

**NOT FOR USE FOR CURRICULAR COURSE CHANGES  
REQUEST FOR PROGRAM IMPROVEMENTS**

**NOTE:** Changes to programs may require course changes, which must be processed electronically. Any questions should be directed to Associate Provost David Reinhold at 7-4564 or [david.reinhold@wmich.edu](mailto:david.reinhold@wmich.edu)

**DEPARTMENT:** BIS

**COLLEGE:** HCoB

**PROPOSED EFFECTIVE FALL YEAR:** Fall 2021

**PROPOSED IMPROVEMENTS:** *Academic Program Proposed Improvements*

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|--|--|--|
| <input type="checkbox"/> New degree*                 | <input type="checkbox"/> New minor*    | <input type="checkbox"/> Admission requirements  |
| <input type="checkbox"/> New major*                  | <input type="checkbox"/> Deletion*     | <input type="checkbox"/> Graduation requirements |
| <input type="checkbox"/> New curriculum*             | <input type="checkbox"/> Revised major | <input type="checkbox"/> Change in Title         |
| <input type="checkbox"/> New concentration*          | <input type="checkbox"/> Revised minor | <input type="checkbox"/> Transfer                |
| <input checked="" type="checkbox"/> New certificate* |  |  |


☐ Other (explain\*\*)    \*\* Other:

**Title of degree, curriculum, major, minor, concentration, or certificate:** Business Analytics

<b>Chair, Department Curriculum Committee:</b> 	<b>Date</b> 11/9/2020
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**CHECKLIST FOR DEPARTMENT CHAIRS/DIRECTORS**

- ☐ For new programs and other changes that have resource implications, the dean has been consulted.
- ☐ When appropriate, letters of support from department faculty are attached.
- ☐ When appropriate, letters of support from other departments in the same college are attached.
- ☐ When appropriate, letters of support from other college deans, whose programs/courses may be affected by the change, are attached.
- ☐ The proposal has been reviewed by HIGE for possible implications for international student enrollment.
- ☐ The proposal is consistent with the departmental assessment plan, and identifies measurable learning outcomes for assessment.
- ☐ Detailed resource plan is attached where appropriate.
- ☐ All questions attached have been completed and supporting documents are attached.
- ☐ The proposal is written and complete as outlined in the Faculty Senate guidelines and the curriculum change guides.

<b>Chair/Director:</b> 	<b>Date</b> 11/10/20
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**CHECKLIST FOR COLLEGE CURRICULUM COMMITTEE**

- ☐ The academic quality of the proposal and the faculty involved has been reviewed.
- ☐ Detailed resource plan is attached where appropriate.
- ☐ Consistency between the proposal and the relevant catalog language has been confirmed.
- ☐ The proposal has been reviewed for effect on students transferring from Michigan community colleges. Detailed information on transfer articulation must be included with undergraduate proposals.
- ☐ Consistency between the proposal and the College and department assessment plans has been confirmed.
- ☐ Consistency between the proposal and the College and department strategic plans has been confirmed.
- ☐ All questions attached have been completed and supporting documents are attached.
- ☐ The proposal is written and complete as outlined in the Faculty Senate guidelines and the curriculum change guides.

<b>Chair, College Curriculum Committee:</b>	<b>Date</b>
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**NOT FOR USE FOR CURRICULAR COURSE CHANGES  
REQUEST FOR PROGRAM IMPROVEMENTS**

**CHECKLIST FOR COLLEGE DEANS**

- ☐ For new programs and proposed program deletions, the provost has been consulted.
- ☐ For new programs, letter of support from University Libraries Dean indicating library resource requirements have been met.
- ☐ When appropriate, letters of support from other college faculty and/or chairs are attached.
- ☐ When appropriate, letters of support from other college deans, whose programs/courses may be affected by the change, are attached.
- ☐ The proposal has been reviewed for implications for accreditation, certification, or licensure.
- ☐ Detailed resource plan is attached where appropriate.
- ☐ All questions attached have been completed and supporting documents are attached.
- ☐ The proposal is written and complete as outlined in the Faculty Senate guidelines and the curriculum change guides.

<b>Dean:</b>	<b>Date</b>
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**FOR PROPOSALS REQUIRING REVIEW BY:**

GSC/USC; EPGC, GRADUATE COLLEGE, and/or FACULTY SENATE EXECUTIVE BOARD

<input type="checkbox"/> Return to Dean		
<input type="checkbox"/> Forward to:	Curriculum Manager:	Date:
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	*needs review by Chair, GSC/USC:	Date
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	Chair, EPGC:	Date
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	Graduate College Dean:	Date:
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	Faculty Senate President:	Date
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	*needs review by Provost:	Date

**FOR USE FOR CURRICULAR COURSE CHANGES  
REQUEST FOR PROGRAM IMPROVEMENTS**

1. Explain briefly and clearly the proposed improvement:

This curriculum change proposes to create a Business Analytics (BA) Graduate Certificate in the Haworth College of Business. The certificate will be administered by the Department of Business Information Systems.

To support this new certificate, the following courses are proposed in separate curriculum change forms:

CIS 6410: Financial Data Analytics (3 credits) OR MBA 6003: Data Analytics for Managerial Decision Making (3 credits) OR CIS 6400: Business Analytics (3 credits)

CIS 6300: Business Data Management (3 credits)

CIS 6500: Visual Analytics (3 credits)

CIS 6640: Predictive Analytics and Data Mining (3 credits) OR MBA 6014: Advanced Analytics for Managerial Decision Making (3 credits)

2. Rationale. Give your reason(s) for the proposed improvement.

Today's business data comes in many different formats, from a great variety of sources (e.g., blogs, social networking, sensors, images, and multi-media files), in large magnitudes of scale, and flow at increasingly accelerated rates. The abundance of data and the less expensive but more powerful technology create business opportunities to make informed data-driven decisions. However, a key challenge in many organizations is that they recognized data analytics to be a strategic competence to stay ahead of the competition, but they also lack analytics talents in existing staff. Therefore, analytics skills provide a foundation of success and competitive advantage in many business disciplines, and data-savvy functional specialists are in high demand in business.

This is why several key organizations have been advocating the inclusion of business analytics in the business college. AACSB, the leading international business accreditation organization in their 2020 standard (i.e., Standard 4\*) mentions that "Curriculum should be managed to ensure appropriate inclusion of technology". Also, throughout this standard, AACSB emphasizes on including analytics skills in the curriculum. The 2020 AACSB standard also indicates that it is the intention of their standards to be flexible enough to accommodate programs in analytics.

Despite the importance of analytics skills for business professionals and calls from academic and industry standards to include business analytics in the curriculum, WMU still does not offer any academic program that trains graduate students in Business Analytics (BA). The proposed BA graduate certificate will fill this gap and provide WMU graduate students with the analytics skills they can apply in business.

\* 2020 Guiding Principles and Standards for AACSB Business Accreditation

3. Effect on other colleges, departments, or programs. If consultation with others is required, attach evidence of consultation and support. If objections have been raised, document the resolution. Demonstrate that the program you propose is not a duplication of an existing one.

Creating a Business Analytics graduate certificate adds value to the university as a whole. Skills learned from this program may be applied to various areas, ranging from business decisions to personal choices. Although this certificate program is a strong standalone degree for students and professionals wishing to sharpen or learn business analytics skills after their undergraduate training, it is also a good companion to other graduate degrees (e.g., MBA, MS) for those wishing to back their business decisions with strong evidence supported by data.

This proposed certificate program will positively affect MBA and MS programs offered in the Haworth College of Business (HCoB) by enhancing the analytical foundation for deeper business insights. MBA and MS students can receive a certificate by successfully finishing the required courses in this BA certificate program. All of proposed courses in the BA certificate program are already adopted in MBA and MS at the business college. Therefore, by picking the specific BA courses in their respective degree programs, students are completing their MBA or MS degrees while earning the certificate. For example, future students completing MS in Finance and their analytics concentration will take all the BA certificate courses and receive the BA certificate.

4. Effect on your department's programs. Show how the proposed change fits with other departmental offerings.

The proposed graduate certificate program will have a positive effect on programs offered through the Department of Business Information Systems (BIS) by enhancing the analytical foundation for deeper business insights. For example, the MS in Information Security students could take the BA certificate courses and apply data analytics techniques in the cyber security domain. Since the BIS department already offers undergraduate Business Analytics major and minor for years, and most courses listed in this proposed BA certificate program are existing courses (or courses revised from the existing courses) offered by the same department, it provides a more complete spectrum of BA training by making the BA certificate program available as well.

5. Alignment with college's and department's strategic plan, mission, and vision.

This new graduate certificate program supports HCoB and College achieving their goals by supporting interdisciplinary and international education. Students from different backgrounds and disciplines will be able to use the learned analytical skills to make data enriched decisions. Also, international MBA and MS students could join this program and learn in-depth business analytics skills. The BA certificate program also aligns well with the newly revamped MBA program that specifically encourages skill-based concentrations. Making analytics training assessable to both undergraduate and graduate programs has also been the recent key strategic direction recommended by Undergraduate Program Council (UPC) and Graduate Programs Council (GPC) at the business college. The college's strategic plan specifically requires implementation of analytics skills in the business curriculum as well. It also aligns well with the department's strategic plan as the provider of analytics education.

6. Effects on enrolled students: Are program conflicts avoided? Will your proposal make it easier or harder for students to meet graduation requirements? Can students complete the program in a reasonable time? Show that you have considered scheduling needs and demands on students' time.

Most of the courses in this certificate program are currently offered regularly. Also, this certificate only requires 4 courses (12 credit hours) within the range of other certificate programs in WMU or other Business schools in Michigan. Therefore, the BA certificate will not make it harder for students to meet graduation requirements. As the required courses of this BA certificate program are also part of other graduate programs (e.g., MBA), finishing the courses required in the certificate program helps students develop a skill set in high demand while still completing their intended graduate degrees. Therefore, the certificate program will make it easier for students to develop an alternate skill set in addition to their graduate programs. The BA certificate program can also be completed independently without requiring other graduate programs.

\* List of WMU Certificate Programs (<https://wmich.edu/grad/academics/certificate-programs>)

7. Student or external market demand. What is your anticipated student audience? What evidence of student or market demand or need exists? What is the estimated enrollment? What other factors make your proposal beneficial to students?

Forecasts of job market demand for jobs requiring data analytics knowledge and expertise show a growing demand. According to the US Bureau of Labor Statistics Occupational Outlook Handbook, management, market research, and operations research analyst jobs will grow at a rate 11%, 18%, and 25%, respectively, between 2019 and 2029\*. In Michigan, these jobs will grow at a rate of 14%, 20%, and 26% between 2019 and 2029\*. Also, according to a 2018 survey conducted by the Graduate Management Admission Council (GMAC), more than 70% of employers hire graduates in data analytics roles\*\*.

However, according to several reports\*\*\*, approximately only 40 graduate programs are offering Business Analytics in the US. Based on the job market trends and the number of programs offering business analytics education in the US, there will be more job opportunities for students who are trained with analytics skills.

Enrollment is expected to range from 15 – 25 during the 2022 – 2023 time period. When it is at full capacity, the goal is to graduate 20 – 35 or more students per year. This is an estimate based on the trends of similar certificate programs reported in the literature (see Nestorov, Malliaris & Jukic, 2019 and Ghasemaghaei, Kapoor & Turel, 2019).

\* U.S. Bureau of Labor Statistics (<http://www.bls.gov>)

\* O\*NET Online (<https://www.onetonline.org/>)  
++ GMAC (<https://www.gmac.com>)  
+++ QS World University Rankings (<https://www.topuniversities.com>)  
Skoolville.com (<https://skoolville.com>)  
Masterstudies.com (<https://www.masterstudies.com>)

Nestorov, S., Malliaris, M. & Jukic, N. (2019). International Conference on Computational Science and Computational Intelligence (CSCI), IEEE.

Ghasemaghaei, M., Kapoor, B. & Turel, O. (2019). Impact of MBA programs' business analytics breadth on salary and job placement: The role of university ranking, Communications of the Association for Information Systems, 44.

8. Effects on resources. Explain how your proposal would affect department and University resources, including faculty, equipment, space, technology, and library holdings. If proposing a new program, include a letter and/or email of support from the university libraries affirming that the library resource issues have been reviewed. Tell how you will staff additions to the program. If more advising will be needed, how will you provide for it? What will be the initial one-time costs and the ongoing base-funding costs for the proposed program? (Attach additional pages, as necessary.)

The BIS department currently offers most of the courses in this proposed certificate program for MBA. At least five faculty in the BIS department are trained in data analytics and have the required knowledge, expertise, and teaching experience to teach the graduate certificate courses.

The BIS department is already offering several analytics courses and has required technology resources to support the proposed certificate courses. The on-premise cloud and virtual machines on the department owned servers have the capacity to support the BA certificate program. Many cloud services (e.g., Microsoft Azure, Amazon Web Services (AWS)) offer free educational licenses that students can use. Also, all the applications we use in this program offer free educational licenses for students. There is no additional requirement for physical space to support the BA certificate program either.

This proposed program does not need any additional support from the libraries. The BA faculty who advise undergraduate BA students and graduate students in existing BA courses will continue to advise students in the BA certificate. Finally, this program will not have any one-time or ongoing costs.

9. List the learning outcomes for the revised or proposed major, minor, or concentration. The department will use these outcomes for future assessments of the program.

The proposed BA certificate aims to provide students with business analytics skills to apply in different business functional areas. Students are expected to have the following knowledge and skills after finishing this program:

- Knowledge of core business analytics principles, assumptions, and applications;
- Ability to apply data acquisition and management skills to prepare data for analytics;
- Ability to apply analytics techniques to identify and visualize patterns and trends in the data and relate those patterns to business decision making at functional, tactical, and strategic levels;
- Ability to build analytical models, evaluate model performance and interpret findings.

10. Describe how this change is a response to assessment outcomes that are part of a department or college assessment plan or informal assessment activities.

As most courses in the proposed BA certificate program are existing courses (or the revised existing courses for the newly revamped MBA), and these courses are frequently in high demand every time they were offered, this result is indicative of interest and demand in the industry. Additional informal assessments in these courses also indicate that students wanted a complete training in analytics. The demand for graduate business analytics programs has not only a reason for the proliferation of such graduate programs, but also attracted interest of major program ranking services (e.g., US News\* and MBA Central\*) to start ranking graduate business analytics programs. Similarly, research in analytics has grown from slightly less than 500 published articles in 2015 to well over 1000 after 2020 (Hindle et al., 2020)\*\*, where forms of analytics, modeling techniques, data management, visualization dominated research trends. These are also the areas that we build into the proposed BA certificate program.

Therefore, we believe that the proposed BA certificate program will be a successful extension of our analytics offering to the graduate level at WMU.

\* <https://www.usnews.com/best-graduate-schools/top-business-schools/business-analytics-rankings>

+ <https://www.mbacentral.org/top/online-business-analytics-mba/>

++ Hindle, G., Kunc, M., Mortensen, M., Oztekin, A. & Vidgen (2020). Business analytics: Defining the field and identifying a research agenda, *European Journal of Operational Research*, 281(3), 483-490.

11. (Undergraduate proposals only) Describe in detail how this change affects transfer articulation for Michigan community colleges. For new majors or minors, describe transfer guidelines to be developed with Michigan community colleges. For revisions to majors or minors, describe necessary revisions to Michigan community college guidelines. Department chairs should seek assistance from college advising directors or from the admissions office in completing this section.

Not Applicable

12. Please offer both “Current Catalog Language” and “Proposed Catalog Language” if there is to be a change in the catalog description for a given program. For the “current” language, please copy and paste relevant language from the most current catalog and for the “proposed” language, please share the exact proposed new catalog language. As possible, bold or otherwise note the key changes in the new proposed catalog language.

## **Business Analytics Graduate Certificate (12 credit hours)**

### **Description:**

The overarching goal of the Graduate Business Analytics Certificate Program is to provide students with a strong foundation in analytical methods, techniques, and tools and train them to apply their analytical skills in making informed data-driven decisions. Students learn skills to acquire and manage real business data from various sources and prepare and visualize the data into compelling charts and dashboards to communicate patterns, trends, and findings. The program emphasizes the application of advanced analytical modeling to analyze massive structured and/or unstructured data and create business insights.

### **Required Courses (4 courses)**

1. CIS 6410\*: Financial Data Analytics (3 credits) OR MBA 6003: Data Analytics for Managerial Decision Making (3 credits) OR CIS 6400: Business Analytics (3 credits)\*
2. CIS 6300: Business Data Management (3 credits)
3. CIS 6500: Visual Analytics\* (3 credits)
4. CIS 6640: Predictive Analytics and Data Mining (3 credits) OR MBA 6014: Advanced Analytics for Managerial Decision Making (3 credits)\*

\* A concurrent curriculum change form for this new course is submitted for approval.

+ Courses listed are equivalent to each other. BA graduate certificate and MS Finance students must take courses with the CIS prefix. MBA students must take courses with the MBA prefix. Students must not take more than one equivalent courses.

### **Course Description**

#### **CIS 6410 – Financial Data Analytics**

This course introduces key data analytics skills, techniques, and tools to analyze financial data. It takes students from basic skills, such as data extraction from popular financial data sources (e.g., Bloomberg, Compustat, CRSP, web, cloud, and light-weight data sources), spreadsheet analysis & data modeling, ETL (extracting, transforming and loading), to some of the more advanced forms of analytics, including descriptive analytics, data visualization, and basic data mining/machine learning for real-time and off-line financial data. Students will learn to access and download data, analyze

the data, create reports, and provide written and oral reports for different financial and non-financial audiences. Professional practices and standards in different financial and analytics professions will also be introduced.

### **MBA 6003 – Data Analytics for Managerial Decision Making**

This course introduces the essential data analytics skills, techniques, and tools in preparing, managing, analyzing, and interpreting data to support strategic decision making in organizations. The course takes students from basic skills such as data extraction from popular data sources (e.g., web, cloud, and light-weight data sources), spreadsheet analysis & data modeling, ETL (extracting, transforming and loading), to some of the more advanced forms of analytics such as pivoting, data visualization, database methodologies, data mining/machine learning, big data, and cloud-based solutions.

### **CIS 6400 – Business Analytics**

This course is designed to give students comprehensive analytical skills. The need for historic and predictive analytics in the health care industry will be examined. Health care data from multiple sources will be integrated, manipulated, aggregated, and filtered. Students will experience dashboard software, and use both predictive models and automated processes to advance data examination and interpretation.

### **CIS 6300 - Business Data Management**

The focus of this course is Business Data Management. Students learn relational database design, management, administration, implementation, data security, and data migration (ETL). Students are introduced to the Big Data concept and NoSQL database. Database software such as Microsoft SQL Server, MongoDB, and related business intelligence and development tools may be used.

### **CIS 6500 - Visual Analytics**

This course introduces data visualization, exploratory data analysis, and visualization theories. Students will learn visualization techniques to analyze real-time and/or off-line data, create high-impact visualizations, and build interactive dashboards to uncover critical business insights. Students will also learn to design data stories with effective visuals to communicate analytics findings to the intended audiences.

### **CIS 6640 - Predictive Analytics and Data Mining**

This course provides students with an understanding of analytical techniques from business analytics, business intelligence and data mining to make practical business predictions and other data-driven decisions. Students will learn a variety of techniques to perform predictive and other forms of analytics, including data preparation, classification, prediction, clustering, regression, association, cross validation, performance evaluation, anomaly detection, etc. Practical real-life data (numeric and text) will be analyzed.

### **MBA 6014 - Advanced Analytics for Managerial Decision Making**

This course provides students with the skills to conduct machine learning and data mining techniques to make practical business predictions and other data-driven decisions. Major classes of analytical techniques popular in the industry are studied, including data preparation, classification, prediction, clustering, regression, association, cross validation, performance evaluation, anomaly detection, etc.