

**PROPOSAL FOR A MINOR IN BUSINESS ANALYTICS
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PROPOSAL FOR A MINOR IN BUSINESS ANALYTICS

1. BACKGROUND – DEFINING BUSINESS ANALYTICS

1.1 What is Business Analytics?

The definition of “business analytics” (BA) can be approached from many different perspectives. Some in the academic world equate business analytics simply to mean business statistics, while others see it as a larger umbrella term that stemmed from within the information systems and decision sciences fields. These perspectives are not incompatible as business analytics includes techniques from both sides of this spectrum.

From an academic perspective, business analytics can be differentiated from other analytics or data-related disciplines in part not just by the domain (business versus not), but also by the framing and level of the data analysis. As the University of Washington describes their BA program, they differentiate it from their data science program in terms of the focus:

Business Analytics blends technical skills, ... analytic frameworks for interpreting data, and business strategies for translating insights into actions ... to optimize a student’s ability to analyze data and then use their business knowledge to make data-driven recommendations and decisions. Business analytics professionals ... will be charged with choosing the correct analytical models to find solutions for their business, create visuals for raw data, and reports for management. Some of the roles business analytics students fill include business analyst, operations research analyst, and market research analyst.

At its heart, business analytics is about supplementing business skills with analytical skills in the formation of a business analyst (<https://online.hbs.edu/blog/post/data-analytics-vs-data-science>):

The main goal of business analytics is to extract meaningful insights from data that an organization can use to inform its strategy and, ultimately, reach its objectives. Business analytics can be leveraged in a variety of ways. Here are a few examples to consider:

- *Budgeting and forecasting: By assessing a company’s historical revenue, sales, and costs data alongside its goals for future growth, an analyst can identify the budget and investments required to make those goals a reality.*
- *Risk management: By understanding the likelihood of certain business risks occurring—and their associated costs—an analyst can make cost-effective recommendations to help mitigate them.*
- *Marketing and sales: By understanding key metrics, ... a marketing analyst can identify the number of leads their efforts must generate to fill the sales pipeline.*
- *Product development: By understanding how customers have reacted to product features in the past, an analyst can help guide product development, design, and user experience in the future.*

From a process perspective, BA definitions often refer to a range of analytical techniques such as data acquisition; visualization; descriptive, predictive, and prescriptive analytics; etc. In addition to emphasizing such techniques as well as the focus on data-driven decision-making and business insights, definitions from some of the major players in the analytics world (see Table 1) also rely on repeated references to phrases and concepts such as:

- self-service
- accessible (sometimes referring to not programming reliant)
- end-users

This context of data-driven decision-making, assisted by self-service analytics tools that are accessible to business users, will assist with framing the basis and justification for a BA minor.

Table 1 - INDUSTRY DEFINITIONS OF BUSINESS ANALYTICS

IBM:

Business analytics is a set of automated data analysis practices, tools and services that help you understand both what is happening in your business and why, to improve decision-making and help you plan for the future.

Oracle:

Let's start by differentiating between data analytics and traditional analytics. The terms are often used interchangeably, but a distinction does exist. Traditional data analytics refers to the process of analyzing massive amounts of collected data to get insights and predictions. Business data analytics (sometimes called business analytics) takes that idea, but puts it in the context of business insight, often with prebuilt business content and tools that expedite the analysis process. Specifically, business analytics refers to:

- *Taking in and processing historical business data*
- *Analyzing that data to identify trends, patterns, and root causes*
- *Making data-driven business decisions based on those insights*

Gartner:

Business analytics is ... delivered as an application suitable for a business user. These analytics solutions often come with prebuilt industry content that is targeted at an industry business process (for example, claims, underwriting or a specific regulatory requirement).

SAS [in reference to their "SAS Business Analytics" tool]:

An interactive, self-service environment lets you easily access and integrate a wide range of data sources for reporting or analysis. ... Easy-to-use predictive analytics and smart algorithms enable business users and analysts to assess possible outcomes, collaborate on what's most relevant, and make better, data-driven decisions without programming. Approachable analytics puts correlation, forecasting, scenario analysis, decision trees and text analysis at your fingertips.

1.2 Background Summary

Business Analytics is more than business statistics. It is about data-driven business decision-making, and the technical and analytical skills needed to interpret data to gain business insights. From a process perspective, it covers techniques that range from data acquisition to visualization and reporting, and includes descriptive, predictive, and prescriptive analytics. It employs tools that are accessible to the business user, aiming to supplement business skills with analytical skills in the formation of a business analyst.

2. JUSTIFYING THE BA MINOR

2.1 Industry Need

It almost goes without saying that businesses continue to value analytics skills, and the data continue to show that.

- A 2020 Deloitte Insights study reported that the number of jobs posted by tech companies for analysis skills surpassed traditional skills such as engineering, customer support, marketing and PR, and administration.
- The Bureau of Labor Statistics (BLS) projects high job growth in – for example – the three aforementioned roles that benefit from business analytics skills. Specifically, the employment of management analysts, marketing research analysts, and operations research analysts is expected to grow over the next decade at 11%, 18%, and 25% respectively, compared to an average of 4% growth for all occupations tracked by the BLS.

In addition, the data show the importance and need for self-service analytics tools for business users.

- A 2020 Gartner study reported that the overall analytics and business intelligence (BI) software market grew to almost \$25 billion in 2019, with modern BI platforms growing at almost 18%.
- A 2020 Dresner Advisory Services study reported that self-service BI continues to provide analytics apps and tools to line-of-business users without the need for intervention from their IT departments, and that 62% of businesses indicated that this is essential to them.

As noted, self-service tools are an important aspect of business analytics. Such tools – which are led by Microsoft Power BI and Tableau – will be discussed as part of the proposal.

2.2 Mission Driven

The importance of analytics to JCU's strategic plan is stated in Objective 1.1:

*Pursue new undergraduate and graduate programs in areas such as healthcare (including nursing), business, STEM concentrations, **data/analytics**, and other areas that will advance John Carroll's mission and increase brand awareness and attractiveness.*

The Boler College of Business continues to make strides in analytics-related programming, especially over the past few years. Most recently, the Boler Analytics Lab and Capital Markets Lab were created to give faculty and students more opportunities to enhance data/analytics classroom instruction and learning. The most significant contribution to Boler's data/analytics efforts has been the establishment of the Kramer School of Accountancy and Information Sciences in 2019, made possible by a very generous gift from Christine M. and Richard J. Kramer.

The impact of this realization is magnified within the accounting discipline where analytics plays a major role. AACSB introduced Standard A7 to their accounting accreditation process in 2013, requiring programs to address data analytics in their curricula. In 2018, AACSB replaced Standard A7 with Standard A5, which focused more on technology and required accounting departments to develop their technological capabilities. Furthermore, while data analytics content is not new to the CPA exam, recent changes reflect more emphasis on the topic. In fact, the AICPA recently (in 2019) added the term "data analytics" to the CPA Exam Blueprints (a document explaining what is tested on the CPA Exam).

The AACSB standards for business programs do not specifically focus on data/analytics; but Standard 4 does state that "the curriculum content cultivates agility with current and emerging technologies."

Recognizing the currency and impact of analytics, AACSB has sponsored Data Analytics Summits since 2018. The Boler College sent two attendees to the first summit, and shortly thereafter conducted our own summit at John Carroll (to analyze our Boler core curriculum), which was attended by several John Carroll alumni who were experts in data-related occupations. The Boler Undergraduate Curriculum Committee (BUCC) carried on with this pursuit and has kept business analytics on the agenda, examining and seeking ways to enhance BA skills and knowledge for our students.

While Boler's Strategic Plan does not specifically refer to analytics, it does refer to the pursuit of distinctive curricular and enrichment programs that leverage existing faculty expertise, as well as to interdisciplinary endeavors within and between Boler and CAS. To this latter point, one goal is to design a BA minor that is accessible to all Boler and non-Boler students. In fact, this proposal is perhaps one of the few BA minors to include non-business electives. To the former point, Business Analytics is a discipline that is built on interdisciplinary elements and as such can make use of existing faculty expertise as well as existing courses, especially in the Business Intelligence (BI) area.

2.3 Expertise and Competition

The nature of business analytics as both disciplinary and interdisciplinary lends itself to courses already offered at John Carroll. Our BI faculty – with backgrounds in decision sciences, information systems, operations/supply chain management, and operations research – currently teach several of the courses that span those needed for a BA minor. The BI courses complement other courses such as Business Analytics and Statistics taught by our Economics faculty. As will be discussed, the use of existing courses is not just a matter of convenience but quite fitting to the needs and objectives of a BA minor.

In fact, nearly all BA minor programs that were examined during the development of this proposal employ business core courses (such as business statistics) as part of the BA minor. There are three points that can be made with respect to an examination of 22 of JCU's comparators and regional competitors (see Table 2):

- All but two of the BA minor programs employ only 3 to 5 additional courses (9 to 15 credits) beyond their business core, reflecting the heavy reliance on existing courses (and existing faculty expertise). In many cases, the courses that go beyond the business core are in subject areas other than BA or BI and likewise appear to be courses that exist as part of other majors.
- Only 4 of the 22 universities do not have a BA minor, a point of great emphasis with respect to the void that needs to be filled at John Carroll.
- More than half (10) of the universities that offer a BA minor also offer either a Data Science major or minor or both. This last point is meant to lend support to the fact that Business Analytics and Data Science can and do reside together in the same universities as each fulfills a different (but related) purpose.

2.4 Justification Summary

Data and surveys continue to emphasize the importance and need for business analytics skills and self-service analytics tools. Not only does John Carroll's strategic plan explicitly emphasize programs that would serve this need, but AACSB also has brought data/analytics to the forefront in its Analytics Summits as well as in its accounting accreditation standards. Given the nature of business analytics, the Boler College already has the expertise and nearly all courses that are needed for a BA minor, many of which are in the closely related and multi-disciplinary BI area. In fact, the use of existing courses is the norm among JCU's comparator and competitor institutions, most of which have a BA minor in place.

Table 2 - COMPETITIVE LANDSCAPE

	Non-Business Data Major	Non-Business Data Minor	Business Analytics Major	Business Analytics Minor	Cred* Beyond Business Core
<i>JCU</i>	<i>Data Science</i>	<i>Data Science</i>		<i>Business Analytics</i>	<i>14</i>
Non-Ohio Comparators					
Belmont	Data Science	Data Science	Bus Sys & Anlyt	Bus Sys & Anlyt	18
Bradley	Data Sci concent	Data Science	Business Analytics	Business Analytics	15
Butler		Data Science			
Canisius	Data Science				
Drake	Data Anlyt -joint	Data Anlyt -joint	Data Anlyt -joint	Data Anlyt -joint	12
La Salle			Bus Sys & Anlyt	Bus Sys & Anlyt	9
Le Moyne			Business Analytics	Business Analytics	9
St. Jos		Data Science	Bus Intel & Anlyt	Bus Intel & Anlyt	12
Stetson		Data Anlyt -joint	Bus Sys & Anlyt	Bus Sys & Anlyt	9
Scranton			Business Analytics	Business Analytics	9
Valparaiso	Data Science	Data Science	Business Analytics	Business Analytics	12
Ohio Comparators (+ Dayton)					
BW				Business Analytics	9
Dayton				Business Analytics	12
Oh North	Data Anlyt -joint	Data Anlyt -joint		Business Analytics	18
Xavier	Data Science		Busin Anlyt & IS	Business Analytics	15
Ohio Public Competitors					
Akron			Busin Data Anlyt		
Cincinnati			Business Analytics	Business Analytics	12
CSU					
Kent			Business Analytics	Data Analytics	15
Miami	Dat Anlyt; Dat Sci		Business Analytics	Business Analytics	15
OSU	Data Analytics		Business Analytics	Business Analytics	15
Ohio U			Business Analytics	Business Analytics	9

* **Credits Beyond the Business Core** refers to the number of credits required for a BA minor that go beyond the courses in the business core. **Note:** in many cases, the total credits required may be more than shown due to prerequisite courses for BA “electives”, particularly for students who do not normally take business core courses.

3. FRAMING THE BA MINOR

3.1 Disciplinary Perspective

An additional point of reference to Table 2 might note some variability in the names of the analytics programs offered within business schools. While most are named “Business Analytics” (12), other programs are named Business Intelligence & Analytics (1), Business Systems & Analytics (3), and Data Analytics (2). This variability reflects the interdisciplinary nature of business analytics, with roots in the information systems and decision sciences fields, the latter of which is closely related to management science and operations research as well as operations management. A look at some of the larger universities around us that have both major and minor BA programs illustrates how departments can cross between these interrelated disciplines.

- Miami University: Information Systems and Analytics Department
- Ohio State University: Department of Operations and Business Analytics
- University of Cincinnati: Department of Operations, Business Analytics, and Information Systems
- Xavier University: Business Analytics and Information Systems

Emphasizing the variability in the terminology, one recent article in the *Journal of Business Analytics* (Power, Heavin, McDermott & Daly, 2018) analyzed the plethora of definitions and pointed out that the most cited research on “business analytics” (Chen, Chiang & Storey, 2012) – which was published in the premier journal *MIS Quarterly* – actually referred to the term as “business intelligence and analytics” (BI&A). Tom Davenport, the scholar who literally wrote the book on business analytics (*Competing on Analytics*, 2007), viewed BI as a set of technologies and processes that “includes both data access and reporting, and analytics”, ultimately seeing BA as a subset of BI.

While the lengthier term is used by some (e.g., St. Joseph’s BI&A program, Gartner’s and Dresner’s tracking of the BI&A market), the shortened version of BA has emerged as the common usage today. Examining this interrelationship between BI & BA, Klimberg and Miori (2010) summed it up well, characterizing the techniques within business analytics as cutting across multiple disciplines/viewpoints:

- *an information technology viewpoint conducting queries that “slice and dice” the data and producing reports and dashboards, possibly using an OLAP tool;*
- *a statistics viewpoint employing data mining tools to analyze and explore the deluge of data and uncover unforeseen relationships, and;*
- *an operations research/ management science (OR/MS) viewpoint developing models that impact the organization’s strategy, planning and operations.*

3.2 Process/Topical Perspective

Consistent with the interdisciplinarity described above, multiple scholars and practitioners have viewed business analytics from a process perspective, identifying knowledge domains that span along a project lifecycle framework. The process approach defines a spectrum that includes:

- data management (acquisition and preparation of the data)
- data analysis (descriptive, predictive, and prescriptive analyses)
- data interpretation (visualization and reporting)

The process approach further aids in identifying relevant courses for a BA program. As can be seen in the following tables (that list courses required beyond the business core), BA minors run the gamut of subject areas and topics. However, they also reflect the domains of the BA process perspective.

Table 3 - EXAMPLES OF "OPEN-ENDED" MULTI-DISCIPLINE BA MINORS

<u>Baldwin Wallace</u>		<u>Ohio Northern</u>	
Required	BUS 365 - Business Analytics	Required	MGMT - Model-Based Dec Mkg
	<i>CSC programming course</i>		<i>ECON - Managerial Econ</i>
	<i>CSC - Data Systems</i>		<i>ECON – Econometrics</i>
Select 2	<i>ECN - Intermed Stat Meth ... OR</i>		<i>MRKT – GeoAnalytics</i>
	<i>... FNC - Empir Meth Finance</i>	Select 5	<i>MRKT - Marketing Research</i>
	<i>MTH - Statistics II</i>		<i>MRKT - Logistics and SCM</i>
	<i>SPM - Sport Research & Analyt</i>		<i>STAT - Stat Computing w SAS</i>
			<i>STAT - Stat Computing w R</i>
			<i>TECH - Database Mgmt/Applic</i>

Table 4 - EXAMPLES OF BA MINORS ANCHORED ON TANGENTIAL DISCIPLINES

<u>Dayton</u>		<u>Kent State</u>	
Required	DSC - Management Science	Required	ECON - Econometrics I
	OPS - Business Process Mgmt		ECON - Econometrics II
	<i>DSC any 300/400</i>		ECON - Data Prep & Visual.
Select 2	<i>MIS any 300/400</i>		CIS programming course
	<i>OPS any 300/400</i>		<i>ACCT - Acctg Data Analyt</i>
			<i>CIS - Enterp Sys & Bus Proc</i>
			<i>CIS - Data Mgmt & BI</i>
			<i>ECON - Industrial Org</i>
		Select 1	<i>ECON - Labor Economics</i>
			<i>ECON - Senior Seminar Econ</i>
			<i>FDM - Computer App in Retail</i>
			<i>FIN - Adv Financial Modeling</i>
			<i>MKTG - Marketing Analytics</i>

Table 5 - EXAMPLES OF BA MINORS ANCHORED ON BA/IS COURSEWORK

<u>Miami</u>		<u>Ohio State</u>	
Required	ISA - Database Systems	Required	BUSMGT - BA: Data Mgmt & Descript Analyt
	ISA - Applied Regress'n in Bus		BUSMGT - BA: Appl Predict Analyt to Bus Data
	ISA - BI & Data Visualization		BUSMGT - BA: Prescript Analyt & Optimiz
	<i>ISA - Business Programming</i>		Electives are grouped in "Areas":
	<i>ISA - Quant Analys of Bus Prob</i>		<i>Business analytics, data mining, customer</i>
	<i>ISA - Stat & Design of Exper</i>		<i>insights & analysis, operations research &</i>
	<i>ISA - Managing Big Data</i>	Select 2	<i>logistics, and statistical modeling</i>
Select 2	<i>ISA - Business Forecasting</i>		Areas inc. courses from various disciplines:
	<i>ISA - Data Mining in Business</i>		<i>ACCTMIS, BUSADM, BUSMGT, BUSML,</i>
	<i>STA - Statistical Program'g</i>		<i>CSE, STAT</i>
	<i>STA - Adv Data Visualization</i>		
	<i>STA - Forecasting Systems</i>		

The examples in the tables focus on our local comparators and some of our local public competitors and offer several points of comparison.

- BA minor programs (e.g., Baldwin Wallace, Ohio Northern) can be built on multiple disciplines. However, in cases where only one specific course is required and the remaining courses are electives, topics covered in a BA minor may lack consistency.
- Absent of BA courses, BA minor programs may rely heavily on one subject area tangential to business analytics. For example, Dayton's program is an extension of operations and decision science, Kent's program pivots off economics, and Xavier's program relies heavily on marketing.
- BA minor programs can use the BA discipline for a core set of courses that cover foundational BA domains. For example, Miami, Ohio State, and Xavier require three BA courses as the core of the BA minor. Other universities not shown (such as Bradley, St. Joseph, and Valparaiso) likewise require three or four BA courses to cover core BA requirements.

The use of three or four BA core courses provides a basis for addressing the knowledge domains as defined in the BA process perspective. In some cases, courses appear to include multiple related topics such as "Business Intelligence & Data Visualization" and "Data Management & Descriptive Analytics." While the titles do not always map verbatim, the BA core courses directly cover the material in the aforementioned foundational topics, including data acquisition, data preparation, descriptive analytics, predictive analytics, prescriptive analytics, data visualization, and reporting. A key factor here is that the courses are not just using these types of techniques, they are focused on and teaching these techniques as the main topics of the courses. This will become part of the criteria for identifying BA core courses.

3.3 Technical/Software Perspective

In addition to the process-driven perspective of knowledge domains, BA programs also must make choices in the analytical software/tools that are taught and employed in the coursework. The variability of the BA definitions also lends itself to a variability of BA tools as well as a range of opinions on the importance of different types of tools. Multiple research articles that provide evidence from job postings can help with additional guidance.

To begin with, while there is a cross-over between Data Science and Business Analytics, the most important toolsets for each profession can and do differ. One recent article (Radovitsky, Hegde, Acharya & Uma 2018) that analyzed job postings for both BDA (Business Data Analytics) and DS (Data Science) positions summarized this well:

- *For BDA jobs, the most frequent terms start with "sql," "tools," "reports," "business," and "environment," which describe a more business-oriented nature of those jobs.*
- *At the same time, the most frequent words in the DS jobs contain "machine learning," "analytical," "python," "big data," "analytics," and "algorithms," which characterizes more technical (programming and software) orientation of those jobs.*

Another article (Verma, Yurov, Lane & Yurova 2019) that also analyzed postings from the perspective of multiple analytics professions offered similar conclusions. For BIA (Business Intelligence Analyst) and BA (Business Analyst) postings:

- *statistical packages required for BIA consist of Excel, SAS and R*
- *one clear leader (Excel) dominates tools required for BA*
- *data management skills required for BA and BIA are ... tools like SQL and SQL Server*
- *technical skills like programming ... do not appear in the top five skill categories.*

For DS (Data Scientist):

- *stronger emphasis is placed on technical skills for the DS category*
- *this difference is more pronounced for programming skills, data mining and big data tools*
- *a DS professional is required to have significant programming expertise.*

These studies went beyond generalities and consistently reported that Excel and SQL appeared in postings far more than all other BA tools. They also showed R in the rankings. Even using a different approach where postings were filtered not by profession but by those containing the keywords “analytics” and “knowledge management”, Chang, Wang & Hawamdeh (2018) found:

- Excel appeared in more than half of the entry-level positions and two thirds of the mid-level.
- SQL appeared in more than one fourth of the entry and mid-level positions.
- Programming languages (R, Python, and Java) appeared in 10 to 15% of postings.

Most recently, in an analysis of job postings across all business areas from Accounting to Supply Chain Management, Nasir, Dag, Young & Delen (2020) reported R to be the third highest technical skill (next to Excel and SQL), with Excel actually tying communication skills as the most requested KSA (Knowledge, Skill, Ability):

... good communication skills and Excel knowledge ... are both required for roughly 60% of jobs. ... proficiency with Excel and communication, leadership, and project management skills are generally the most demanded skills for all job types. However, it is interesting to note that after these customary skill requirements, analytical and technical KSAs are the most common, with technical skills like data manipulation and visualization (in the form of R, SQL, Tableau, etc.) consistently appearing in the top 20 demanded KSAs

As data access and visualization tools, SQL and Tableau fall more into the business intelligence (rather than statistical) realm. Gartner ranks “Analytics and BI Platform” tools on what they call the “Magic Quadrant”, and Tableau appears as a leader second only to Microsoft (see Figure 1). Gartner analyzes the tools based on a number of criteria, including: data source connectivity, data preparation, analytics, automated insights, data visualization, data storytelling, and reporting. Gartner’s report points to Power BI as Microsoft’s BI functionality made widely available to business users. The addition of Power BI to the list brings us back full circle to the “process perspective” of business analytics. In this context, Zhang, Chen & Wei (2020) examined the pedagogy of a full range of BA knowledge domains (from data acquisition to analysis to reporting), and they described a set of tools that could be used to implement each process. These tools included Microsoft Access, SQL, Microsoft Excel, R, Tableau, and Power BI.

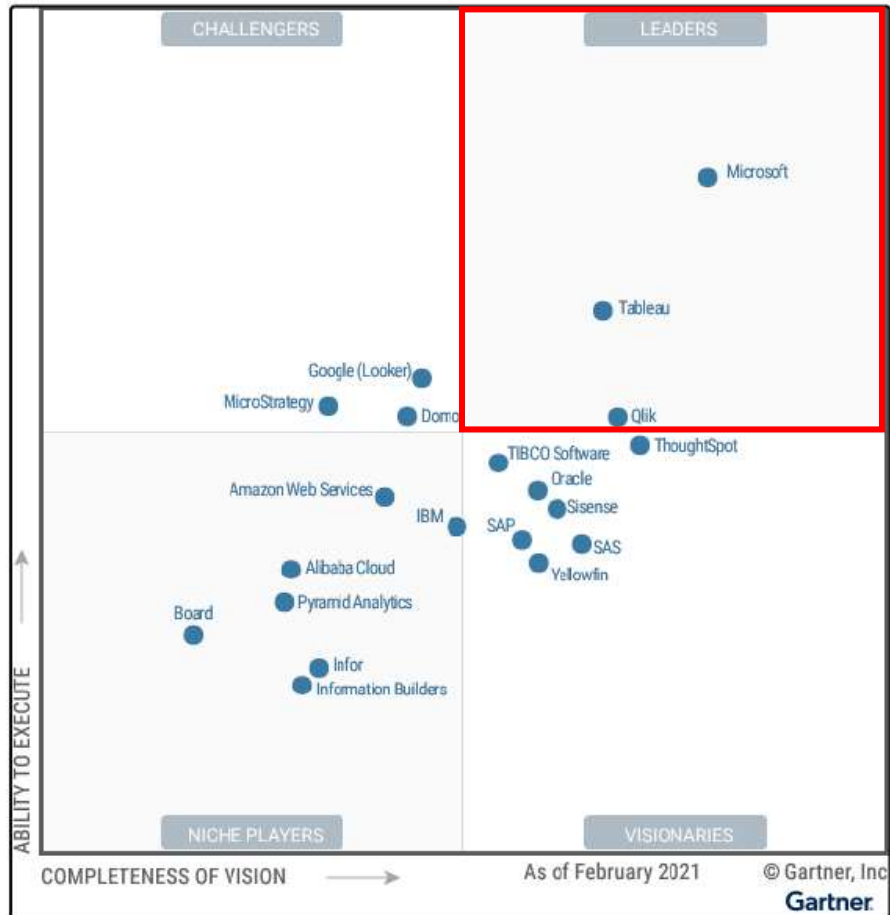
3.4 Framework Summary

Business Analytics is a multi-disciplinary field closely related to Business Intelligence. It includes statistical, information systems, and management science viewpoints. In Boler, the BI area consists of faculty in information systems and management science as well as related fields. Business analytics also involves a range of techniques that span project lifecycle knowledge domains, including data acquisition, preparation, analysis (descriptive, predictive, and prescriptive), visualization, interpretation, and reporting. Most universities have a BA minor and use existing courses as part of the minor, including courses from the business core. BA minors average 12+ credits beyond the business core. Some universities fall back on other business disciplines to carry the weight of the BA minor, while others utilize BA coursework as the primary core courses. Either way, an argument can be made to frame the coursework around the knowledge domains of the BA process and to employ BA-relevant tools that are accessible to business users, including Microsoft Excel, SQL, R, Tableau, and Power BI.

Figure 1 - LEADERS IN THE “ANALYTICS AND BUSINESS INTELLIGENCE” SPACE

Magic Quadrant

Figure 1: Magic Quadrant for Analytics and Business Intelligence Platforms



Source: Gartner (February 2021)

Note: When referring to “Microsoft”, Gartner points to Microsoft Power BI as their primary business intelligence software tool. The impact of the tool is enhanced by its low cost and low barrier to entry, especially given Microsoft’s massive market reach with its SQL Server and Office platforms.

4. REQUIREMENTS AND DETAILS OF THE BA MINOR

4.1 Outline of the BA Minor

The BA Minor will consist of a required set of BA core courses plus one elective course (or “pair”).

- Business Majors: 22 credits total; reduced by 8 credits by double counting Boler Core courses ...effectively 14 credits beyond Boler Core (i.e., 11 credits of BA core + a 3-credit BA elective)
- CAS Majors: 23-26 credits total; reduced by 3-9 credits if double counting non-Boler courses ...DATA 122 counts towards BA core; non-Boler BA electives can double count for some majors

4.1.1 BA Minor Core Courses (19 credits)

Boler core courses

- | |
|--|
| <ul style="list-style-type: none">- BI 100 BUSINESS ANALYSIS WITH EXCEL (1 credit)- BI 200 DATA-DRIVEN DECISION-MAKING (3 credits)- EC 210 BUSINESS ANALYTICS AND STATISTICS (4 credits)
or EC 209 INTRODUCTION TO LINEAR REGRESSION (1 credit) + stats course* (3 credits)
* DATA 122 or 228 or BI 141/EC 206 or PO 105 |
|--|

- BI 201 BUSINESS DATA ACQUISITION USING SQL ... new (1 credit)
- BI 202 BUSINESS APPLICATIONS OF R ... new (1 credit)
- BI 241 INTRODUCTION TO DATA VISUALIZATION WITH TABLEAU (3 credits)
- BI 341 ADVANCED DATA-DRIVEN DECISION-MAKING (3 credits)
- BI 371 BUSINESS DECISION OPTIMIZATION (3 credits)

4.1.2 BA Minor Contextual Elective (3 to 6 credits) ... select 1 course or “pair” from any list below

- **3-credit Context-Specific Data-Intensive Business Course** (additional pre-requisites apply*)
* prerequisites met by Boler core; non-Boler students can choose this option if they meet pre-requisites
 - . AC 341 ACCOUNTING INFORMATION SYSTEMS
 - . EC 410 ECONOMETRICS
 - . FN 342 INVESTMENTS ... includes Bloomberg certification
 - . MK 381 DIGITAL MARKETING ANALYTICS
 - . MK 402 MARKET ANALYSIS

... OR ...

- **4-credit Context-Specific Data-Intensive Course + Lab** (additional pre-requisites apply)
 - . PO 300 + 300L POLITICAL SCIENCE RESEARCH METHODS
 - . PS 301 + 301L EXPERIMENTAL DESIGN AND ANALYSIS IN PSYCHOLOGY
 - . SC 351 + 352 SOCIOLOGICAL DATA ANALYSIS

... OR ...

- **6-credit “Pair” of Adv Stats + Context-Specific Methods** ... select DATA 260 plus 1 course from list
 - . DATA 260 INTERMEDIATE STATISTICS WITH SPSS

Plus 1 of the following (does not have to be taken in the same semester as DATA 260):

 - . COM 304 RESEARCH METHODS
 - . EPA/SPS 232 RESEARCH METHODS IN EXERCISE SCIENCE AND SPORTS STUDIES
 - . PO 200 INTRODUCTION TO METHODS
 - . SC 350 SOCIOLOGICAL RESEARCH METHODS I

4.2 BA Minor Course Descriptions

4.2.1 BA Minor Core Courses (new courses shown in red)

BI 100 BUSINESS ANALYSIS WITH EXCEL (1 credit)

How to answer key business questions, analyze company finances, forecast sales, and prepare business cases while improving your Excel skills.

BI 200 DATA-DRIVEN DECISION-MAKING (3 credits)

Introduction to management information systems, decision support systems, and the data-driven decision process. Special emphasis on database management and the strategic use of information to drive decision-making in organizations. Group projects add practical experience to the conceptual approach. Prerequisite(s): BI 100.

BI 201. BUSINESS DATA ACQUISITION USING SQL (1 credit)

Introduction to Structured Query Language (SQL) and relational databases and modeling as they relate to accessing business data. The primary focus will be on data retrieval statements (i.e., data query language). Multi-tables databases and joins also will be covered. Prerequisite(s): BI 200.

BI 202. BUSINESS APPLICATIONS OF R (1 credit)

Introduction to the R programming language using business analytics problems. Topics include using RStudio, reading data into R, and programming in R. Statistical techniques such as data mining and marketing analysis examples will provide context to the topics. Prerequisite(s): EC 209 or EC 210.

BI 241 INTRODUCTION TO DATA VISUALIZATION WITH TABLEAU (3 credits)

Teaches concepts, theories, and skills, related to data visualization. Students merge, join, and download data from several sources to prepare and interpret usable visualizations. Students learn theory and design principles of data-based visualizations, how to spot misleading visualizations, as well as best practices for data visualization and dashboard design. Students also sharpen their analytical skills and learn to use Tableau. Prerequisite(s): BI 100 and EC 210

BI 341 ADVANCED DATA-DRIVEN DECISION-MAKING (3 credits)

Develops skills to translate a variety of data types into conceptual insights, and exposes students to “big data” and the analytical process and tools to manage and exploit the data. Topics include data types and sources, constructing queries using SQL data analysis using Excel, Cognos and Power BI, predictive analytics, and reporting and presentation of analyses. Prerequisite(s): BI 200 and EC 210

BI 371 BUSINESS DECISION OPTIMIZATION (3 credits)

Application of mathematical optimization to decision-making. Uses MS-Excel and several add-ins as tools to find optimal solutions to a wide variety of business problems. Topics include linear programming, network models, non-linear programming, goal programming, decision trees, and simulation. Prerequisite(s): BI 200 and EC 210

EC 210* BUSINESS ANALYTICS AND STATISTICS (4 credits)

Descriptive statistics, probability and probability distributions, sampling, and sampling distributions, hypothesis testing, chi-square analysis, analysis of variance, correlation, bivariate and multivariate regression analysis, time series, and index numbers.

**A statistics course (DATA 122 or 228 or BI 141/EC 206 or PO 105) + EC 209 can be substituted for EC 210*

4.2.2 BA Minor Electives (Boler)

AC 341 ACCOUNTING INFORMATION SYSTEMS (3 credits)

Introduction to, analysis and understanding of the role of accounting information systems in business organizations; operation and evaluation of computerized accounting systems; internal control.

Prerequisite(s): AC 202 (and AC 201).

EC 410 ECONOMETRICS (3 credits)

Building econometric models, understanding different econometric methods, and estimating models using computer packages. Prerequisite(s): EC 201, EC 202, and EC 210.

FN 342 INVESTMENTS (3 credits) ... includes Bloomberg certification

Principles in the selection and management of investments, from the viewpoints of large and small investors. Prerequisite(s): FN 312 (minimum grade of C).

MK 381 DIGITAL MARKETING ANALYTICS (3 credits)

Focuses on the analytics behind planning and evaluating digital marketing efforts, now heavily emphasized in the inbound marketing process. Topics include SEO, building dashboards, website analytics, social media analytics, search analytics, audience analytics, content analytics, engagement analytics, mobile analytics, ROI, data visualization, KPIs, and translating analytical insights into action.

Prerequisite(s): MK 301.

MK 402 MARKET ANALYSIS (3 credits)

Examination of the quantitative tools marketers use to develop, monitor, and evaluate marketing strategies. Topics include the use of online survey tools, statistical analysis using SPSS, market share metrics, financial analysis, and analysis of promotion effectiveness. Prerequisite(s): MK 301 and EC 210; Senior standing.

4.2.3 BA Minor Electives (Non-Boler)

COM 304 RESEARCH METHODS (3 credits)

Building on the department goal of understanding target audiences, students will explore qualitative and quantitative methodologies for defining and reaching audiences, and demonstrate an understanding of demographics, psychographics, primary and secondary research, survey design, focus groups, benchmark research (pre-and-post campaign assessment), one-on-one interviews, ethnography, narrative analysis, experimental design, case studies, and more.

DATA 260 INTERMEDIATE STATISTICS WITH SPSS (3 credits)

Power analysis, factorial and repeated measures analysis of variance, nonparametric procedures, contingency tables, introduction to linear regression. Use of SPSS. Note: A grade of C- or higher in DATA 260 is required to register for any course that has DATA 260 as a prerequisite. Students may not earn credit for both DATA 260 and DATA 261. Prerequisite(s): DATA 122 or equivalent

EPA/SPS 232 RESEARCH METHODS IN EXERCISE SCIENCE AND SPORTS STUDIES (3 credits)

Research methodology used in exercise science, allied health and sports studies. Emphasis on the individual aspects of the research process, such as the use of research databases, developing reviews of literature, developing research questions. Development of a research proposal is required.

PO 200 INTRODUCTION TO METHODS (3 credits)

Introduces various approaches used in the social sciences to understand the socio-political world and provide causal explanation for its discernible patterns and features. Includes the basics of forming a research hypothesis and a review of the literature relevant to a research project.

PO 300 POLITICAL SCIENCE RESEARCH METHODS (3 credits)

The principles and tools of political (and social) science research, including variables, hypotheses, measurement, research designs, sampling, data collection, and data analysis. Emphasis on practical application by learning the use of professional analysis software. Should be taken by the end of the junior year. Prerequisite(s): PO 200; Corequisite(s): PO 300L.

PS 301 EXPERIMENTAL DESIGN AND ANALYSIS IN PSYCHOLOGY (3 credits)

Introduction to the scientific method as it is used to design, conduct, and analyze experiments in psychology. Prerequisite(s): PS 100 or PS 101; Minimum grade of C- in DATA 122, DATA 260 (or equivalent) and EN 125 (or equivalent); Corequisite(s): PS 301L.

SC 350 SOCIOLOGICAL RESEARCH METHODS I (3 credits)

Focuses on the logic of, procedures for, and issues relating to, theory testing in various types of social research. Topics include hypothesis construction, concept operationalization, research design, data collection, instrument construction, sampling techniques, and ethical concerns. Methods include surveys, in-depth interviews, observational field research, and content analysis. Prerequisite(s): SC 101 and two additional SC courses.

SC 351 SOCIOLOGICAL DATA ANALYSIS (3 credits)

How to do quantitative data analysis, including SPSS statistical analysis program coding/recoding variables, levels of measurement, hypothesis testing, estimation, sampling distributions, bivariate relationships, correlations, and regression. Requires an original quantitative research project. Prerequisite(s): DATA 122 or PO 105, and SC 350; Corequisite(s): SC 352.

4.3 Prerequisites and Scheduling

Room in student's schedule permitting, all BA Minor core courses can be completed in 3 semesters (based on prerequisite sequencing).

4.3.1 Summary of BA Minor Course Prerequisites

BA Minor Core Course Prerequisites

- BI 200: BI 100
- BI 201: BI 200
- BI 202: EC 210
- BI 241: BI 100 and EC 210
- BI 341: BI 200 and EC 210
- BI 371: BI 200 and EC 210
- EC 209 (if substituted for 210): DATA 122 or equivalent

Note. BI 100 and EC 210 have no pre-requisites

BA Minor Elective Course Prerequisites

- AC 341: AC 201, AC 202

- DATA 260: DATA 122 or equivalent
- EC 410: EC 201, EC 202, EC 210
- FN 342: FN 312 (and AC 201, AC 202, EC 201, EC 202, EC 210)
- MK 381: MK 301
- MK 402: EC 210 and MK 301
- PO 300: PO 200
- PS 301: PS 100 or 101, DATA 122 and 260, EN 125
- SC 350: SC 101 + 2 SC courses
- SC 351: DATA 122 and SC 350 (requires 3 SC courses)

Note. COM 304, EPA/SPS 232, and PO 200 have no pre-requisites.

4.3.2 BA Core Course Scheduling

Fall/Spring/Summer

EC 209

EC 210

BI 100

BI 200

BI 241*

**Taught by Podium every semester in 2021*

Fall/Spring

BI 341

Spring Only

BI 371

Once per Year (TBD)

BI 201

BI 202

4.3.3 Resources/Staffing/New Courses

Except for the two proposed 1-credit courses on SQL (BI 201) and R (BI 202), all BA Minor Core courses have been taught/covered without issue for numerous years. BI 201 is a fitting topic for the BI faculty to teach. Various Boler faculty members would have the expertise to teach BI 202. Initially, R. Grecni (BI) and Y. Wu (MK) are willing and able to develop and teach 201 and 202 respectively. As each is a 1-credit course likely to be taught once per year, there are no anticipated issues in staffing these courses.

4.4 Proposal Summary

The BA Minor consists of 22 to 26 credits: 19 credits of required BA core courses, and 3 to 6 credits of context-specific data-intensive electives. Boler majors (and even Business Minors) can complete the BA Minor with 14 credits (four 3-credit courses plus two 1-credit courses) due to two conditions:

- 8 credits from the Boler core count towards the BA Minor core, leaving 11 credits to complete the courses in the BA Minor core; and
- 3 credits are sufficient to complete the BA Minor elective requirement since Boler core courses fulfill the pre-requisites for the context-specific data intensive business courses.

The above conditions are common practice among most universities. In particular, the double counting of business core courses within a BA minor is the norm since such courses are directly relevant to business analytics. For John Carroll, the relevant Boler core courses are similar to those that are double counted at other universities, namely: introductory courses in Excel and business statistics, as well as a course in data-driven decision making (that covers data acquisition and data analysis). While CAS majors may not be able to take full advantage of the crossover between the business core and the BA Minor core, there are some CAS courses (e.g., DATA 122) that double count towards the BA Minor.

5. BA LEARNING GOALS AND COURSE MAPPING

5.1 BA Core Courses

The BA Minor core courses in this proposal were selected to fulfill the foundational BA competencies. As was seen in Tables 4 and 5, a similar approach was taken by Miami, Ohio State, and Xavier (as well as others not shown such as Bradley, St. Joseph, and Valparaiso) who require three or even four BA core courses (beyond the business core) – taught in a BA/BI area related to decision sciences or information systems – to cover material on data management, visualization, descriptive analytics, and predictive and/or prescriptive analytics.

Likewise, as proposed, John Carroll would require three 3-credit BA core courses beyond the business core – taught in the BI area – to cover foundational BA domains. In addition, two 1-credit courses (BI 201 and 202) are proposed for the primary purpose of covering key BA software tools, namely SQL and R, in the context of business problems. Table 6 maps the coverage of the areas as they relate to the BA core courses.

Table 6 - MAPPING FUNDAMENTAL BA KNOWLEDGE DOMAINS TO BA CORE COURSES

	<i>Boler Core Courses</i>			<i>New Courses</i>		<i>Existing Courses</i>		
	EC 210 (4 cr)	BI 100 (1 cr)	BI 200 (3 cr)	BI 201 (1 cr)	BI 202 (1 cr)	BI 241 (3 cr)	BI 341 (3 cr)	BI 371 (3 cr)
Data Access/Models			1	2			2	
Data Preparation			1				2	
Data Visualization			1			2	2	
Descriptive Analytics	1		1		1		2	
Predictive Analytics	1				2			2
Prescriptive Analytics			1					2
Business Reporting			1			2	2	2
BA Software Tools								
Excel	1	1	2					2
Power BI			1				2	
R					2			
SQL				2				
Tableau						2		

Note: 1 = Introductory or Partial Coverage; 2 = Reinforcing or Intermediate/Advanced Coverage

A key criterion to the coverage of foundational BA material is for the focus of the course to be on the BA domain(s). In other words, the courses are meant to directly instruct students on the relevant BA topics rather than merely using the technique while teaching a tangential topic. This does not mean that a BA core course cannot and should not use examples from disciplines (particularly business-related) to teach the knowledge and skills of a BA domain. On the contrary, the inclusion of business-related contexts is important to helping a student become a more informed business analyst. For example, when teaching prescriptive analytics techniques such as optimization, simulation, etc., it is advantageous for BI 371

(Business Decision Optimization) to employ relevant examples (which may include supply chain or operations-related problems) that are conducive to utilizing prescriptive techniques. Ultimately, a key factor of business analytics (and the BA Minor core) is the business context – it focuses on data, tools, problems, and insights that are directly relevant to business users.

5.2 BA Minor Electives (Context-Specific, Analytics/Data-Intensive Courses)

The BA Minor electives in this proposal were selected to reinforce BA-related knowledge and skills in the context as they are applied to the problems of a discipline. To be counted as a BA Minor elective, a course must fall into one of the following categories:

- An upper-level (junior or senior) course with a primary focus on data analysis taught in a context as it is applied to the problems of a discipline. Such a course would include substantive use of an analytics software tool (such as R, SPSS, SAS, etc.) and will have a statistics course as a prerequisite (direct or indirect) or a corequisite computer lab course. Emphasis is placed on framing the contextual problem of the discipline and utilizing the statistical software in its solution. This would include courses such as: EC 410, MK 402, PO 300/300L, PS 301/301L, SC 351/352.
- If a course at any level has a primary focus on research methods (in the context of a discipline) but does not include the substantive use of analytics software and/or require a statistics prerequisite or a computer lab, an advanced statistics course (e.g., DATA 260) that employs statistical software (such as R, SPSS, SAS, etc.) can be “paired” up with the methods course so that together they fulfill the requirement of the elective. Methods courses of this nature would include: COM 304, EPA/SPS 232, PO 200, SC 350. As a note, the advanced statistics course does not have to be taken during the same semester as the methods course.
- An upper-level business course with a primary focus on business data and/or databases and the study, access, retrieval, and/or analysis of that data. This would include courses such as: AC 341, FN 342, MK382.
- An upper-level business course designed to focus on a fundamental BA process domain and that includes substantive use of an analytics software tool. This would include courses like EC 410.

5.3 Program Learning Goals

The learning goals of the BA Minor reflect the BA knowledge domains. These goals are as follows:

- **Data Acquisition.** Accurately identify and access data sources and structures so as to retrieve and prepare data for business analysis.
- **Analytics Techniques.** Appropriately apply predictive and prescriptive analytics techniques* to business data and problems.
- **Descriptive/Visualization.** Effectively describe and visualize business data using analytics and business intelligence tools.
- **Reporting/Communication.** Ethically interpret and communicate the results of business data analyses.

*Note. Examples of predictive analytics include regression analysis (the mainstay of predictive methods) and data mining. Examples of prescriptive analytics include optimization, simulation, and algorithmic decision-making.

Students will be assessed using various in-class techniques, including quizzes, exams, homework, projects, and presentations.

6. OVERSIGHT AND BUDGET

6.1 Oversight

The BA Minor will be administered from the Management, Marketing, and Supply Chain Department, and as such, it will be directed by the MMS department chair. The Boler Undergraduate Core Curriculum (BUCC) will provide ongoing review and consultation on the minor. To that end, a group of Boler faculty comprised of BUCC members who teach BA core courses (R. Greci, C. Watts, and A. Welki) along with Boler faculty who teach business analytics-related courses (K. Schuele, M. Sheldon, and Y. Wu) met with the Boler Dean (S. Moore) and Associate Dean (W. Simmons) to review and advise on the proposal. Such a sub-group will be convened for future consultation. In addition, an advisory group comprised of John Carroll alumni – similar to the group convened for the Boler Analytics Summit – also will be consulted.

6.2 Implementation and Cost

Almost all courses for the BA Minor currently exist and are well staffed. As such, the goal and intent would be to offer the BA Minor in the next academic year (2022/2023). Two new 1-credit courses (BI 201 and 202) will be added and taught once per year. For the benefit of existing students who already have expressed an interest in a BA Minor, these new courses could be offered as soon as 2022/2023. At approximately \$1350 per credit hour for an adjunct (with a master's degree and 7 years' experience), the cost equivalent to offer two 1-credit courses for the BA Minor is \$2700 per year. There are no anticipated software costs as the two new courses will be using open-source software.

There is a variable cost to offering BI 241 in its current form. The course currently is taught by Dr. Robert Alvarez, Professor and Curriculum Chair of Analytics Programs at Podium Education. The Boler College has been working with Podium to deliver courses that cut across multiple programs (undergraduate, MBA, graduate certificate, etc.). While BI 241 could be taught by a Boler faculty member (course load permitting) or a hired adjunct instructor, the relationship with Podium has presented an opportunity to reach multiple constituents and serve multiple programs and thus involves a cost/benefit complexity. On the benefit side, Podium courses also have generated revenue from JCU alumni and others who have paid to take a course as a supplemental learning experience (for example, to learn Tableau).

Non-JCU student revenue combined with summer revenue from Podium courses has offset (at least in part) the cost of their instructional services (which is charged per credit at 50% of net tuition revenue). Benefits aside, additional students taking BI 241 will incrementally increase our instructional costs. The analysis in Table 7 (below) does not account for the cost/benefit complexity of the Podium relationship but rather looks only at the incremental cost of \$700 per student added to BI 241. The analysis starts at 10 extra students in BI 241 due to the BA minor and increases to 20. It is difficult to project interest, but 20 reflects the size of the Leadership Minor. The number of students minoring in 2020 in Leadership and Entrepreneurship – the two leading minors among Boler students – was 22 and 45 respectively.

6.3 Competitiveness and Revenue

Despite the competitive environment surrounding business analytics, it is unclear as to how the addition of a BA minor will affect enrollment at John Carroll. Given that nearly all of our comparators and competitors have a BA minor, it is very conceivable that John Carroll loses some (albeit likely small) number of students who wish to supplement their business major with a business analytics minor. At a minimum, not only does a BA minor benefit our students (as well as the organizations who hire them), it

offers a selling point during admissions recruitment. If we were to gain even one student per year (at the current discounted net tuition of approximately \$15500), the BA minor would yield a net benefit.

The following analysis (in Table 7) assumes a gain of one full-time student per year, with the assumption of graduating each gained student after four years, at which point the maximum gain would be realized. Each student would generate \$15500 per year in additional revenue. Any number of students gained beyond one would increase revenues while having a lesser effect on costs (for example, the incremental Podium cost of \$700 per new student, the partial effect that each new student has on the possible need to offer an additional section due to course capacity, etc.). Even if one student was gained only every other year, and we reached 30 students in our Podium costs, the budget would still show a positive net contribution. Furthermore, if we employed an adjunct to teach BI 241, we would need only to gain one new student every four years to realize a positive financial contribution.

Table 7 – ESTIMATED BUDGET

	Year 1	Year 2	Year 3	Year 4	Year 5
Cumulative increased enrollment Revenue (at \$15500* per student)	1 15,500	2 31,000	3 46,500	4 62,000	4 62,000
Increased Podium students Cost (at \$700 per student)	10 (7,000)	15 (10,500)	20 (14,000)	25 (17,500)	25 (17,500)
New credits to be taught Cost (at \$1350 per credit)	2 (2,680)	2 (2,680)	2 (2,680)	2 (2,680)	2 (2,680)
Potential Contribution	5,820	17,820	29,820	41,820	41,820
Cumulative	5,820	23,640	53,460	95,280	137,100 *

* The University Committee on Resource Allocation (UCRA) template includes a continuing student revenue of \$17,500 after the first year, resulting in a cumulative 5-year contribution of \$155,100.

6.4 Future Direction

The BA minor proposal received support from all members of BUCC and the working group of Boler faculty members, as well as agreement that the BA minor curriculum covered the range of knowledge domains, skills and tools within a reasonable number of credits (15 additional credits beyond the Boler core was the targeted maximum). In addition, the development of the proposal added to the discussion about analytics within the Boler core curriculum. In particular, BUCC plans to consider how R (and possibly SQL) might be incorporated into the Boler core, with EC 210 as the natural target for R. While it is possible to incorporate SQL into BI 200, the level of complexity would be a difficult fit; and it is likely to be a more appropriate inclusion in BI 341. Both changes will be discussed with the goal that if R and SQL can be “absorbed” into the BA Minor core (by way of EC 210 and BI 341 or some other manner), then it will create more room to include a project-based capstone-style course for the BA minor. While other core courses in the proposed BA Minor employ projects, a capstone-style project course would help to reinforce and apply core skills and tools, and would provide a point of differentiation when compared to many of our competitors and comparators.

How does a Business Analytics (BA) Minor differ from a Data Science (DS) Minor?

There are 2 major points of difference.

1. BA is based first and foremost on the applied context of data-driven business decision-making and on solving business problems in areas such as finance, marketing, supply chain, etc.
2. BA is based primarily on end-user business analysis tools (such as Excel, Power BI, Tableau, etc.), while DS relies more on programming-based tools (such as R, SQL, Python, etc.).

These points are highlighted in some of the definitions provided in the proposal, including from Gartner (the leading IT research group) and SAS.

Gartner:

*Business analytics is ... delivered as an application **suitable for a business user**. These analytics solutions often come with prebuilt industry content that is targeted at an **industry business process** (for example, claims, underwriting or a specific regulatory requirement).*

SAS [in reference to their "SAS Business Analytics" tool]:

*An interactive, **self-service environment** lets you easily access and integrate a wide range of data sources for reporting or analysis. ... Easy-to-use predictive analytics and smart algorithms enable business users and analysts to assess possible outcomes, collaborate on what's most relevant, and make better, data-driven decisions **without programming**. Approachable analytics puts correlation, forecasting, scenario analysis, decision trees and text analysis at your fingertips.*

These points also are highlighted in the job skills research referenced in the proposal. For example, Verma, Yurov, Lane & Yurova (2019) looked at job postings and found:

For Business Analyst postings:

- one clear leader (**Excel**) **dominates** tools required for BA
- technical **skills like programming ... do not appear in the top five** skill categories.

For Data Scientist postings:

- **stronger emphasis is placed on technical skills for the DS category**
- **this difference is more pronounced for programming skills, data mining and big data tools**
- **a DS professional is required to have significant programming expertise.**

Perhaps related to this difference in focus, few Boler students are completing a DS Minor (despite Boler faculty encouragement). While the DS minor is still young and numbers may increase, Boler students have noted that the programming focus is not what they were seeking. BA and DS programs serve different (but related) purposes and audiences, with more than half of the schools in our analysis offering programs in both areas. It seems probable that there is some number of Boler students who do not pursue or finish the DS Minor in part due to the programming focus. This may be part of the reason for the **2-to-1 difference in the number of schools in our analysis that have BA versus DS minors**. In addition, the large number of BA minor programs may be due to their serving in a supplemental capacity to the education of business majors, thus making them more compatible to business students.

The supplemental nature and applied business focus are the most important aspects of a BA minor. In nearly all schools in our analysis, the BA minor is meant almost entirely for business majors (although we have explicitly built in accessibility for non-business majors by including non-business electives). As a discipline, the BA field relies primarily on areas such as business statistics, business intelligence, and management science for its foundation. From a program offering perspective, a BA minor expands into other business areas like marketing and economics. Ultimately, **BA coursework** relies heavily on existing (and sometimes new) **business courses that are taught from the perspective of business disciplines**.

Why/how did the relationship with Podium develop?

To begin with, Boler and JCU are under no obligation to continue using Podium to deliver BI 241 (Data Visualization with Tableau). At any time, depending on Boler (likely BI) faculty capacity and adjunct availability, we can choose to deliver the class with full-time or part-time faculty. Based on several reasons as described below, Boler has chosen to currently continue to deliver BI 241 via Podium.

The relationship between JCU and Podium Education began in the fall of 2019 when Podium contacted then Dean Miciak. Initial presentations were made to the Boler deans and a few Boler and Data Science faculty about how Podium could partner with JCU. As revealed in these meetings, Podium was offering an online set of courses that could be taken not only by business students but by any major. We saw courses like those taught in Boler (such as BI100 and EC210), courses that mapped to the BI/BA area (including a business-focused Tableau course), and a Python course that could possibly cross into the Data Science area. Their goal was to partner with us on the entire slate of 4 or 5 courses.

Podium brought several things to the table beyond their expertise in the subject area (led by a PhD-credentialed expert in business analytics), including a bootcamp-style pedagogical approach delivered in a very high-quality online experience (complete with “online coaches”). In addition to undergraduate offerings, they agreed to help us promote courses to non-degree seeking students and as a possible employee up-skilling option for corporate partners, thus opening doors to a new market and revenues. At that time, the BI and EC faculty had no capacity to offer additional courses or take on more students.

In spring 2020, the Boler Undergraduate Curriculum Committee (BUCC) voted to ask Podium to pilot a course to review their pedagogy, content, and student outcomes. It’s important to note that BUCC and other Boler faculty members were fully engaged in all decisions from the outset. BUCC was arguably more engaged in the content and delivery of Podium’s courses than they had been in any Boler course. Members of BUCC were added to the original online courses on Canvas; they reviewed the syllabi and course materials, attended live labs, and reviewed student outcomes. Podium was open to our scrutiny, and any faculty member may gain access to Podium course materials on a parallel Canvas course.

After evaluating the piloted course (a cross between BI 100 and EC 210, later listed as BI 141), discussion followed about offering a business-focused Tableau course (later listed as BI 241). The first offering of BI 241 was evaluated as BI 141 had been, including an Accounting faculty member attending most (or possibly all) of the live labs. BI 241 offered several points of value-added opportunity.

- Boler was not teaching such a course and did not have the capacity to offer it.
- Podium helped Boler to market the course to alumni as a point of additional revenue.
- Podium offered a high-quality online student experience with offline support including tutoring and coaching, and could immediately teach it online and prep students for Tableau certification.

In addition, after Boler enlisted Podium to teach BI 241, the Communications Department recognized the value of such a course as part of their entirely online Comm Grad Certificate/Master’s program.

To my understanding, over the past two summers (2020 and 2021), Podium’s offerings have generated more than \$80,000 in net revenue to JCU. One of the offerings – Data Visualization with Tableau – filled a gap that proved to be value-added to both our students and alumni. While developing the BA Minor, a need for BI 241 was identified. As BI 241 is currently being offered, and as Podium has proven to be a valuable partner with possible future opportunities (particularly in the corporate market), the BA minor proposal included Podium as a potential delivery mechanism for BI 241. However, this is not locked in as the only option, and the cost/benefit of the Podium relationship will continue to be evaluated.

January 24, 2022

Dr. Chrystal Bruce
Department of Chemistry
Chair, Faculty Committee on Academic Policies

Dear Professor Bruce,

I am pleased to endorse the Business Analytics Minor proposal before the Committee on Academic Policies (CAP). The proposal is thorough and minor represents an attractive potential option for many students in Boler as well as in the College of Arts and Sciences. Capturing, summarizing, understanding, and incorporating in decision-making the sea of data now available to organizations presents an extraordinary challenge. Meeting this challenge is creating rapidly growing opportunities for workers with capacity to address and analyze data. The Business Analytics Minor offers students a course of study designed to provide students the vital knowledge and skills employers seek in this field. It also adds a credential that enhances employability across a range of majors.

Certificate and so-called nanodegree programs on Coursera, Udacity, and edX are proliferating. This reflects an acute skills gap among existing workers and demand for up-skilling and training of current workers. It also signifies the opportunity for those entering the workforce. While John Carroll offers major and minor programs in the related field of Data Science, it is important to recognize that Business Analytics differs from Data Science. As the proposal's first section conveys, Data Science is closely connected with crucial technical aspects of accessing data, manipulating data, and modeling underlying data relationships. Business Analytics involves a marriage of traditional business skills and data analysis to derive and convey data driven insights for decision-making. The skills gap in *both* fields is significant and growing. As the proposal documents, however, compared to peer institutions and local competition, John Carroll is behind in providing Business Analytics programing to our students.

The Business Analytics Minor is an important step toward updating our program offerings and improving our competitive position to attract new students to John Carroll. This programing moves the University and the Boler College forward on the *Ignite the Future* strategic plan and the *Inspired Futures* strategic vision. It is also in lockstep with Boler's mission and its vision to educate students to make superior decisions and make a difference in our region.

A significant advantage of the program is its structure. It is built largely around courses the University and the Boler College already deliver. This structure limits new course development time and expense. Initially, the program entails only two new one-credit hour courses (one in SQL and one in R). Further, it holds out the prospect of folding learning from these courses into existing Boler business core courses through curriculum evolution. The contextual elective course also leverages existing courses in a student's major field. This enhances student understanding the role of data and analysis in their major as well as their ability to address data in other major courses with greater depth of understanding and expertise.

One concern that some might raise about the minor is staffing. Several faculty who currently teach analytics related courses may soon leave the University through retirement, leading to questions about the program's sustainability. Program structure actually helps allay this concern. The Boler College is committed to delivering the business core curriculum. The fact that the minor draws key courses from the business core curriculum ensures course offerings will be available every semester. This in turn provides students with scheduling flexibility in pursuing the minor. The University and the Boler College are also committed to maintaining AACSB accreditation. AACSB requires the College to have sufficient and qualified faculty to staff these courses. Finally, Boler's strategy of offering relevant academic programming coupled with a tight fit between the minor and the University's commitment to the *Inspired Futures* vision further solidifies institutional commitment to quality staffing for courses in the Business Analytics Minor.

In sum, the Business Analytics Minor proposal is timely, well conceived, and well written. It fills a gap in our academic offerings that the University has identified as a strategic priority as it seeks to increase enrollment. The program requires very little incremental resource commitment to develop. Its structure packages mostly existing courses in a cohesive way that allows students to validate their learning in an area of interest to potential students and potential employers. Once approved, the minor will give students across in many majors the chance to enhance their academic program while gaining an important edge in the job market upon graduation. I enthusiastically support the proposed Business Analytics Minor. I am happy to provide additional information regarding my support - or that of the Boler College - for this excellent program proposal upon the request of the CAP.

Sincerely,

Scott Moore
Interim Dean, Boler College of Business
216-397-4531
moore@jcu.edu



**JOHN M. AND MARY JO BOLER
COLLEGE OF BUSINESS**

1 John Carroll Boulevard
University Heights, Ohio 44118-4581
boler.jcu.edu

October 8, 2021

To the Faculty Council Committee on Academic Policies:

I am writing this letter in support of the new minor in Business Analytics in the Boler College of Business. We have had the need for an analytics minor for some time in the Boler College. This minor is easy to support since it uses existing courses to complete the minor. It also allows our students to stay competitive in a world that drowning in data. This minor will help our students to create islands of information from the data and make informed business decision that are based on facts. We will be able to support the required courses for the minor in the future.

This program has the full support from the Management, Marketing and Supply Chain Department.

Sincerely,

A handwritten signature in cursive script that reads "Charles A. Watts".

Dr. Charles A. Watts
Professor of Supply Chain Management/Chair
Management, Marketing, and Supply Chain
cwatts@jcu.edu
(216) 397-4448



JOHN M. and MARY JO BOLER
COLLEGE OF BUSINESS
Department of Economics and Finance
1 JOHN CARROLL BOULEVARD
UNIVERSITY HEIGHTS, OHIO 44118-4581

October 24, 2021

To the Faculty Council Committee on Academic Policies:

We write today to lend our support for the newly proposed minor in Business Analytics in the Boler College of Business. This minor has been discussed in BUCC (Boler Undergraduate Curriculum Committee) and among our faculty for a number of years and we are very pleased that all the effort is finally coming to fruition. We are excited to be finally able to offer a program of this nature, given the demand for people who are able to work competently with “big” data – who can visualize it, understand it, organize it in a way so that it is useful, and analyze it in an effective and meaningful way.

Our colleague, Dr. Andy Welki, has been involved in the creation of this minor from the outset (he is also our departmental representative on BUCC) and we can believe that our department will be able to support the demands for the required courses (EC 210 or EC 209) and the elective course (EC 410) for the minor.

Dr. Greci and his team have crafted a thorough and persuasive proposal and it has the full support of the Department of Economics and Finance.

A handwritten signature in black ink that reads "Lindsay Calkins".

Lindsay Calkins
Co-Chair, Department of Economics and Finance

A handwritten signature in black ink that reads "William Elliott".

William Elliott
Co-Chair, Department of Economics and Finance



Office of Undergraduate Admission
1 JOHN CARROLL BLVD.
UNIVERSITY HEIGHTS, OHIO 44118-4581
PHONE 216.397.4294
WWW.JCU.EDU

October 8, 2021

Dr. Mark Waner
Chair, Faculty Council

Dear Dr. Waner:

I am writing to indicate our enthusiastic support for the proposed new minor in Business Analytics. I have been asked to provide information regarding the relationship of this new program to our recruitment efforts and ways in which we can attract new students to John Carroll University because of this program.

The Division of Enrollment supports this new minor as it not only supports the strategic plan to pursue new programs in data/analytics, but also provides utility to serve students in various academic disciplines and career paths. As we prepare students for the future of work, we will be advantaged by offering academic programs that will support students in their career and provide skill sets that are desirable to employers. This minor also supports our plans for growth in healthcare and aligns with strong employer relationships that JCU has already cultivated for both internships and full-time employment.

This program at the undergraduate recruitment level aligns with our current Enrollment Marketing Plan to elevate programs in the Boler College of Business. By adding a minor in Business Analytics to our academic portfolio, we can showcase to our prospective students how we are supporting them for the future of work and providing them critical skills for the longevity of their careers.

If approved, we will put strategy and tactics into place in consultation with the Boler faculty and Integrated Marketing and Communications department, to market this opportunity in several ways - including student record purchases, developing a communication flow at all stages of the enrollment funnel, digital advertising and ensuring that our website and recruitment materials are updated and present a compelling story that aligns to the Inspired Futures brand. We will also work with the Boler faculty to provide extensive training to our enrollment team (and other key partners, e.g., our athletic coaches).

Please contact us if we can provide any additional information throughout your deliberations.

We encourage the members of Faculty Council to review and endorse this option.

Sincerely,

A handwritten signature in blue ink that reads "Stephanie Levenson".

Stephanie Levenson
Vice President for Enrollment Management



Office of Institutional Effectiveness

1 JOHN CARROLL BLVD.
UNIVERSITY HEIGHTS, OHIO 44118-4581
PHONE 216.397.1600
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September 21, 2021

Dr. Mark Waner,
Chair, Faculty Council

Dr. Chrystal Bruce,
Chair, Committee on Academic Policies
John Carroll University

Dear Dr. Waner and Dr. Bruce:

I am writing to indicate my support for the proposed minor in Business Analytics. I encourage the members of the Committee on Academic Policies to recommend that the proposed new program be approved by the faculty and made part of the curriculum.

I have been asked to provide information regarding the relationship of new program to the overall curriculum, the viability of its assessment plan, and the availability of resources to support assessment of the program.

The proposed minor is congruent with our existing academic structure, being comparable in size and structure to other minors (once courses that overlap with the Integrative Core, Boler core, and various majors are taken into consideration). The learning goals and course of study show a strong alignment with many of our institutional academic learning goals. I note here critical thinking, communication, and application of ethical frameworks.

The proposed minor is well aligned with current strategic initiatives in that it provides a program open to most University students that is aligned with market demands (from both incoming students and from employers).

This proposal provides a solid framework for a viable assessment plan. It describes program-level goals that are specific, measurable, easily aligned with the institutional academic learning goals, and focused on student learning. The proposal also indicates potential direct measures of student learning that are closely matched to the goals. Data obtained from such measures should enable

the faculty and director to make curricular changes at appropriate intervals to best ensure student learning.

Assessment of student learning is a routine part of faculty work and every academic program at John Carroll University already is involved in assessment. This minor will be no different. *There is nothing in this proposal to suggest that assessment of this program will require additional resources beyond those already provided by the institution in general or my office, in particular.*

If the minor is approved, I look forward to the opportunity to work with the Department of Management, Marketing, and Supply Chain to develop a formal assessment plan, curriculum map, and assessment instruments and procedures. Addition of a new minor does not approval from the state of Ohio or from our regional accreditor, the Higher Learning Commission.

I fully support the approval of this new program. Please contact me at x1600 or rbruce@jcu.edu if there is anything else that I can provide to inform your deliberations.

Sincerely,

A handwritten signature in black ink that reads "Robert Todd Bruce". The signature is written in a cursive style with a large, stylized "R" and "B".

Robert Todd Bruce
Assistant Provost for Institutional Effectiveness and Assessment



LAURI J. STRIMKOVSKY
VICE PRESIDENT FOR FINANCE AND ADMINISTRATION

October 14, 2021

Chrystal Bruce, PhD
Professor of Chemistry
Chair, Committee on Academic Policy

Dear Dr. Bruce:

The University Committee on Resource Allocation has reviewed the proposal for a minor in Business Analytics.

Based on the budget information, including projected enrollment, the committee is in support of this program moving forward to the Committee on Academic Policies for approval.

Please do not hesitate to forward any questions CAP may have to me.

Sincerely,

A handwritten signature in black ink that reads "Lauri Strimkovsky".



To: Dr. Mark Waner, Chair of Faculty Council
From: Michelle M. Reynard, Registrar
Date: October 7, 2021
Re: Review of Business Analytics Minor

Dear Dr. Waner,

After reviewing the proposal for the Business Analytics minor, I have concluded that there are no special needs for scheduling, billing, formalizing a degree audit or other exceptions that would prevent the minor from being implemented.

I am also satisfied that if approved, the degree specifications and new courses will be communicated to the Office of the Registrar in a timely manner for implementation in Banner and the Bulletin.

Sincerely,

A handwritten signature in black ink that reads "Michelle M. Reynard".

Michelle M. Reynard
Registrar
mreynard@jcu.edu