Cover Sheet for In-State Institutions
New Program or Substantial Modification to Existing Program

Institution Submitting Proposal	

Each __action__ below requires a separate proposal and cover sheet.

New Academic Program	Substantial Change to a Degree Program
New Area of Concentration	Substantial Change to an Area of Concentration
New Degree Level Approval	Substantial Change to a Certificate Program
New Stand-Alone Certificate	Cooperative Degree Program
Off Campus Program	Offer Program at Regional Higher Education Center

Payment Submitted:	Yes No	Payment Type:	R*STARS # Check #	Payment Amount:	Date Submitted:

Department Proposing Program			
Degree Level and Degree Type			
Title of Proposed Program			
Total Number of Credits			
Suggested Codes	HEGIS:	CIP:	
Program Modality	On-campus Distance Education (fully online) Both		
Program Resources	Using Existing Resources Requiring New Resources		
Projected Implementation Date (must be 60 days from proposal submisison as per COMAR 13B.02.03.03)	Fall Spring Summer Year:		
Provide Link to Most Recent Academic Catalog	URL:		

Preferred Contact for this Proposal	Name:
	Title:
	Phone:
	Email:

President/Chief Executive	Type Name:
	Signature: Date:
	Date of Approval/Endorsement by Governing Board:

Revised 1/2021

January 17, 2023

Kim E. Schatzel, Ph.D.
President

Office of the President
8000 York Road
Towson, MD 21252-0001

James D. Fielder, Ph.D.
Secretary of Higher Education
Maryland Higher Education Commission
6 N. Liberty Street
Baltimore, MD 21201

Dear Secretary Fielder:

Towson University seeks your review and approval to offer a **Doctor of Philosophy (Ph.D.) in Business Analytics** in accordance with the Code of Maryland Regulations (COMAR) 13B.02.03.06.

This full-time research program is designed to prepare scholarly educators specializing in supply chain management and technology management. The program aims to provide students with research methodologies to develop innovative and independent research and with instructional opportunities to effectively teach business analytics courses based on cutting-edge technologies.

If you have any questions or require additional information, please contact Rhodri Evans, Assistant Provost for Assessment, Accreditation and Compliance, at rhodrievans@towson.edu or by phone at 410-704-3312.

Thank you in advance for your review.

Sincerely,

Kim Schatzel, Ph.D.
President

KS/rjme

cc: Dr. Darlene Smith, Interim Associate Vice Chancellor, Academic and
          Student Affairs, USM
        Dr. Melanie L. Perreault, Provost and Executive Vice President for
          Academic and Student Affairs
        Dr. Clare N. Muhoro, Associate Provost for Academic Affairs
        Dr. Sidd Kaza, Associate Provost for Research and Dean of Graduate
          Studies
        Dr. Judy Harris, Interim Dean, College of Business & Economics

OI *410.704.2356*   F *410.704.3488*
presidentsoffice@towson.edu
www.towson.edu

A PROPOSAL FOR A PH.D. IN BUSINESS ANALYTICS PROGRAM AT TOWSON UNIVERSITY

Table of Contents

A. Critical Centrality to Institutional Mission and Planning Priorities

A1. Program Description and Alignment with Institutional Mission

Towson University (TU) submits this proposal to create a Doctor of Philosophy (Ph.D.) in Business Analytics program, which will be housed in the Association to Advance Collegiate Schools of Business (AACSB)-accredited College of Business and Economics (CBE), and which will be the first of its kind in the University System of Maryland (USM) and the State of Maryland.

The Ph.D. in Business Analytics program is a full-time research program that prepares graduate students, who are motivated to pursue an academic and research career, to be scholarly educators with two areas of research emphasis: supply chain management and technology management. The program aims to provide students with research methodologies to develop innovative and independent research and with instructional opportunities to effectively teach business analytics courses based on cutting-edge technologies as independent instructors. Admitted students will be offered financial support, a mixture of fellowships and research/teaching assistantships, to cover their tuition and stipends so that students can focus on research during their studies.

The degree requires a minimum of 60 credits: nine credits in interdisciplinary foundations of business management; 15 credits in research methods; 12 credits for seminars in business analytics research, including six credits in research seminars related to the declared area of research emphasis; and 24 credits in dissertation research. The program will be delivered on TU's main campus, with most courses taught face-to-face and a small number delivered via a hybrid instructional mode.

The establishment of a new research-focused Ph.D. degree program in Business Analytics fully aligns with TU's new expanded mission statement, which the USM Board of Regents approved in September 2022. TU's mission statement now includes a greater emphasis on research and provides the authority to grant research doctoral degrees, paving the way for the university's ongoing pursuit to achieve an R2-Doctoral Carnegie Classification.

A2. Strategic Goals Alignment and Affirmation as an Institutional Priority

Towson University's 2020-2030 Strategic Plan embraces a vision for a bolder and brighter future through academic excellence, which includes the goal of developing selective new doctoral programs that meet regional needs and align with the institution's mission. More specifically, the program will support TU's mission and strategic plan goals to increase the institution's commitment to graduate student research and prepare more students to be academics and researchers in high-need areas such as business/data analytics, where there is a growing need for qualified scholarly educators. The launch of this and other new doctoral programs will serve as a key driver for TU to

achieve a high research activity Carnegie status and thus the university administration considers its implementation an institutional priority.

A3. Five-Year Funding Plan

Towson University plans to allocate funds to support the Ph.D. program for the first five years as follows: $417,137 in Year 1, $654,207 in Year 2, $898,755 in Year 3, $1,143,592 in Year 4, and $1,143,910 in Year 5 (see Table L2 – Expenses for a detailed breakdown of the anticipated expenditures needed to implement the program). While the program will primarily be delivered by existing tenured and tenure-track faculty, the Provost's Office has approved one new tenure-track position to support program implementation.

A4. Institutional Commitment

As outlined above, the proposed Ph.D. program is integral to the university's new research-driven mission and strategic vision, and TU's commitment to the program is evident in the funding allocated to support the program's implementation over a five-year period (see section L for further details).

The Ph.D. in Business Analytics program already has most of the necessary administrative and technical supports and physical facilities in place to operate successfully. The Department of Business Analytics and Technology Management that will house the degree is well-established at TU and can draw upon 12 tenured or tenure-track faculty to teach in the program and serve as dissertation advisers, etc. (see section I for a listing of faculty who will teach in the program). Additionally, the department intends (with the college and central administration's endorsement) to hire one tenure-track faculty position in year one to help implement the program (see sections I and L.2 for further details).

The administrative support expenses needed to support the program are minimal, and the department is not seeking any capital investments or specialized facilities, since current classroom/office space in CBE will suffice. At the institutional level, the Office of Technology Services is able to provide comprehensive technical assistance to faculty and students, while the only program-specific technology supports required are computer desks for students. Beyond the aforementioned new faculty position, other major expenditures relate to student expenses (stipends, tuition remission, and conference attendance/travel).

TU is committed to student success; students admitted are provided with sufficient time for program completion. Doctoral students are provided up to 10 years to complete their degree. TU anticipates, however, that faculty mentors and advisors will guide students in this program, and full-time completion is expected within four years from admission and matriculation.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan

B1. Program Demand and Need

The field of business/data analytics cuts across all sectors of the new data-driven ("big data") economy, which is rooted in the STEM (science, technology, engineering, and mathematics) disciplines, and in which Maryland is celebrated as a national leader. A number of colleges and universities across the State have started to offer a variety of innovative programs in business/data analytics at the undergraduate and graduate levels to prepare students to work with analytical tools and technologies in this data-driven economy. However, there are no such programs currently offered at the doctoral level in Maryland. Consequently, TU's proposed Ph.D. in Business Analytics will fill an existing market gap in higher education in Maryland, serving as the culminating degree for students pursuing doctoral degree in this field, and thereby helping to address the need for advancement and evolution of knowledge. Furthermore, in producing highly trained scholarly educators, Towson will create a cadre of graduates able to serve as faculty in business, management, data science as well as other business/data analytics programs offered elsewhere in the State, and who, in turn, will help prepare students for rewarding employment and career success in the new data-driven economy.

B2. Alignment with Maryland State Plan for Higher Education

One of three goals outlined in the new 2022 Maryland State Plan for Higher Education is to "promote and implement practices and policies that will ensure student success." Embedded within this overarching goal is the priority (Priority 5) to "maintain the commitment to high-quality postsecondary education in Maryland." The goal of this doctoral program is to transform graduate students into scholarly educators, which fully aligns with Priority 5. As indicated above, business/data analytics lies at the cutting-edge of the new data-driven economy, and thus this proposed degree offering addresses the Priority 5 action item by identifying "innovative fields of study." Moreover, doctoral students enrolled in the program will be provided with pedagogical training and teaching assistantship opportunities, and will be required to work with faculty mentors to present their independent research at national/international academic conferences and publish in high quality academic journals. These activities support the Priority 5 action item of providing practical "real world" experiences.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State

C1. Employment Opportunities

The proposed Ph.D. program will prepare graduates primarily for postsecondary faculty positions in the field of business/data analytics. There is a growing need for trained

scholarly educators to conduct research and teach in these degree programs which, in turn, will produce graduates to work in the big data economy.

Framework for Market Study

The following framework guides the current market study:
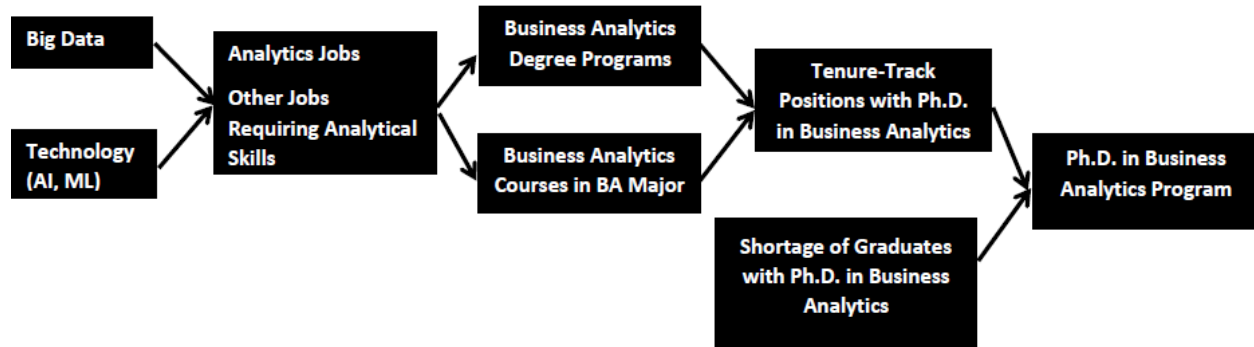
The underlying assumption is that the big data economy enabled by advanced technologies (e.g., machine learning, artificial intelligence) has created a demand for new jobs in business analytics or transformed traditional jobs requiring analytical skills. The U.S. Bureau of Labor Statistics (2021) reported that approximately 63,000 people were employed nationwide in the occupation category of data analytics, including business intelligence analyst, data analyst, business analyst and data scientist. As of May 2020, such data analytics occupations are projected to grow by 32% in 2030 (reaching 83,000 positions).[1] However, this is likely an underestimate of the demand for talent in data analytics since non-data analyst jobs increasingly also require data analytics skills.

A 2017 IBM report estimated that job roles which require data analytics skills would reach 2.72 million in the United States by 2020, including an increase in demand for data-driven decision makers.[2] In order to lead analytics teams or craft a company's digital strategy, executives will need a foundational understanding of data and analytics as well. A 2018 McKinsey study showed that the job demand gap for business analytics ranged from 140,000 to 190,000.[3]

To educate the new workforce, colleges and universities have started to integrate business analytics courses in their curriculum or to offer new programs in business analytics, leading to an increasing demand for tenure-track positions with Ph.D. in

---

[1] U.S. Bureau of Labor Statistics, Occupational Employment and Wages, May 2020. https://www.bls.gov/oes/current/oes152098.htm (accessed on October 16, 2022).
[2] IBM (2017), IBM Predicts Demand for Data Scientists Will Soar 28% by 2020. https://www.forbes.com/sites/louiscolumbus/2017/05/13/ibm-predicts-demand-for-data-scientists-will-soar-28-by-2020/?sh=6a37bd447e3b (accessed on October 18, 2022).
[3] McKinsey Co. (2018), *Analytics Comes of Age*. https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Analytics/Our%20Insights/Analytics%20comes%20of%20age/Analytics-comes-of-age.ashx (accessed on October 18, 2022).

Business Analytics. Meanwhile, the supply of graduates with Ph.D. in Business Analytics has lagged behind and resulted in a shortage of qualified educators in business analytics for years to come.

C2. Market Demand and Training Needs

A systematic study published in *Issues in Information Systems* (IIS, 2021), was conducted on formal business analytics degree programs offered by all 535 U.S. AACSB-accredited business schools. The study found that no business school offered a formal degree program in business analytics in 2014.[4] Seven years later, 348 out of 535 U.S. AACSB-accredited business schools (65 percent) were offering degree programs in business analytics either at the undergraduate or graduate level, or both (not including business analytics certificates or minor programs). For even those business schools that do not offer degree programs in business analytics, at least one business analytics course is required for the most popular undergraduate major – business administration. The study also reported that a total of 1,540 faculty were assigned to teach in business analytics programs, 1,075 of whom held a Ph.D. degree.

According to the 2021 IIS study, the AACSB annual reports showed the demand for tenure-track assistant professor positions in AACSB-accredited business schools as follows:

Year	2019	2020	2021
No. of Tenure-Track Positions Posted by AACSB Schools	64	90	121
Annual Growth Rate in Demand		41%	34%

The statistics reported in the 2021 IIS study are an underestimate for the number of programs in business analytics offered and the overall demand for tenure-track faculty positions, since non-AACSB-accredited business schools were not included in the study. It is estimated that approximately 25-30 percent of all business schools in the United States are AACSB-accredited. Therefore, there are at least 1,200 other business schools in the United States which may be accredited by other accreditation bodies or not accredited at all. At the lower end of estimates, the demand for tenure-track (or equivalent) assistant professor positions at all non-AACSB-accredited business schools is likely to be at least double the demand by all AACSB-accredited business schools.

C3. Anticipated Vacancies and Training Needs

Given the current high growth rates of demand for tenure-track (or equivalent) assistant professor positions, TU assumes a modest annual growth rate for the period 2021-2028

---

[4] Zheng, Hameed, Lavoie & Sendall (2021). An Overview of Current Business Analytics Programs across US AACSB Schools, *Issues in Information Systems*, 22 (2), pp. 306 – 317.

and projects the number of tenure-track assistant professor position needed for all U.S. business schools as follows:

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
No. of Tenure-Track Asst. Prof. Positions Posted in AACSB-Accredited Business Schools	**64**	**90**	**121**	145	167	192	211	232	244	256
Estimated No. of Tenure-Track Asst. Prof. Positions in Non-AACSB-Accredited Business Schools	128	180	242	290	334	384	422	464	488	512
Estimated Total No. of Positions	192	270	363	435	500	576	633	697	732	768
Estimated Annual Growth Rates for 2022-2028		**41%**	**34%**	20%	15%	15%	10%	10%	5%	5%

Using the number of tenure-track assistant professor vacancies posted by AACSB-accredited business school for Years 2019, 2020 and 2021 as a baseline, TU estimates that the number of tenure-track (or equivalent) assistant professors positions needed by all U.S. business schools, including AACSB-accredited and non AACSB-accredited schools, may have reached 363 in 2021. The projected number of tenure-track positions for business analytics may exceed 768 by 2028, when the first cohort of graduates from TU's proposed Ph.D. in Business Analytics goes to the job market.

In terms of training needs, the program will prepare scholarly educators with research expertise in fields such as economic theory, data analytics, machine learning, supply chain management, and management information systems. Meanwhile, business schools have an increasing demand for instructors who are trained in the discipline of business analytics and equipped with innovated teaching pedagogies.

C4. Projected Supply of Prospective Graduates

Per the MHEC program enrollment database, a number of colleges and universities have started to offer programs related to business/data analytics. Enrollment has increased dramatically over the period 2017-2021.

School Name	Degree Level	PGM-CD	Program Name	CIP	2017	2018	2019	2020	2021
Capitol Technology University	BACHELORS	50701	DATA SCIENCE	307001	0	3	3	5	5
Capitol Technology University	MASTERS	50301	BUSINESS ANALYTICS & DATA SCIENCE -	521302	0	3	5	3	3
Frostburg State University	POST BACCALAUREATE CERTIFICATE	50603	BUSINESS ANALYTICS	520201	0	0	0	1	1
Goucher College	BACHELORS	179900	INTEGRATIVE DATA ANALYTICS	300801	0	0	1	5	5
Johns Hopkins University	MASTERS	50603	BUSINESS ANALYTICS & RISK MNGT	521399	59	82	164	210	280
Johns Hopkins University	MASTERS	220703	DATA ANALYTICS AND POLICY	450102	89	110	108	46	132
Johns Hopkins University	MASTERS	170200	DATA SCIENCE	270501	97	179	249	347	456
Johns Hopkins University	POST BACCALAUREATE CERTIFICATE	220703	DATA ANALYTICS AND POLICY	450102	13	20	16	7	7
Johns Hopkins University	POST-MASTERS CERTIFICATE	170200	DATA SCIENCE	270501	0	1	0	0	0
Loyola University Maryland	BACHELORS	70202	DATA SCIENCE	110401	0	7	19	21	32
Loyola University Maryland	MASTERS	70201	DATA SCIENCE	110401	23	29	34	44	35
McDaniel College	MASTERS	50700	DATA ANALYTICS	521301	0	0	0	22	68
McDaniel College	POST BACCALAUREATE CERTIFICATE	50701	DATA ANALYTICS	521301	0	4	2	0	0
Mount St. Mary's University	BACHELORS	79900	DATA SCIENCE	307001	0	0	0	3	7
Mount St. Mary's University	POST BACCALAUREATE CERTIFICATE	79900	DATA SCIENCE	270599	0	0	0	2	0
Salisbury University	BACHELORS	170101	DATA SCIENCE	307001	0	0	0	9	13
Univ. of MD Global Campus	MASTERS	50300	DATA ANALYTICS	521302	363	329	296	273	255
Univ. of MD Global Campus	POST BACCALAUREATE CERTIFICATE	50301	FOUNDATIONS IN BUSINESS ANALYTICS	521302	18	17	22	17	10
Univ. of MD, College Park	BACHELORS	59903	OPERATIONS MGMT AND BUSINESS ANALYT	521301	85	120	135	163	166
Univ. of MD, College Park	MASTERS	50300	BUSINESS ANALYTICS	521302	74	161	209	201	214
					821	1065	1263	1379	1689

The total enrollment in various data/business analytics or closely related programs at the bachelor's, post-baccalaureate certificate, master's, and post-master's certificate level across Maryland totaled 1,689 as of fall 2021 (up from 821 enrollments statewide as of fall 2017), and a number of these programs have seen significant growth in the past five years. Note that not all programs offering business/data analytics tracks under traditional majors may be captured by the MHEC database. It has become popular that some analytics courses are required in schools without formal degrees in business analytics. TU anticipates that the programs listed in the above table will serve as a pipeline to the proposed Ph.D. degree and that TU will enroll six new doctoral students each year in the first five years of the program.

D. Reasonableness of Program Duplication

D1. Similar Programs

Per TU's research, no university in the State of Maryland currently offers a full-time, research-focused Ph.D. program in business analytics that prepares graduates for an academic career. Arguably, the closest program to TU's proposed degree is Capital Technology University's (CTU) 54-credit Ph.D. program in Business Analytics and Data Science. However, CTU's program, which was approved by MHEC in 2015, is "designed to prepare accomplished professionals for senior positions in either public or private sectors," and "to enable professionals from the field to understand and evaluate the scope and impact of decision sciences and associated technology from the institutional as well as from an industry and global perspective." CTU's program is delivered online and taught by working professionals in the field (https://www.captechu.edu/degrees-and-programs/doctoral-degrees/business-analytics-and-data-science-phd).

In contrast, TU's proposed program will be taught through a mix of face-to-face and online instructional modes by full-time tenured or tenure-track faculty with Ph.D. degrees and is a research-focused program designed to prepare students to pursue an academic career as scholarly educators.

	Fall Enrollment in Similar Programs					
Institution	Program Name	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)	Year 4 (2020)	Year 5 (2021)
Capitol Technology University	Ph.D. in Business Analytics & Data Science	41	40	44	41	39

Source: MHEC Trends in Enrollment Data by Program

	Degrees Awarded in Similar Programs					
Institution	Program Name	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)	Year 4 (2020)	Year 5 (2021)
Capitol Technology University	Ph.D. in Business Analytics & Data Science	0	2	9	8	8

Source: MHEC Trends in Degrees and Certificates by Program

D2. Program Justification

U.S. business schools have not started to provide Ph.D. degree programs in business analytics until recent years. A recent survey of the AACSB database shows that only 149 U.S. AACSB-accredited business schools offered full-time doctoral programs, and only 42 of which offered doctoral degrees in areas related to business analytics.[5] There are a number of Ph.D. programs in data science programs offered outside of business schools. According to a 2019 *Harvard Business Review* article, however, quantitative and analytic skills are considerably more valuable when combined with business know-how, which helps data analysts identify patterns, develop insights, and empathize with users, who are managers and decision makers across their organizations.[6] Given the cycle of four-to-five years to earn a typical Ph.D. degree, there is a severe shortage of graduate students with Ph.Ds. in business analytics, and graduates with doctoral

---

[5] AACSB (2022). AACSB Accredited Schools. https://www.aacsb.edu/accredited?searchTerm=Ph.D.+in+Business+Analytics&countries=united-states&educations=doctoral&formats=full-time (accessed on August 15, 2022)

[6] Stobierski, Tim (2019). The Advantages of Data-Driven Decision-Making, Harvard Business Review. https://online.hbs.edu/blog/post/data-driven-decision-making (accessed on August 16, 2022)

degrees in business analytics obtained from an AACSB-accredited business school are likely to become very attractive in the academic job market.

E. Relevance to High-Demand Programs at Historically Black Institutions (HBIs)

Based on TU's research, none of the four HBIs located in the State of Maryland currently offer a doctoral program in business analytics, data analytics or a related discipline. Therefore, TU does not anticipate its proposed Ph.D. degree will negatively impact the implementation or maintenance of high-demand programs at HBIs. Instead, TU's program could attract HBI graduates seeking to pursue doctoral studies in the field of business/data analytics and ultimately prepare scholars to teach and conduct research at HBIs in related disciplines

F. Relevance to the Identity of Historically Black Institutions (HBIs)

As indicated above, there are no programs currently offered at the doctoral level in business analytics, data analytics or a related discipline at any of Maryland's four HBIs. Consequently, given the specialized subject-area and doctoral-level focus of the proposed Ph.D. in Business Analytics, TU does not anticipate that its implementation will have an impact on the uniqueness and institutional identities and missions of HBIs.

G. Adequacy of Curriculum Design, Program Modality and Related Learning Outcomes

G1. Program Establishment and Oversight

The Ph.D. in Business Analytics curriculum was developed by faculty within the Department of Business Analytics and Technology Management in CBE, drawing upon the market data presented above and faculty expertise in business analytics methodologies and the areas of research focus, including supply chain management and technology management. The program receives support from other departments across TU. Additionally, the Department of Economics within CBE will contribute one fundamental methods course (ECON 601 Introduction to Econometrics) and the Department of Marketing within CBE will contribute one course in interdisciplinary foundations of business management (MKTG 770 Marketing Analytics and Metrics). Outside CBE, the Department of Computer and Information Systems and the Department of Mathematics will contribute another methodology course in the area of data mining and machine learning (COSC 757 Data Mining, COSC 760 Big Data Analytics or MATH 547 Statistics for Risk Modeling).

The program proposal was vetted through a rigorous review and approval process involving the department, college, TU's academic senate, and the Provost's Office and engaging both faculty and administrators.

A tenured or tenure-track faculty member will be appointed as program director, responsible for recruitment, communication with prospective students and student

progress during their studies. The program director may rotate on a three-year term. The program director will be supported by the chair of the Department of Business Analytics and Technology Management.

G2. Program Educational Objectives and Learning Outcomes

The Ph.D. in Business Analytics program is a full-time, research program that prepares graduate students, who are motivated to pursue an academic and research career, to be scholarly educators with two areas of research emphasis: supply chain management and technology management. The primary educational objectives of the program are to train students in research methodologies, enabling them to develop innovative and independent research, and provide students instructional opportunities to effectively teach business analytics courses based on cutting-edge technologies as independent instructors.

Students who complete the program are expected to demonstrate the following learning outcomes:

1. Master methodologies required to evaluate and conduct independent research.
2. Develop substantive core knowledge in their area of research emphasis.
3. Design and conduct original research in their area of research emphasis.
4. Demonstrate the ability to effectively communicate the results of their research.
5. Demonstrate the ability to teach undergraduate or graduate level courses as an independent instructor.

G3. Assessment and Documentation of Student Learning Outcomes

The program will employ a variety of assessment measures appropriate at the doctoral level to assess student learning, including (but not limited to) course papers, presentations, comprehensive examinations, and preparation of a dissertation and oral defense. The table below maps specific assessment activities to specific learning outcomes.

Assessment of Learning Outcomes

Learning Outcomes	Assessment
Develop substantive core knowledge in an area of research emphasis	Course grades and assignments; comprehensive exams
Master methodologies required to evaluate and conduct research	Course grades and assignments; comprehensive exams
Design and conduct original research in an area of research emphasis	Submissions to peer reviewed journals Dissertation preparation
Demonstrate the ability to effectively communicate the results of their research	Conference presentations Oral defense of dissertation

Learning Outcomes	Assessment
Demonstrate the ability to teach undergraduate or graduate level courses as an independent instructor	Course evaluations Doctoral peer evaluations

Achievement of student learning outcomes will be documented in a variety of ways. For example, grades earned at the individual assignment and course level will be documented in TU's learning management system (Blackboard), while the final approved version of the dissertation will be submitted to the Office of Graduate Studies and archived in TU's library. Student conference presentations and journal publications will be recorded and reported by program director to the department. More generally, assessment data will be recorded, archived, and tracked over time by the program director, who can draw on the expertise and resources of TU's Office of Assessment for assistance. Assessment data will be disseminated to program and department faculty, as well as to CBE's assessment committee, for review annually for consideration in the context of program improvement and consistent with best practices.

In addition to course-based assessment data, course evaluation data collected and analyzed will provide an indirect data source to measure student achievement of learning outcomes.

G4. Program Requirements and Course Descriptions

G4.1 Admissions Requirements

Admission to the program will be highly competitive. Minimum requirements include official transcripts showing a 3.0 cumulative GPA (on a scale of 4.0) for all undergraduate and graduate course worked completed, a master's degree, three letters of recommendation, statement of research plan, demonstrated strong quantitative, analytical and communication skills, and GRE or GMAT scores. An admissions committee comprised of tenured and tenure-track faculty members will be responsible for evaluation of applications and admission decisions.

G4.2 General Requirements

Students enrolled in the program will be required to satisfy the following requirements:

1. Earn a minimum of 60 credits: nine credits in interdisciplinary foundations of business management; 15 credits in research methods; 12 credits for seminars in business analytics research, including six credits in research seminars related to the declared area of research emphasis; and 24 credits in dissertation research.
2. Form a doctoral advisory committee by the end of the first year after admission, comprising three tenured or tenure-track faculty members. The chair of the committee must be a member of the graduate faculty and the Business Analytics and Technology Management department. The doctoral advisory committee will approve the student's program of study and guide the student's research activities.

3. Pass a written qualifying exam on the foundational course subjects prior to being admitted to candidacy.
4. Develop and defend a dissertation proposal.
5. Complete and successfully defend a dissertation based on timely and original research in declared area of emphasis: supply chain management or technology management.
6. Attend and present own research at national or international research conferences.

G4.3 Program of Study

Interdisciplinary Foundations of Business Management (9 credits):

- MKTG 770 Marketing Analytics and Metrics (3)
- EBTM 720 Supply Chain Analytics (3)
- EBTM 760 Business Data Warehousing (3)
  - o or COSC 760 Big Data Analytics (3)

Research Methods (15 credits):

- ECON 601 Introduction to Econometrics (3)
  - o or MATH 646 Regression Analysis (3)
- COSC 757 Data Mining (3)
  - o or MATH 547 Statistics for Risk Modeling (3)
- EBTM 719 Introduction to Business Research (3)
- EBTM 739 Survey Research (3)
- EBTM 749 Decision Analytics (3)

Research Seminars in Business Analytics (6 credits)

- ETBM 729 - Seminar in Empirical Business Research (3)
- EBTM 772 - Seminar in Machine Learning for Business Analytics (3)

Research Seminars in Area of Research Emphasis (6 credits) (select one option):

Supply Chain Management Emphasis (6 credits)

- EBTM 751 Seminar in Supply Chain Research I (3)
- EBTM 752 Seminar in Supply Chain Research II (3)

or Technology Management Emphasis (6 credits)

- EBTM 761 Seminar in Management Information Systems Research I (3)
- EBTM 762 Seminar in Management Information Systems Research II (3)

Dissertation Research (24 credits):

- EBTM 997 Dissertation Research

Each student will be matched with a faculty mentor (or mentors) for their chosen area of research emphasis. The faculty mentor(s) shall serve as the dissertation chair or co-chairs. The dissertation committee consists of a minimum of four tenured or tenure-track faculty members with graduate faculty status including the dissertation.

G4.4 Example Study Plan

	Fall	Spring	Summer
Year 1	• ECON 601 Introduction to Econometrics or MATH 646 Regression Analysis • EBTM 719 Introduction to Business Research • MKTG 770 Marketing Analytics and Metrics	• EBTM 720 Supply Chain Analytics • EBTM 729 Seminar in Empirical Business Research • EBTM 760 Business Data Warehousing or COSC 760 Big Data Analytics	

Year 2	• EBTM 739 Survey Research
	• COSC 757 Data Mining or MATH 547 Statistics for Risk Modeling
	• Research Emphasis
	  ○ EBTM 751 Seminar in Supply Chain Research I
	  ○ or EBTM 761 Seminar in Management Information Systems Research I
		• EBTM 749 Decision Analytics
		• EBTM 772 Seminar in Machine Learning for Business Analytics
		• Research Emphasis
		  ○ EBTM 752 Seminar in Supply Chain Research II
		  ○ or EBTM 762 Seminar in Management Information Systems Research II
			Comp. Exams
			
			Admission to Candidacy

Year 3	• EBTM 997 Dissertation Research - 6 credits each semester; 12 credits per year • Students work with advisors to identify dissertation topics, collect data, develop methodologies, and conduct analysis • Defend dissertation proposal		
Year 4	• EBTM 997 Dissertation Research - 6 credits each semester; 12 credits per year • Defend dissertation • Journal manuscript preparation and submissions		

G4.5   Course Descriptions

EBTM 719   Introduction to Business Research

Introduces fundamentals of business research methods, including the formulation of research questions, qualitative and quantitative research methods, structure of a business research paper, main databases and software packages for business research, citation styles and reference management, business research ethics, research grant writing, main business academic journals, particularly in the fields of information systems and business analytics. Students learn how to make the lifecycle of a paper publication. 3 credits.

EBTM 720   Supply Chain Analytics

Addresses analytics applied in different stages of supply chain and focuses on how technology is used to collect and analyze data to support decision making in the supply chain. Topics include supply chain decision support systems, supply chain optimization technologies, supply chain intelligence, supply chain visibility and collaborative technologies, and other emerging supply chain technologies. 3 credits.

EBTM 729   Seminar in Empirical Business Research

Reviews and extends knowledge and applications of regression models in empirical business research. Covers design and specifications of regression models to address research questions. Other topics include reporting and interpreting regression results, mediation models, moderation models, non-linear effects, instrumental variables, and generalized regression models concerning panel data. 3 credits.

EBTM 739   Survey Research

Focuses on survey research and structural equation modeling. Topics include survey instrument design, survey data collection, issues associated with survey research and testing for non-response bias and common method variance, assessment of reliability, convergent and discriminant validity, measurement model analysis, structural model analysis, mediation analysis, moderation analysis, latent growth curve model, among others. Students to learn and practice structural equation modeling tools (AMOS and SmartPLS) through hands-on labs. 3 credits.

EBTM 749   Decision Analytics

Provides a broad foundation in decision models and techniques used in industry and research for technical and managerial problems. Focuses on applications of techniques as well as interpretations of results. Covers both quantitative and qualitative methods, including decisions under multiple objectives, utility theory, influence and affinity diagrams, biases in probability assessment, risk and uncertainty management, defining decision attributes and alternatives, simulation, optimization, and stochastic modeling. 3 credits.

EBTM 751   Seminar in Supply Chain Research I

Surveys literature on supply chain research. Topics include supplier management, customer management, inventory management, lean manufacturing, logistics and distribution. Students are required to critique literature and submit a research proposal. 3 credits.

EBTM 752   Seminar in Supply Chain Research II

Reviews advanced topics in supply chain research, including supply chain sustainability, supply chain technologies and digital transformation, global supply chain, supply chain

disruption, supply chain risk management and other emerging topics in contemporary supply chain management. Students are required to collect data, build and test own research models, and complete a research paper. 3 credits.

EBTM 760   Business Data Warehousing

Covers fundamental technologies that improve the management of data within organizations: relational models, SQL, NoSQL, data warehouse architecture and design, visualization, master data management, and data preparation. Also introduces features of major cloud warehouse platforms and explores real-world case studies of data warehouse projects. 3 credits.

EBTM 761   Seminar in Management Information Systems Research I

Surveys contemporary research in information systems and introduces research methods used to address current issues and challenges related to information systems. Students are required to collect data, construct and test their own research models, and complete a research paper. 3 credits.

EBTM 762   Seminar in Management Information Systems Research II

Provides students with an in-depth understanding of research in the field of information systems and is primarily focused on understanding how information technologies have shaped society and businesses. Introduces key societal and business challenges related to digital technologies and systems. Students learn to critique relevant literature, identify their own research topics, and initiate research design. 3 credits.

EBTM 772   Seminar in Machine Learning for Business Analytics

Emphasizes hands-on data analysis experience. Covers various statistical methods and machine learning tools for analyzing large, complex real-world data in business and industry. Topics include advanced techniques in machine learning: nonparametric smoothing methods, generalized additive models (for nonlinearity), advanced tree methods (bagging, boosting, and random forests), advanced dimensionality reduction techniques (sparse principal component analysis), text mining, and sentiment analysis. Discusses recently developed techniques published in academic journals so students can learn to initiate their research questions and draft research proposal. 3 credits.

EBTM 997   Doctoral Dissertation Research

A requirement to maintain doctoral student status during the completion of Comprehensive Exam, Dissertation Proposal Defense and ultimately, Dissertation Defense. 1-6 credits.

COSC 757   Data Mining

This course provides students with an understanding of the field of data mining and knowledge discovery in data (KDD). Students will become familiar with the foundations

of data mining from a number of perspectives and will explore cutting-edge research in data mining published in academic journals and conferences. Students will also gain hands-on experience with data mining tools. 3 credits.

COSC 760   Big Data Analytics

Study of big data analytics, including the management of various public and private datasets from business, health care, multimedia, cyber-physical systems (CPS), Internet of Things (IoTs), and social media. Hands-on experience with managing the collection, ingestion, storage, analytics, and interpretation of big data using various cloud-based big data frameworks and NoSQL databases such as Hadoop, MongoDB, CouchDB, Elasticsearch, and Spark. Introduction to various big data analytics methods using distributed machine learning libraries. Current research and future trends in big data analytics from the current literature will be explored. 3 credits.

ECON 601   Introduction to Econometrics

The problem of testing economic theories against empirical data; the formulation and estimation of regression models; the use of the method of multiple regression in testing the various hypotheses of economic theories; serial correlation; the problem of identification; application of simultaneous equation model. 3 credits.

MATH 547   Statistics for Risk Modeling

The theory and applications of key statistics for risk modeling concepts and procedures including supervised versus unsupervised learning, regression versus classification, the common methods of assessing model accuracy, data checking and validation, generalized linear models, principal component analysis, decision tree models, bagging, boosting, and random forests, cluster analysis, K-means clustering, and hierarchical clustering. R or a similar software package is used for data analysis. 3 credits.

MATH 646   Regression Analysis

Theoretical and applied aspects of regression analysis including linear regression, generalized linear models, model selection, multicollinearity, leverage points, transformations, AIC, BIC, AICC, ANOVA tests, serially correlated errors, logistic regression, deviance, and simple models for stationary time series. 3 credits.

MKTG 770 Marketing Analytics and Metrics

Focuses on learning how to use various analytics tools: multivariate linear regression, logistic regression, principal component analysis, multidimensional scaling, clustering and classification, market basket analysis, choice modeling, conjoint analysis. Students will be expected to use state-of-the-art programming language to analyze real-world large data sets and make strategic recommendations for managerial actions. 3 credits.

G5. General Education Requirements

General education requirements do not apply to this program.

G6. Specialized Accreditation or Graduate Certification Requirements

There are no specialized accreditation or graduate certification requirements for this program and its students.

G7. Contracting

Contracting does not apply to this program.

G8. Program Information Assurances

Towson University will provide students and prospective students with clear and complete information about the program and the various supports/resources available to them through multiple mechanisms and in a timely manner.

Academic Unit	Documents / Information
University	University Catalog
College	College Program Catalog
Department / Program	Program Handbook, Program Brochure, Program Website, Department Website
Course	Syllabus
Academic Advisor	Academic Advising
Ph.D. Program Director	Advising / Information
Student Advisory Committee	Advising and Approves Study Plan

G9. Advertising, Recruiting, and Admissions Materials

TU regularly reviews its advertising, recruiting, and admissions materials to ensure that they clearly and accurately represent the program and services available, and that there is consistency across different modes of communication such as the TU website, the academic catalog, other print and online promotional materials, etc. More specifically, the Department of Business Analytics and Technology Management will provide much of the program material, which are written by faculty members for distribution. The program will be advertised at conference websites, such as Decision Sciences Institute (DSI) and INFOMRS.

H. Adequacy of Articulation

Not applicable.

I. Adequacy of Faculty Resources

I1. Faculty Summary

The Department of Business Analytics and Technology Management consists of nine tenured faculty, including three full professors and three associate professors, and three tenure-track assistant professors. All tenured and tenure-track faculty have earned a Ph.D. degree in disciplines including business analytics, operations/supply chain management, information systems, and industrial engineering. The Provost's Office has budgeted one tenure-track position to support this program. Two tenured faculty members from other departments (Economics and Marketing) in CBE, who also hold Ph.D. degree in relevant fields, will be teaching courses for this program as well. Meanwhile, the program is supported by two departments outside of CBE: the Department of Computer and Information Systems, which contributes COSC 757 Data Mining, and the Department of Mathematics, which contributes MATH 547 and MATH 646.

Department faculty have been productive in producing high quality and high impact research. Over the period AY2016-2021, a total of 17 peer reviewed journal articles were published in A or A* journals as identified by the Australian Business Dean's Council (ABDC) journal ranking list.

Faculty Name	FTE	Highest Degree Earned/Field of Study/Institution	Rank	Status	Proposed Courses Faculty Will Teach
Existing Faculty					
Cheng, Feng	1	Ph.D. in Supply Chain Management, Arizona State University	Assistant Professor	Full-time	EBTM 729 Seminar in Empirical Business Research EBTM 751/752 Seminars in Supply Chain Research
Han, Chaodong	1	Ph.D. in Supply Chain Management, University of Maryland, College Park	Full Professor / Department Chair	Full-time	EBTM 729 Seminar in Empirical Business Research EBTM 751/752 Seminars in Supply Chain Research

Faculty Name	FTE	Highest Degree Earned/Field of Study/Institution	Rank	Status	Proposed Courses Faculty Will Teach
Li, Xiaolin	1	Ph.D. in Management Systems, Kent State University	Full Professor	Full-time	EBTM 739 Survey Research EBTM 761/762 Seminars in Management Information Systems Research
Mohamed, Mona	1	D.Sc. in Information Technology, Towson University	Assistant Professor	Full-time	EBTM 760 Business Data Warehousing
Nag, Barin	1	Ph.D. in Management Science, University of Maryland, College Park	Full Professor	Full-time	EBTM 749 Decision Analytics
Otto, James	1	Ph.D. in Management Information Systems, University of Kentucky	Associate Professor	Full-time	EBTM 760 Business Data Warehousing EBTM 761/762 Seminars in Management Information Systems Research
Parolia, Neeraj	1	Ph.D. in Business Administration, University of Central Florida	Associate Professor	Full-time	EBTM 760 Business Data Warehousing EBTM 761/762 Seminars in Management Information Systems Research
Pillutla, Sharma	1	Ph.D. in Operations Management, Syracuse University	Full Professor	Full-time	EBTM 749 Decision Analytics
Scala, Natalie	1	Ph.D. in Industrial Engineering, University of Pittsburgh	Associate Professor	Full-time	EBTM 720 Supply Chain Analytics EBTM 749 Decision Analytics

Faculty Name	FTE	Highest Degree Earned/Field of Study/Institution	Rank	Status	Proposed Courses Faculty Will Teach
Tomasi, Stella	1	Ph.D. in Management Information Systems, Temple University	Full Professor	Full-time	EBTM 760 Business Data Warehousing EBTM 761/762 Seminars in Management Information Systems Research
Yao, Dong	1	Ph.D. in Management Science, University of Wisconsin–-Milwaukee	Full Professor	Full-time	EBTM 749 Decision Analytics EBTM 719 Introduction to Business Research
Zhu, Xiaorui	1	Ph.D. in Business Analytics, University of Cincinnati	Assistant Professor	Full-time	EBTM 772 Seminar in Machine Learning for Business Analytics
Zhao, Yongchen	1	Ph.D. in Economics, State University of New York at Albany	Associate Professor	Full-time	ECON 601 Introduction to Econometrics
Chang, Hua	1	Ph.D. in Marketing, Drexel University	Associate Professor	Full-time	MKTG 770 Marketing Analytics and Metrics
New Faculty					
New Hire (starting Fall 2023)	1	Ph.D. in Business Analytics	Assistant Professor	Full-time	EBTM 772 Seminar in Machine Learning for Business Analytics EBTM 719 Introduction to Business Research

I2. Faculty Training

TU provides faculty with an abundance of resources related to evidence-based best practices in teaching. These resources, available for faculty across all ranks and titles, are available through the Provost's Office and also, for CBE faculty, through the college.

The Faculty Academic Center of Excellence at Towson (FACET), a unit under the Provost's Office, serves as a catalyst and model for using effective learning approaches that have the potential for transforming the quality of the academic experience for

faculty and students. Dissemination of information is available through in-person and online delivery methods in the form of special events, workshops, and seminars. The numerous and varied presentation topics provide insight and practical suggestions on effective teaching and learning at the university level.

In particular, FACET promotes an "on-demand" approach to pedagogical training, in which teaching resources are provided based on a recent needs assessment survey of faculty. Current areas in which all faculty can obtain readily accessible best practice teaching tools/pedagogical training include:

- Strategies for student engagement.
- Facilitating group work.
- Supporting students for success.
- The Scholarship of Teaching and Learning (SoTL): Guide to understanding and doing SoTL (Vanderbilt University).
- Open Educational Resources (OERs): Guide to finding, adapting, creating, and using OERs (Maryland Open-Source Textbook Initiative).
- Universal Design for Learning (UDL).

At the college-level, CBE provides professional development support for faculty through conference travel as well as faculty development offerings throughout the academic year. Faculty self-select attendance at professional, university, and college workshops.

Additionally, both FACET and TU's Office of Technology Services provide comprehensive training and technical assistance to faculty in support of the university's learning management system (LMS), Blackboard, which is a long-standing and widely utilized LMS. Faculty can draw upon a broad range of resources and undertake training on teaching best practices and pedagogy in relation to Blackboard regardless of whether they are teaching face-to-face, hybrid, and fully online courses.

J. Adequacy of Library Resources

The library resources available will be sufficient to meet the needs of students and faculty in the program. TU's Cook Library houses an extensive collection of materials relating to business and economics, including print and electronic books, online government documents, and a compilation of scholarly journals (print and electronic). The library provides access to over 20 economics-relevant databases such as EconLit, NBER, Business Source Complete, JSTOR, and SpringerLink.

Faculty and students can access the databases, catalogs, e-book content, and electronic journals from any location on campus through TU's secure wireless network as well as remotely through the Cook Library web page. Comprehensive lists of databases, electronic reference books, and journals in all formats are available through the Cook Library web page.

In addition to Cook Library, faculty and students have access to materials through reciprocal agreements at nearby Baltimore institutions as well as across USM affiliated institutions. Cook Library also provides access to resources in other libraries across the country. These materials can be requested for loan through standard interlibrary loan (ILL) services. As part of this service, faculty and students have access to RAPID ILL, a service customary at high research activity institutions. The current turnaround time for article requests is typically less than 48 hours.

Furthermore, CBE has subscription to CompuStat via WRDS and students in the program will have access to the following software: Stata, SAS, M Plus (CBE has it), Qualtrics, SPSS, SAP, and Mathematica.

K. Adequacy of Physical Facilities, Infrastructure, and Instructional Equipment

The current physical facilities, infrastructure and instructional equipment are sufficient to support the needs of the program. There is existing office space in CBE that can be converted into doctoral student offices and TU's long-term master plan includes the construction of a new building to house the college. Additionally, Cook Library has a data studio and the department has launched a data analytics lab (sponsored by P&G Foundation) that students in the program can use.

L. Adequacy of Financial Resources with Documentation

L1. Table 1 – Program Resources and Narrative Rationale

Resources Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1. Reallocated Funds	$328,577	$477,087	$662,595	$848,392	$848,710
2. Tuition/Fee Revenue (c + e below)	$88,560	$177,120	$236,160	$295,200	$295,200
a. Number of Full-time Students Enrolled	6	12	18	24	24
b. Credit Hour Tuition Rate (Weighted)	$660	$660	$660	$660	$660
c. Subtotal Tuition	$71,280	$142,560	$190,080	$237,600	$237,600
d. Fees per Credit Hour	$160	$160	$160	$160	$160
e. Subtotal Fees	$17,280	$34,560	$46,080	$57,600	$57,600
3. Grants, Contracts & Other External Sources	$0	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0
TOTAL (Add 1–4)	$417,137	$654,207	$898,755	$1,143,592	$1,143,910

Reallocated Funds: Includes faculty and administrative staff expenses (Table 2: Program Expenditures: line items 1 and 2); equipment and travel expenses (Table 2: Program Expenditures: line items 4 and 7d); and student tuition remission and stipends (Table 2: Program Expenditures: line items 7b and 7c).

Tuition/Fee Revenue: Assumes six students are admitted in each fall semester: three in-state and three out-of-state in terms of state of residency. In-state tuition is $482 per credit hour; out of state tuition is $838 per credit hour. Weighted tuition is estimated at $660 per credit hour. It is anticipated that each student will take 18 credits in Years 1 and 2 and 12 credits in Years 3 and 4. In Year 3, six students will take 12 credits in dissertation research while 12 students will take 18 credits in coursework. In Year 4, 12 students will take 12 credits in dissertation research and 12 students will take 18 credits in coursework. Table 1 does not assume that students will enroll on a part-time basis since the proposed doctoral program is designed for full-time study.

Grants, Contracts and Other External Sources: While it is anticipated that students will have opportunities to join research projects and receive additional funding through grants and contracts while enrolled in the program, this is not guaranteed.

Other Sources: No other sources of revenue are anticipated.

L2. Table 2 - Program Expenditures and Narrative Rationale

Expenditure Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1. Total Faculty Expenses (b + c below)	**$173,750**	**$180,700**	**$187,928**	**$195,445**	**$203,263**
a. #FTE	1.0	1.0	1.0	1.0	1.0
b. Total Salary	$125,000	$130,000	$135,200	$140,608	$146,232
c. Total Benefits	$48,750	$50,700	$52,728	$54,837	$57,031
2. Total Administrative Staff Expenses (b + c below)	**$5,767**	**$5,767**	**$5,767**	**$5,767**	**$5,767**
a. #FTE	0.0	0.0	0.0	0.0	0.0
b. Total Salary	$5,340	$5,340	$5,340	$5,340	$5,340
c. Total Benefits	$427	$427	$427	$427	$427
3. Total Support Staff Expenses (b + c below)	**$0**	**$0**	**$0**	**$0**	**$0**
a. #FTE	0.0	0.0	0.0	0.0	0.0
b. Total Salary	$0	$0	$0	$0	$0
c. Total Benefits	$0	$0	$0	$0	$0
4. Equipment	**$7,500**	**$7,500**	**$7,500**	**$7,500**	**$0**
5. Library	**$0**	**$0**	**$0**	**$0**	**$0**
6. New or Renovated Space	**$0**	**$0**	**$0**	**$0**	**$0**
7. Other Expenses (b + c + d below)	**$230,120**	**$460,240**	**$697,560**	**$934,880**	**$934,880**
a. #Students Enrolled	6	12	18	24	24
b. Student Stipend	$160,712	$321,424	$482,136	$642,848	$642,848
c. Student Tuition Remittance	$69,408	$138,816	$208,224	$277,632	$277,632
d. Student Conferences and Travel	$0	$0	$7,200	$14,400	$14,400
TOTAL (1–7)	**$417,137**	**$654,207**	**$898,755**	**$1,143,592**	**$1,143,910**

Faculty: Assumes one new full-time tenure track faculty position (starting Year 1) with a four percent annual cost-of-living adjustment and 39 percent fringe benefit rate.

Administrative Staff: The Ph.D. program director will receive a summer stipend of $5,340 with an eight percent FICA for handling administrative tasks during the summer.

Support Staff: No additional support staff is needed.

Equipment: Student computer desks costing $1,250 for each incoming student. No additional expenses assumed beyond Year 4.

Library: No additional library expenditures are anticipated. The current subscriptions to database and journals offered by TU's Cook Library and CBE can be shared with the Ph.D. program.

New or Renovated Space: No additional facilities expenditures are anticipated.

Other Expenses: The program anticipates admitting six new students each year, who are expected to graduate in four years. Two fellowships ($35,000 in stipend for each recipient) and four 20-hour teaching assistantships ($22,678 in stipend for each recipient) have been budgeted for a duration of four years. The doctoral teaching/research tuition remittance rate is estimated at an in-state rate of $482 per credit hour per student per semester. Conference and travel expenses are budgeted at a rate of $1,200 for each student admitted to candidacy starting in Year 3.

M. Adequacy of Provisions for Evaluation of Program

M1. Procedures for Evaluating Courses, Faculty and Student Learning Outcomes

Course evaluation begins during the initial development of the course in the curricular review process. Course proposals are evaluated for:

- Appropriateness of course difficulty and workload.
- Effective assessment and grading practices in the course.
- Course syllabus consistency with the guidelines established by TU, which reflect best practices in course development.

These elements of a course are reviewed by the department, the CBE Curriculum Committee, and the University Curriculum Committee. The primary focus at the department level is to ensure course content accuracy and program alignment, the focus at the college and university level is to facilitate the production of quality course proposals. In addition, college and university level review includes addressing any resource issues, determining if conflicts exist between departments/colleges.

Ongoing evaluation of courses takes place primarily in two ways, namely review by department faculty and student evaluation. The faculty review courses taught on an annual basis to determine strengths and concerns related to a course as well as to make sure that the content identified in the course syllabus is being covered. If a review indicates concerns or problems with a course, faculty work to develop strategies for addressing/rectifying problems. Student evaluation of courses takes place at the end of every semester. Using a tool developed by TU faculty that allows for quantitative and qualitative feedback, students can assess instructor performance (e.g., ability to communicate clearly; quality of student- instructor interaction; preparedness) and suggest "improvements" for a course.

Evaluation of faculty takes place using policies and procedures established by TU promotion, tenure/reappointment and merit committees and occurs at the department,

college, and university level. The main areas of evaluation include teaching, scholarship, and service. Tools used as part of the annual evaluation process include review of the individual's portfolio that includes, but is not limited to, the following:

- Evidence of scholarship (e.g., articles in scholarly journals; presentations at scholarly meetings).
- Service work.
- A synopsis of teaching related-activities (e.g., courses taught; new instructional procedures; interdisciplinary, diversity, international, and technology-related projects).
- Review of course syllabi.
- Peer teaching observation reports.
- Quantitative and qualitative student evaluation of instruction.

Section G3 outlines the various assessment measures that will employed throughout the program and shows their alignment with specific student learning outcomes. For the dissertation research courses, student achievement is assessed via the preparation and oral defense of the dissertation proposal and dissertation, whereas in the traditional instructor-led courses, assessment measures exist for each learning outcome. On an annual basis, specific learning outcomes are identified for assessment purposes. The program director will oversee the processes involved in the assessment of student learning outcomes, including collection and analysis of data, and creation of action plans, as necessary.

M2. Evaluation of Program Educational Effectiveness

The assessment of this program will be guided by the University's Office of Assessment, following established TU policies and procedures, including review of the program's assessment plan to ensure that learning outcomes remain appropriate and students are meeting expectations. CBE's assessment committee will also work with the University's Office of Assessment to collect, analyze, report on, and use data related to institutional effectiveness, accreditation, student success, satisfaction and retention, and campus performance against key benchmark indicators.

Furthermore, with CBE being accredited by AACSB, the program will be required to adhere to rigorous professional standards in order for the college to remain accredited.

Additionally, TU will conduct a comprehensive evaluation of the Ph.D. program every seven years as part of the USM-mandated Periodic Review of Academic Programs process. The purpose of the review is to promote continuous program improvement and ensure that the needs of students are being met. Each program will prepare a self-study, engage an external reviewer to evaluate the program and identify strengths and areas for improvement, and submit a final report to the USM Board of Regents for review and approval.

N. Consistency with the State's Minority Student Achievement Goals

TU has a strong record of a commitment to diversity, equity, and inclusion principles. This is evidenced by the fact that Towson is only one of a handful of universities in the country to have no achievement gap, meaning that underrepresented student groups achieve the same or better academic success as the entire student population. In 2020, the university introduced its inaugural Diversity Strategic Plan. The plan, "*A More Inclusive TU: Advancing Equity and Diversity (2020–25),*" is firmly grounded in the premise that TU's ongoing success is dependent on the university's capacity to shift perspectives and approaches and strategically place diversity, equity, and inclusion at the core of its mission.

The department anticipates recruiting students into the doctoral program from TU's diverse undergraduate population and as well as from Maryland's HBIs, since none of these institutions offer a comparable doctoral degree. In turn, graduates from TU's program could potentially be hired in the future as faculty at HBIs to teach in their undergraduate/master's/certificate programs in business/data analytics, thereby strengthening the capacity of HBIs.

Also specific to the context of the proposed Ph.D. program is TU's participation in recruitment at The PhD Project, an organization founded by the KPMG Foundation, Citibank, AACSB, and the Graduate Management Admission Council (GMAC) to advance workplace diversity by increasing diversity of business schools. While The PhD Project is focused on development of diverse faculty, similar strategies can be used to recruit and retain minority students in the Ph.D. in Business Analytics program. Additionally, The PhD Project continues support and resources with individuals as they become students in doctoral programs and later as faculty.

O. Relationship to Low Productivity Programs Identified By The Commission

Not applicable

P. Adequacy of Distance Education Programs

Not applicable. The vast majority of courses will be delivered on the main TU campus via face-to-face instruction. A small number of courses, including EBTM 720 and MKTG 770, are currently delivered in a hybrid mode: some class sessions are scheduled on campus face-to-face and some class sessions may be delivered as synchronous or asynchronous online. Through FACET, TU is able to assure that online courses meet quality standards and maintain academic rigor and faculty are certified to teaching online courses.