

KENT STATE UNIVERSITY

COLLEGE OF BUSINESS ADMINISTRATION

KENT, OH 44242

Program Development Plan (PDP) for

**Master of Science in Business Analytics
(MSBA)**

September 2014

1. Designation of the new degree program, rationale for that designation, definition of the focus of the program and a brief description of its disciplinary purpose and significance.

The College of Business Administration, Kent State University, proposes to establish a Master of Science in Business Analytics (MSBA). Analytics is the science of turning data into meaningful information a business could use for its competitive advantage. Demand for business analytics expertise transcends all areas of business including banking, healthcare, retail markets, manufacturing, finance and the public sector. As a diverse field that caters to the needs of equally diverse industries, business analytics programs are amalgamation of curricula from business, engineering, mathematics, information systems, statistics, and other cognate disciplines. Designating the degree at a master's level will enable the college to attract more mature students with either work experiences and/or strong STEM or business requisite baccalaureate proficiencies.

The College of Business Administration offers undergraduate majors in Accounting, Business Management, Computer Information Systems, Economics, Entrepreneurship, Finance, Managerial Marketing, and Marketing while graduate degrees are offered in MBA, EMBA, Masters in Accounting, and Masters in Economics, and Ph.D. in several concentrations. The proposed MSBA will draw from the college's diverse expertise in some of these disciplines to provide an interdisciplinary curriculum in business analytics. Graduates from the program will gain the knowledge that will enable them to glean meaningful information they need to provide business solutions from natural and often imperfect data.

There has always been need for data analysts. But, this need has become more acute in recent years due to proliferation of technologies, both for capturing and analyzing the data. Consequently, as sophistication in technology grows, the need for data analytics experts will continue to grow. At the present, there are substantially fewer experts in the field of data analytics than there are opportunities for them.

The disciplinary purpose of the program is to produce graduates that understand and are ready to implement business analytical methods in realistic business contexts. By being 'ready to implement' business analytical methods, we mean that the graduate is not only aware of the analytical methodologies in play but also has an understanding of the challenges involved in choosing the right problems or opportunities to address, selecting the best method(s) for analysis, interpreting the results into actionable solutions, and communicating and promoting the solution to stakeholders. Additionally, graduates of this program should be prepared to provide leadership throughout the entire process. The degree program, described in detail below, will provide opportunities for baccalaureate graduates from Business, Computer Science, Digital Sciences, Mathematics, Technology, etc. to advance and diversify their educational backgrounds in an emerging field with excellent potential for continued growth and employment.

2. Description of the proposed curriculum.

The proposed curriculum was developed through a combination of activities including bench-marking of leading programs (e.g. InformationWeek: 20 Top Analytics Programs¹), workshops at international conferences (e.g. Decision Sciences Institute: Panel discussion on *Business Analytics Programs and Curricula*)², weekly reading of practitioner newsletters (e.g. *Data Science Central*)³, vendor informational meetings (e.g. TDWI & IBM⁴), vendor workshops (e.g. SAP Analytics⁵), the Guide to the Business Analysis Body of Knowledge⁶, invited talks at our *Center for Information Systems (CIS)* meetings on analytics from area practitioners⁷, personal discussions with many interested parties in both the academic and practitioner circles, and analyzing the content of leading analytics textbooks.

The process of building the curriculum began with a review of InformationWeek's top 20 analytics programs list. The first differentiating characteristic noted was the difference between *business* analytics programs and *non-business* programs. As one would expect, the business analytics programs tend to include more managerial and business-

¹ <http://www.informationweek.com/big-data/big-data-analytics/big-data-analytics-masters-degrees-20-top-programs/d/d-id/1108042?>

² <http://convention2.allacademic.com/one/dsi/dsi13/>

³ <http://www.datasciencecentral.com/profiles/blogs/check-out-our-dsc-newsletter>

⁴ <http://events.tdwi.org/events/solution-spotlight-ibm-2014/information/cleveland.aspx>

⁵ <http://scn.sap.com/community/uac/blog/2014/04/01/sap-university-alliances-americas-faculty-summer-workshops-2014>

⁶ IIBA International Institute of Business Analysis. *The Guide to the Business Analysis Body of Knowledge: Version 2.0 Framework*

⁷ CIS. (Nov 1, 2013), "Big Data." Joe Turk, Director for Technology Business Development, the Cleveland Clinic; Doug Meil, Chief Software Architect, Explorys; Gary Weber, IT Group Manager, Progressive.

oriented courses than the non-business analytics programs that are generally offered by schools of mathematics, statistics, and engineering. York University⁸ in Toronto has a very good example of this type of program. In addition to a selection of data analysis and data management courses, they have courses titled: *Skills for Leadership, Analytics Consulting, and Case Analysis and Presentation Skills*. These courses clearly fall into our focal category of *Leadership and Decision-Making* and would not likely be present in a non-business analytics program. In our proposed curriculum, similar content can be found in the *Analytics in Practice, Business Analytics, and Capstone Project* courses. On the other-side, a non-business program that provides a good example of the alternative form is the Master of Science in Analytics (MSA) program offered by the Institute for Advanced Analytics at NC State⁹. It is unlikely that you would find a course specifically dealing with leadership and management in these more technically-oriented programs offered outside of business schools.

After initial benchmarking that provided the three focal categories of the program, other sources were used to support this framework and additionally revalidate the model. An “analytical body of knowledge” (BOK) was constructed through reviewing another (BOK) from a professional society (The International Institute of Business Analysis or IIBA) and cross-referencing this with other MSBA programs, skill lists from the program at Villanova as well as from professional websites and textbooks. This produced a list of technical, managerial, and software skills that were relevant to the program. The final result balances these skill sets in the curriculum within our three foci model. No program can hope to include a comprehensive treatment of all possible analytical skills so prioritization was also part of the final selection of skills and the course designs to impart them.

This proposal is for a Master’s level degree program in Business Analytics. The program will require students to have completed a baccalaureate degree in STEM disciplines such as engineering, computer science, mathematics, the sciences, or in business where they would have gained the requisite background for the program. Otherwise, prospective applicants will be required to take prerequisite courses, commensurate to their background, before they could be admitted into the program as full time students.

The degree plan is a one-year 30 credit-hour full-time program with part-time options. Twenty-four (24) of the hours will be required and six (6) will be electives. The curriculum will be balanced with respect to the coverage of problem types within functional business areas. Irrespective of their area of specialization, instructors of required courses will be expected to pull examples from all of the various business foci. There are substantial numbers of public datasets available within each functional area, where instructors could select appropriate examples and project scenarios in consultation with appropriate departmental units. Finally, the balance of the functional area coverage may be customized by selecting appropriate electives. As the program grows, it is expected that additional functional-area offerings will be developed, though initially, electives will be selected from predominantly existing method-based courses as well as a set of the most relevant business courses. Optimally, some or all of the function-specific elective courses should be designed and staffed by faculty in those areas.

The proposed degree balances data management, analysis, and communication and leadership using SAP, Oracle, Hadoop, SAS, R and other tools to graduate consummate data analysts who will have both analytical skills and the know-how to use and frame the knowledge to support strategic business decisions. The framework for the MSBA curriculum and course descriptions are presented in Appendix A.

3. Administrative arrangement for the proposed program: department and school or college involved.

The College of Business Administration has five departments—Accounting, Economics, Finance, Management & Information Systems (M&IS), and Marketing & Entrepreneurship each headed by a Chair who reports to the Dean of the College.

The MSBA degree program will be housed in the M&IS department. A subcommittee of the College’s Graduate Council, made up of graduate faculty from the home department, will oversee curricula matters and qualifications of faculty teaching in the program. All marketing and advising responsibilities for the program will rest with the home department in consultation with the College’s Marketing and Public Relations Office and Associate Dean for Graduate Programs.

⁸ http://www.schulich.yorku.ca/client/schulich/Schulich_LP4W_LND_WebStation.nsf/page/MScBA+Program+Length+and+Curriculum?OpenDocument

⁹ <http://analytics.ncsu.edu/>

4. Evidence of need for the new degree program, including the opportunities for employment of graduates. This section should also address other similar programs in the state addressing this need and potential duplication of programs in the state and region.

In the past several years the general job outlook for various majors has been sporadic at best. However, job prospects for majors that are founded on educational fundamentals of STEM have been reasonably stable, with growth in areas such as analytics. The continuing need for target marketing by businesses has created data sources that were not possible only a few years ago. Data collection from web logs, smartphones, social media, business and sales transactions, among others, has created the new data mining industry, and demand for data analysts who can extract meaningful information from data. A Jobs Ohio¹⁰ report that “data-driven marketing now accounts for about 3.3 percent of Ohio’s gross domestic product...an industry that employs more than 20,000 Ohioans” buttresses the need for the proposed MSBA degree program. In a separate, recent survey of Northeast Ohio Employers, more than 90 percent indicated that they desire graduate business students to have proficiency in using statistical and analytical tools for data-driven decision making. In addition, analytic skills are among the top five desired by local employers.

Additionally, in a survey of Northeast Ohio businesses the respondents indicated that the cumulative increase in the number of analytics employees within their organizations would be by 97.5% over the next three years. In the intermediate to long-term time horizons 48% predict that employment opportunities will “increase dramatically”, 48% predict it will “increase moderately”, and 4% predict it will remain the same, while 0% believe the employment opportunities will contract. Other results from this survey can be found in Appendix A.

According to the U.S. Bureau of Labor Statistics¹¹ (BLS) 2022 projections, the fastest growing occupations include healthcare related professions, information technology, and data analytics (information security and marketing). But for medical practitioners like doctors, nurses, and therapists, the common thread among these occupations is data analytics. In the healthcare industry for example, there is strong need for collecting and analyzing patient information in all forms (text, voice, and video) on maladies, diagnosis, and treatment. The data complexity in this realm is exacerbated by government mandated healthcare laws and the deployment of electronic health records, which could be mitigated through analytics.

The BLS¹² 2012-2022 projections of *Job openings by occupational group* report show job openings (from both growth and replacement needs) of about 3,378,000 for healthcare practitioners and technical; 1,938,000 in healthcare support; and 1,308,000 in computer and mathematical fields. While the majority of these more than 6 million job openings are expected to be in actual healthcare service provision, a good proportion will be in support services that involve data analytics. With Ohio accounting for about 3% of the US GDP, about 180,000 of these job openings are likely to be in Ohio, with a good proportion being in data analytics. The 2012-2022 expected job growths in select areas that would have need for analytics is presented in Appendix B. The proposed MSBA degree program will provide graduates with the requisite knowledge they need to take advantage of these opportunities.

Similar Programs in Ohio

There are currently only two master’s level analytics degree programs in Ohio (University of Cincinnati and Bowling Green State University), and an undergraduate specialization at The Ohio State and Bowling Green State Universities. Other ancillary programs also exist at the University of Akron (9 credit-hour MBA concentration), Cleveland State University (graduate certificate), and Case Western Reserve University (MS in Management-OR & SCM), which do not provide complete immersion as would a full master’s degree program in business analytics. The proposed MSBA is designed to bridge this gap to meet the needs of students and employers in northeast Ohio. A table of these programs and their descriptions is presented in Appendix C.

5. Prospective enrollment.

The proposed MSBA degree program will provide working professionals and students from baccalaureate programs opportunities for advanced degree in business analytics. The program is also complimentary to STEM programs at other northeast Ohio universities that could serve as feeders.

Northeast Ohio is home to more than 50 hospitals including world-renowned Cleveland Clinic and University Hospitals, over 200,000 healthcare and bioscience workers, and other businesses such as the Good Year Tire and Rubber Company, First Energy Corporation, The Timken Company and several others that are potential sources for enrollment and

¹⁰ Jobs Ohio, 2013/2014 annual report/Strategic plan

¹¹ <http://www.bls.gov/news.release/ecopro.t04.htm>

¹² <http://www.bls.gov/opub/oog/2013/winter/occupations.htm>

employment of students of the MSBA program. Further, the more than 100,000 students in northeast Ohio colleges and universities provides another source for students who would want to gain knowledge in this burgeoning field of study in order to improve their marketability.

At the time of this writing the University of Cincinnati MSBA program enrolled about 100 students. Given the similarities between metropolitan Cincinnati and Cleveland, northeast Ohio population advantages noted earlier, feedback from our CIS group, and ongoing broader survey of interest in the MSBA degree program we expect to generate enrollment of about 30 students in the first year, 35 students in the second year, with excellent potential for continued growth. Our expectation is that at full capacity we would admit a cohort class of about 50 students each year.

It is reasonable to expect that much of the earlier enrollees for the MSBA degree program will most likely be baccalaureate degree graduates in business, computer science, digital sciences, and mathematics from Kent State University, similar and engineering programs from the University of Akron and Cleveland State University, and local businesses. More enrollments needed to sustain the degree program will come from marketing efforts to our PhD Project partner institutions, and other organizations and institutions across the country. The PhD Project is an organization established for the sole purpose of increasing the number of African American, Latino American, and Native American (AALANA) full-time tenure-track faculty in colleges of business.

6. Special efforts to enroll and retain underrepresented groups in the given discipline.

Historically, underrepresented groups and women do not pursue degrees in STEM disciplines as much as they do in the arts and education. This is a national phenomenon that is not unique to Kent State University. In an effort to improve its ethnic diversity across its campuses Kent State University established the Division of Diversity, Equity and Inclusion, led by a Vice President, whose efforts to date have resulted in increased recruitment and retention of underrepresented groups. The MSBA degree program will gain from these successes and will be actively marketed to this group of students.

Furthermore, in recent years some organizations such as the PhD Project have embarked on efforts aimed at recruiting underrepresented groups into STEM-like disciplines. Kent State's College of Business Administration is a member of The PhD Project and has worked with that organization to advance its goals. The college will use its network of PhD Project member schools and non-member schools with predominantly AALANA and women population of students to market and recruit underrepresented groups. Also, the college has strong internship programs for master's level students and underrepresented groups are considered for awarding of scholarships.

7. Availability and adequacy of the faculty and facilities available for the new degree program.

Kent State University College of Business Administration is accredited by the AACSB and abides by that organization's strict standards for faculty qualifications and curricula rigor. With a Doctor of Philosophy (Ph.D.) degree in several disciplines the M&IS department faculty have the requisite expertise to offer the MSBA program.

Facility Resources for the Proposed MSBA

The home department (M&IS) for the proposed MSBA degree program is the largest of all five departments in the College of Business Administration. The department supports two majors (Business Management and Computer Information Systems) and various minors at the undergraduate level, and Ph.D. in Business Administration in four concentrations—Operations Management, Information Systems, Human Resources, and Business Strategy. The department does not currently offer a Master's level degree program but offers several courses in support of the Master of Business Administration (MBA) degree program, and several other masters' level concentrations.

Business analytics is a data, technology, and expertise enabled curriculum which requires appropriate resources for success. Kent State University has a world-class library with over 1 million volumes. It is a member of the OhioLink library exchange system and the campus is connected through wireless computer networks. The library and wireless computer networks offer our professors easy access to research monographs and journals. Each of our faculty also has high speed computers in their offices to enable easy access to these resources.

The College of Business Administration is a member of the SAP University Alliance, which gives our students and professors access to one of the leading Enterprise Resource Planning (ERP) systems in the world. Since the college partnered with SAP, SAP has been integrated into several programs in the college to expose our students to one of the professional ERP systems they are likely to face after graduation. Germane to the MSBA degree program is SAP-HANA, SAP's platform for Big Data Analytics, which the MSBA degree program faculty members have at their disposal. Other research and analytics tools available to faculty and students include SAS, JMP, R and STRATA. However, in order to maintain the technology, data and advising needs for students in the program general fees of \$1,000 will be assessed on each student per year.

Faculty Resources for the Proposed MSBA

The M&IS department has a diverse core of 19 full-time faculty members, 7 of who have expertise in operations research and operations management, statistics, information systems, and supply chain management. This 7 faculty core has a combined teaching experience of more than 80 years and published more than 150 papers in the top research journals in their respective fields. Since additional courses will be required for the MSBA degree program, the college has committed to hiring 1 more tenure-track full time faculty member with established research and teaching records in business analytics, and 4 adjunct faculty members to augment the existing faculty core.

Other expertise in the college at the disposal of the department for the delivery of elective courses and discipline-based concentrations in the MSBA degree program includes more than 10 faculty members from marketing, economics, and finance, and several others from mathematics and computer science.

8. Need for additional facilities and staff and the plans to meet this need.

Five years ago Kent State University switched to the Responsibility Center Management (RCM) financial model where colleges and departments use business-type strategies to manage their operations. Under RCM, costs and revenues are taken into consideration when making decisions about the viability of existing or new programs. The MSBA degree program will be no exception and will undergo the same scrutiny as other programs. Since the establishment of this financial model, the College's RCM metrics have been consistently favorable. The college is committed to reinvesting some of those monies into faculty and curricula resources such as for the MSBA degree program.

The department has also been creative in managing and generating sustainable resources. It has performed well under the RCM financial model and is in a position to provide needed resources in support of the MSBA degree program. Further, the program has the full support of the College Dean and other departments in the college who have interest in, and continuing commitment to the program. As of now there are 7 faculty members in the MSBA degree program with one full time tenure-track and four adjunct faculty members planned. The need for more faculty resources will be assessed after the first two years of the program.

At the present, there is no plan for additional facility resources. But as noted, the College has the capacity to supply any needed resources and will do so when the need arises.

9. Projected additional costs associated with the program and evidence of institutional commitment and capacity to meet these costs.

Kent State University has majors in mathematics, business, economics, computer science, information systems, marketing, finance and other disciplines that provide strong foundation for an analytics program. Although the proposed MSBA degree program and faculty core will be housed in the M&IS department, expertise for offering it will be drawn from across the campus and the northeast Ohio business community. For example, two of the required courses in the program are offered through the Computer Science Department, and some elective courses are offered through four other departments.

Drawing from its strong faculty base in mathematics, information technology, and business, the Kent State University MSBA degree program will offer its students the tools they need to take advantage of the growing employment opportunities in data analytics. The college has also committed \$215,000 toward hiring more faculty members to augment existing faculty core, and provide advising and technology updates for the program. Additional resources will be made available as the program grows.

A five-year estimated budget for the MSBA degree program is shown in Appendix D. To the best of our knowledge and estimation, the program is expected to break-even by its second year of full operation, and progressively shows positive returns beyond that point.

The MSBA degree program has been approved by the College of Business Graduate Program Committee, the Associate Dean, and the Dean.

APPENDICES

- A: Description of proposed MSBA curriculum
- B: Evidence of need for the MSBA degree program
- C: Similar programs in Ohio
- D: Projected Five-Year Budget for the MSBA degree program

Appendix A:

Description of Proposed MSBA Curriculum

1. MSBA Degree Program Illustration

The proposed MSBA is different from similar programs in northeast Ohio because of the following:

- Balance of information and data management, data analysis, decision-making and leadership.
- Interdisciplinary curriculum includes required or elective courses from business functional areas, Computer Science, Digital Sciences, and Information Architecture & Knowledge Management.
- Distinctive faculty in leadership and organizational behavior adds to our ability to balance the technical and social/managerial aspects.
- Use of enterprise technologies: SAP Alliance (HANA, crystal reports, analytics modules), Oracle Academy (Enterprise level DBMS, analytics tools), Hadoop, SAS, JMP, R and others.
- Ability to focus on business functional areas or additional methods with electives.
- Emphasis on communication.

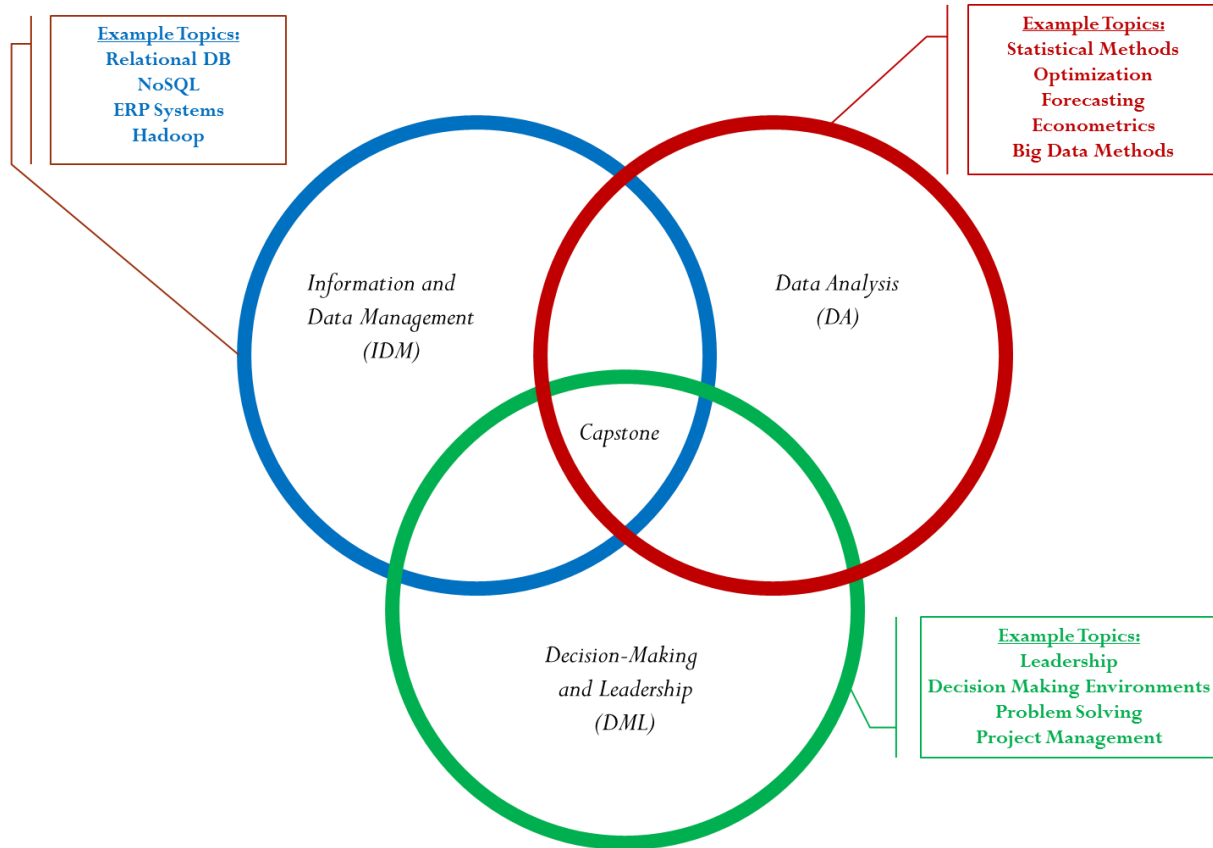


Figure 1 - MSBA Program Coverage

The courses in the curriculum have been designed to achieve a balance between the technologies, analytical methods, and the business and personal acumen needed in order to effectively implement analytical methods and interpret, communicate, and act on the results. The correct balance (note that an *equal* balance is not the goal) should provide a graduate from the program with both a firm grasp of the most important analytical techniques along with the knowledge of how they should be implemented, interpreted, and communicated in a variety of business contexts. The overall philosophy of the program is reflected in an observation made by Dave Clark, Vice President of Amazon.com:

“People who can do high level math are practically a commodity. People who can figure out which problem is the right one to solve and then apply high level math are both expensive and elusive. Those who can communicate effectively the answer in such a way managers can understand, priceless.”¹³ Our goal for the MSBA degree program is to produce these “priceless” individuals.

The correct balance between these facets is achieved by formally defining the three facets of the program as Information and Data Management (IDM), Data Analytics (DA), and Decision-Making and Leadership (DML). This view of the curriculum allows each of the courses to be scrutinized with the goal that each of them embodies elements of all three facets. This is especially important in the courses focused on analytical methods where a potential trap to be avoided is over-focusing on the methods rather than exploring the full context of how the methods are used in business environments. Potential employers agree that these are important areas to include in the makeup of the program. In our survey of potential employers, they were asked to categorize each of the three facets as to its importance in the program. The percentage of respondents that selected each category is shown in the table below.

	Not Important	Somewhat Important	Important	Very Important / Critical
Information and Data Management (IDM)	0%	12.5%	50%	37.5%
Data Analysis (DA)	0%	8.7%	39.1%	52.2%
Decision-Making and Leadership (DML)	0%	8.3%	58.3%	33.3%

The balance the program strives for would be towards a mixture of 50% data analytics (DA) with the other 50% split evenly between both Information and Data Management (IDM) and Decision-Making and Leadership (DML). The data analytics portion contains the primary skills associated with analytics. It makes sense that the mix would emphasize this portion while still adequately addressing the important skills represented in the other two facets. Although this is conceptually appealing, we wanted to ensure that potential employers viewed the necessary mix in a similar fashion. In our survey of potential employers we described these three program facets and what percentage of a graduates knowledge should be aligned with each facet. Respondents could enter any percentage they wished as long as they totaled 100%. The results were: 40.83% of knowledge should be aligned with data analytics (DA), while 29.58% should be aligned with both Information and Data Management (IDM) and Decision-Making and Leadership (DML). While the percentages are marginally different this lends support to the over philosophy of the program.

Information and Data Management includes technologies and methods used to collect, manipulate, and extract data from the extremely large, “messy”, and unstructured data commonly referred to as “Big Data”, as well as from traditional data sources. Data Analytics includes methods and software technologies for implementing those methods. Decision-Making and Leadership includes decision-making at all stages of analysis: from identifying and defining the problem, to identifying correct technologies and methods to employ, to interpreting the mathematical results and making sound business decisions based on those results. Finally, the Leadership component of this facet is a term that is used here in its broadest sense and encapsulates all the business acumen, communication, human, and other soft skills necessary to be an effective leader within an organization, thus facilitating the ability to achieve maximum benefits associated with the organization’s analytics efforts. These communication and leadership skills are covered explicitly in the “Analytics in Practice” and “Business Analytics” required courses and will be ‘practiced’ in each of the methods-oriented courses as is described below. Additionally, electives such as “Leadership and Organizational Change” allow a student to go into even more depth.

The goal in the design of each of the courses listed below is that all three facets will be integrated into every course. The courses that are predominantly focused on methods should expend at least 10 to 20% of course time on business contextual elements that elevate “mathematical problems” to the level of “business cases”. Starting with artificial and polished datasets and stopping with the mathematical conclusions should be strictly avoided. These courses should spend significant time exploring data sources, as well as extracting, modifying, and cleaning data that would be

¹³ http://www.industryweek.com/articles/new_business_analytics_degree_aims_to_produce_problem_solvers_25653.aspx

required when encountering problems in the real world. Additionally, they should explore the business motivation behind and value of such analyses and, finally, they should explore how the mathematical conclusions inform the business problem and how the results of the analysis can best be communicated. Leadership, as was discussed earlier, is emphasized throughout the process. Leadership is not only reflected in the final conclusions, decisions, and solution implementation but throughout the process from problem identification through implementation and evaluation. Again, the need to incorporate full business cases and contexts in the methods-based courses is a requirement to achieving this goal. Focusing on only the mathematical portion of the process would exclude this critical component.

Simulating the organizational context of business analytics cannot really be accomplished without utilizing the same technologies that are likely to be encountered in real-world organizations. Hence, our memberships in the SAP University Alliance program and Oracle Academy give our students access to some of the premier enterprise-level analytical software available today. Instead of using predominantly MS Excel and statistical packages for demonstration and practice of analytical concepts, our students will interact with fully functional enterprise versions of the various software these vendors provide. Although you will not see SAP or Oracle names in any of our course descriptions or course names (the SAP Alliance actually prohibits that), they will be used pervasively within the coursework. Students will use SAP (as well as other technologies) for tasks such as data visualization, big data analytics (using the huge Sam’s Club data warehouse provided through SAP), predictive analytics and data mining, OLAP analysis, reporting (Crystal Reports). In addition to these more exclusive technologies the program will also utilize open source and other proprietary software such as Hadoop, MapReduce, SAS, JMP, R (through SAP intergration and standalone), and others. As new technologies are constantly being developed, the program will actively seek out and incorporate these new technologies where appropriate and available.

The value of the program described above and detailed below is again supported by our survey of NE Ohio potential employers. When asked how they felt about the program overall on a scale from very negative to very positive, 96% were positive or very positive, 4% were neutral, while 0% were negative or very negative. Additionally, they were asked, “If you were responsible for hiring an entry-level employee for an analytics position in your organization, how interested would you be in interviewing graduates of this proposed program?” To this question their responses were, 70% were very interested, 22% were somewhat interested, and only 9% were not interested. Finally, the table below shows their responses on the importance of the courses proposed for the program.

Survey Question to Potential Employers:

“Please provide your opinion as to the importance of each course in the curriculum as a whole”

<i>Course Title</i>	<i>Not Important</i>	<i>Important</i>	<i>Critical</i>
Business Analytics	<u>0%</u>	<u>26.1%</u>	<u>73.9%</u>
Database Management & Database Analytics	<u>0%</u>	<u>60.9%</u>	<u>39.1%</u>
Data Mining Techniques	<u>0%</u>	<u>65.2%</u>	<u>34.8%</u>
Advanced Data Mining and Predictive Analytics	<u>0%</u>	<u>73.9%</u>	<u>26.1%</u>
Quantitative Management Modeling	<u>0%</u>	<u>82.6%</u>	<u>17.4%</u>
Analytics for Big Data	<u>0%</u>	<u>73.9%</u>	<u>26.1%</u>
Analytics in Practice	<u>0%</u>	<u>52.2%</u>	<u>47.8%</u>
Capstone Design in Business Analytics	<u>0%</u>	<u>47.8%</u>	<u>52.2%</u>

Table. Survey Results on Question of Importance within the Program

2. MSBA Course Descriptions

8-Three Credit-Hour Required Courses (24 Total Credit Hours) (25% IDM, 50% DA, 25% DML aggregate balance)

Business Analytics (MIS 64XXX)

This course provides an overview of business analytics and its appropriate applications in various industries and functional areas. Critical thinking, problem definition, problem solving, effective communication, and leadership are emphasized. Methods such as data visualization and descriptive, predictive, and prescriptive analytics are covered from a broad perspective. This course is applied, hands-on, and case-based. Cases emphasize the communication of quantitative solutions to lay people and required leadership during decision-making and implementation stages. Must be taken during the first semester of enrollment after acceptance into the program (20% IDM, 40% DA, 40% DML).

Database Management and Database Analytics (revision of MIS 64082)

The design, implementation and management of database management systems within organizations are studied from an applied perspective. Additional emphases include data warehousing, structured query language for analytics, and introductions to NoSQL databases and Big Data analytics. Must be taken during the first semester of enrollment after acceptance into the program (70% IDM, 20% DA, 10% DML).

Data Mining Techniques (CS 63015)

The course presents the concepts and techniques of data mining. Data mining is a process of discovering information from a large set of databases. This course takes a database perspective on data mining. Prerequisites: CS 53005 (fulfilled by MIS 64082) and MATH 50011. (10% IDM, 80% DA, 10% DML).

Advanced Data Mining and Predictive Analytics (MIS 64XXX)

This course extends the coverage of data mining and predictive analytics. Topics will focus on the applied use of these techniques in realistic settings. Example techniques include: neural networks, Multilayer Perceptron (MLP) networks, Radial basis functions networks, Support vector machines, Naïve Bayes classification, and others. Prerequisite: CS 63015 (10% IDM, 80% DA, 10% DML).

Quantitative Management Modeling (MIS 64019)

A variety of optimization and heuristic modeling techniques are explored. Decision-making environments, model selection, and interpretation are emphasized. Various linear and non-linear mathematical programming techniques are the primary topic but are supplemented with other optimization and heuristic techniques (10% IDM, 80% DA, 10% DML).

Analytics for Big Data (CS Special Topic – CS plans to create permanent course)

This course focuses on techniques commonly applied to the vast stores of mostly unstructured data being generated in business today. Focal techniques and technologies include: Hadoop, map reduce technology, unstructured data concepts, and noSQL databases (40% IDM, 50% DA, 10% DML).

Analytics in Practice (MIS 64XXX)

This course focuses on supporting techniques and managerial and professional skills necessary to being an effective data analyst. Other topics include project management, requirements analysis, change management, team dynamics, leadership, and effective communication between all stakeholders (10% IDM, 10% DA, 80% DML).

Capstone Design in Business Analytics (MIS 64XXX)

In this culminating project, students draw on the breadth and depth of the curriculum to address an industry supplied problem in small teams. Teams will explore prescriptive analytics as is appropriate to their design project (30% IDM, 40% DA, 30% DML).

2-Three Credit-Hour Elective Courses (6 Total Credit Hours)
– extends knowledge on methods and/or business functions and processes

Methods Electives:

MIS 64011	Systems Simulation
ECON 62054	Econometrics I
IAKM 60370	Semantic Analysis Methods
IAKM 60411	Clinical Analytics
DSCI 64210	Data Science

Business Functions and Processes Electives*:

MIS 64028	Global Supply Chain Business Models
MIS 64160	Leadership and Organizational Change
MKTG 65051	Marketing Management
IAKM 60312	Business Intelligence - Competitive Intelligence
DSCI 61010	Enterprise Architecture

3. Example Full-Time Schedules

One-year, 12 Months, example:

Fall – 12 credit hours

Business Analytics*
Database Management and Database Analytics*
Data Mining Techniques*
Analytics in Practice or Elective

Spring – 12 credit hours

Advanced Data Mining and Predictive Analytics
Quantitative Management Modeling
Analytics for Big Data
Analytics in Practice or Elective

Summer – 6 credit hours

Capstone Design
Analytics in Practice or Elective

One-Year, 9 Months, example:

Fall – 15 credit hours

Business Analytics*
Database Management and Database Analytics*
Data Mining Techniques*
Analytics in Practice or Elective
Elective

Spring – 15 credit hours

Advanced Data Mining and Predictive Analytics
Quantitative Management Modeling
Analytics for Big Data
Analytics in Practice or Elective
Capstone Design

*course must be taken first semester

Appendix B:

Evidence of Need for the MSBA Degree Program

Several research reports continue to stress the importance of knowledge in data analytics. In one such report the authors concluded that ability to analyze big data “will become a key basis of competition, underpinning new waves of productivity growth, innovation, and consumer surplus.”¹⁴ The study further observes that by 2018, the United States could face a “shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the analysis of big data to make effective decisions.” This observation is also supported by the latest U.S. Bureau of Labor Statistics¹⁵ data on job outlook for people with analytics related experiences, some of which are presented in the following table.

2012-2022 Job Outlook for Analytics Related Occupations

Occupation	Job Outlook	Percent Change	Rate of Change	Median Pay/year
Mathematicians	800	23%	Much faster than average	\$101,360
Financial Analysts	39,300	16%	Faster than average	\$76,900
Budget Analysts	3,800	6%	Slower than Average	\$69,280
Market Research Analysts	131,500	32%	Much faster than average	\$60,300
Statisticians	7,400	27%	Much faster than average	\$75,560
Operations Research Analysts	19,500	27%	Much faster than average	\$72,100
Computer Systems Analysts	127,700	25%	Much faster than average	\$79,680
Information Security Analysts	27,400	37%	Much faster than average	\$86,170

¹⁴ <http://www.mckinsey.com/insights>

¹⁵ <http://www.bls.gov/ooh/business-and-financial/>

Appendix C:

Similar Programs in Ohio

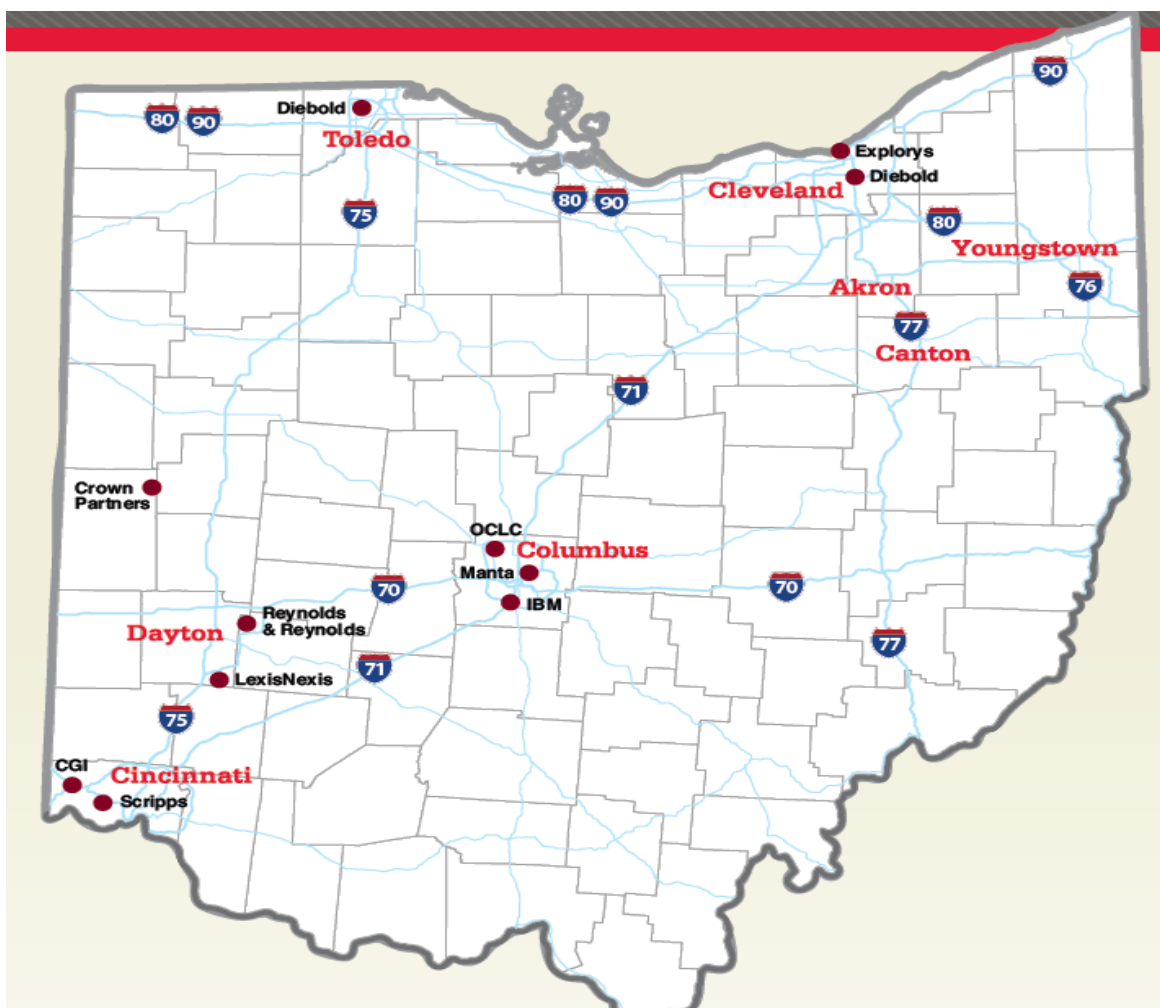
Jobs Ohio¹⁶ reports that “three of the world’s largest big data solution providers are located or headquartered in Ohio,” and that Ohio is “home to many of the largest consumer product and apparel companies in the world”, who depend on data analytics to run their businesses. Higher education has an indubitable role in providing the educated and labor force-ready students these businesses urgently need to remain competitive. The state of Ohio recognizes this urgency by making workforce readiness a top priority. Yet, as shown in the table below, only 5 out of 13 four-year institutions in the state currently have data analytics programs.

Institution	Baccalaureate	Masters	Comments
Kent State University (Proposed)		30 credit-hour business analytics program integrating data management, data analysis, and decision-making and leadership	Graduate program. Data analysts with both analytical and strategic decision making skills
The Ohio State University	5-hour cluster of business analytics courses beyond baccalaureate degree requirements		Undergraduate program. Far from northeast Ohio to serve growing needs of the region
University of Cincinnati		35 credit hours: 21 in modeling and statistics, and 14 in electives	Comprehensive program but not close to northeast Ohio to serve growing needs of the region
Bowling Green State University	Undergraduate specialization in business analytics	39 credit hours in analytics, statistics, database and project management	Graduate program comprehensive but cannot fulfill growing needs of the region
Cleveland State University		16 hours certificate program in marketing analytics	The courses and program are specific to marketing
Case Western Reserve University		39 credit hours: 9 business core hours (including 3 hours of Marketing Analytics for SCM), 12 hours of operations research, and 18 hours of supply chain.	Program comprehensive but focused on OR and SCM, and cannot fulfill growing needs of the region
University of Akron		9 credit-hour MBA-concentration	The program is only a concentration

¹⁶ Jobs Ohio, 2013/2014 annual report/Strategic plan

Another report by Jobs Ohio Information Technology and Services¹⁷ supports the earlier report, stating that “Ohio is recognized as a global leader in data analytics.” However, as is clear from the map of the state’s major metropolitan areas below, two of the data analytics programs (Ohio State University—undergraduate cluster, and University of Cincinnati—comprehensive graduate) are in the southern half of the state. Clearly, there is unmet need of comprehensive data analytics educational programs in the northern half of the state, especially in the Cleveland/Akron metropolitan area, to serve the growing needs of students and businesses in northeast Ohio.

Ohio’s metropolitan technology hot beds



¹⁷ http://jobs-ohio.com/images/information_technology_aug13.pdf

Appendix D:

Projected Five-Year Budget for the MSBA Program

Estimated Annual Revenues from the proposed MSBA	FY 0001	FY 0002	FY 0003	FY 0004	FY 0005
	30 Enrolled	35 Enrolled	40 Enrolled	45 Enrolled	50 Enrolled
Net Tuition (8 M&IS Courses at \$750/course/student)	\$180,000.0	\$210,000.0	\$240,000.0	\$270,000.0	\$300,000.0
General Fees (\$1,000/student)	\$30,000.0	\$35,000.0	\$40,000.0	\$45,000.0	\$50,000.0
Net Tuition & Fees	\$210,000.0	\$245,000.0	\$280,000.0	\$315,000.0	\$350,000.0

**Estimated Annual Expenses
from the proposed MSBA**

Salaries and Wages/Supplies	\$215,000.0	\$215,000.0	\$215,000.0	\$215,000.0	\$215,000.0
1 Full time Tenure-Track Faculty (\$160,000.0)*					
4 Adjunct Faculty Members (\$30,000.0)*					
1 Part-Time Adviser (\$20,000)					
Technology updates and Administrative Overhead (\$5,000)					

Net Income (Deficit)	(\$5,000.0)	\$30,000.0	\$65,000.0	\$100,000.0	\$135,000.0
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* The tenure-track faculty member will teach 4 courses in the program each year and 4 courses will be taught by the current MSBA core faculty members. The core faculty members will be redeployed from their regularly scheduled undergraduate classes which will be staffed with adjuncts.