBA program with their extensive experience in business research, which includes access to the Virtual Business Information Center (VBIC) portal https://www.lib.umd.edu/vbic/, a collection of electronic and print business resources intended to provide research assistance to the Robert H. Smith School of Business and general users seeking authoritative business information. Additionally, the business school can also rely on their own Financial Markets and Research Labs., where a wide variety of highly specialized financial and statistical analysis resources and datasets area available to their students and faculty, including personalized consultant services for data and research analysis for faculty and students from Charles Lahaie clahaie@rhsmith,umd.edu, Assistant Director, Financial Markets and Research Labs, as part of the Smith IT.

Other Research Collections

Because of the University's unique physical location near Washington D.C., Baltimore and Annapolis, University of Maryland students and faculty have access to some of the finest libraries, archives and research centers, including major trade organizations and associations in the country vitally important for researchers in business and subject areas.

Conclusion

With our substantial journals holdings and index databases, as well as additional support services and resources, the University of Maryland Libraries have resources to support teaching and learning in business. These materials are supplemented by a strong monograph collection. Additionally, the

Libraries Article Express and Interlibrary Loan services make materials that otherwise would not be available online, accessible to remote users in online courses. As a result, our assessment is that the University of Maryland Libraries are able to meet the curricular and research needs of the proposed Master of Science in Business Analytics (MSBA) program.