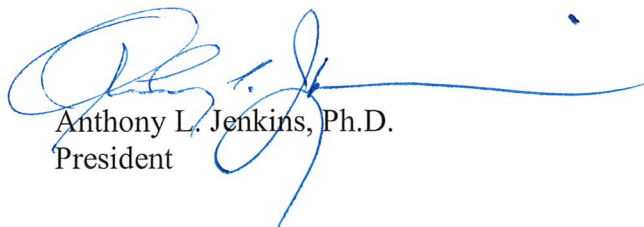April 5, 2021

Dr. James D. Fielder, Jr.
Secretary of Higher Education
Maryland Higher Education Commission
6 North Liberty Street
Baltimore, MD 21201

Dear Dr. Fielder:

I am seeking your approval to offer a new Bachelor of Science in Data Science at Coppin State University (CSU). The proposed codes for the new program are CIP 30.7001 and HEGIS 1703.00. The program will contribute to workforce and innovation and economic growth goals of Maryland as identified in the University System of Maryland's Strategic Plan. More specifically, this program is expected to help meet Maryland's critical need for data scientists who are equipped with skills to interpret and manage complex enterprise systems.

The proposal has the approval of appropriate campus committees and was submitted to me for my endorsement. I am pleased to recommend this proposal and request your approval. Should you have any questions, please contact me or my staff. Additionally, you may contact Dr. Leontye Lewis, Provost and Vice President for Academic Affairs.

Sincerely,

Anthony L. Jenkins, Ph.D.
President

cc: Dr. Leontye Lewis, Provost & Vice President for Academic Affairs
        Dr. Antoinette Coleman, Associate Vice Chancellor for Academic Affairs
        Dr. Emily A. A. Dow, Assistant Secretary
        Dr. Sadie R. Gregory, Interim Dean, College of Business
        Mr. Michael W. Bowden, Assistant Vice President for Planning & Assessment

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

Institution Submitting Proposal	Coppin State University

*Each **action** below requires a separate proposal and cover sheet.*

- ◉ New Academic Program
- ○ New Area of Concentration
- ○ New Degree Level Approval
- ○ New Stand-Alone Certificate
- ○ Off Campus Program

- ○ Substantial Change to a Degree Program
- ○ Substantial Change to an Area of Concentration
- ○ Substantial Change to a Certificate Program
- ○ Cooperative Degree Program
- ○ Offer Program at Regional Higher Education Center

Payment Submitted: ○ Yes ○ No	Payment Type: ◉ R*STARS # ○ Check #	Payment Amount: $850.00	Date Submitted: 4/5/21

Department Proposing Program	Accounting and Management Information Systems
Degree Level and Degree Type	Bachelor of Science
Title of Proposed Program	Data Science
Total Number of Credits	120
Suggested Codes	HEGIS: 1703.00	CIP: 30.7001
Program Modality	◉ On-campus ○ Distance Education (*fully online*)
Program Resources	○ Using Existing Resources ○ Requiring New Resources
Projected Implementation Date	◉ Fall ○ Spring ○ Summer Year: 2021
Provide Link to Most Recent Academic Catalog	URL: **www.coppin.edu/catalogs**

Preferred Contact for this Proposal	Name:	Mr. Michael W. Bowden
	Title:	Assistant VP for Planning and Assessment
	Phone:	(410) 951-3010
	Email:	mbowden@coppin.edu

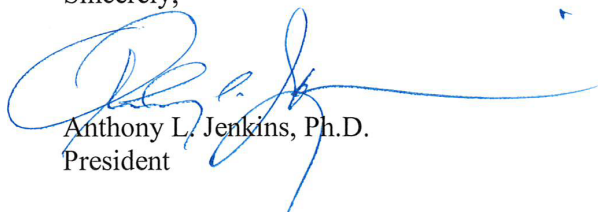| President/Chief Executive	Type Name: Leontye Lewis, Ed.D., Provost and Vice President for Academic Affairs
	Signature: *[signature]* Date: 04/05/2021
	Date of Approval/Endorsement by Governing Board:

Revised 1/2021

April 5, 2021

Dr. Jay A. Perman, Chancellor
University System of Maryland
Chancellor's Headquarters/Baltimore Office
701 E. Pratt Street
Baltimore, MD 21202

Dear Chancellor Perman:

I am seeking your approval to offer a new Bachelor of Science in Data Science at Coppin State University (CSU). The proposed codes for the new program are CIP 30.7001 and HEGIS 1703.00. The program will contribute to workforce and innovation and economic growth goals of Maryland as identified in the University System of Maryland's Strategic Plan. More specifically, this program is expected to help meet Maryland's critical need for data scientists who are equipped with skills to interpret and manage complex enterprise systems.

The proposal has the approval of appropriate campus committees and was submitted to me for my endorsement. I am pleased to recommend this proposal and request your approval. Should you have any questions, please contact me or my staff. Additionally, you may contact Dr. Leontye Lewis, Provost and Vice President for Academic Affairs.

Sincerely,

Anthony L. Jenkins, Ph.D.
President

cc: Dr. Leontye Lewis, Provost & Vice President for Academic Affairs

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FORM

X	New Instructional Program
	Substantial Expansion/Major Modification
	Cooperative Degree Program
X	Within Existing Resources, or
	Requiring New Resources

Coppin State University

Institution Submitting Proposal

Bachelor of Science in Data Science

Title of Proposed Program

Bachelor of Science	**Fall 2021**
Award to be Offered	Projected Implementation Date

1703.00	**30.7001**
Proposed HEGIS Code	Proposed CIP Code

Accounting & Management Information Systems	**Dr. Emmanuel Anoruo**
Department in which program will be located	Department Contact

410-951-3446	**eanoruo@coppin.edu**
Contact Phone Number	Contact E-Mail Address

Leontye Lewis

4/5/2021

_____ _____

Signature of President or Designee Date

A Proposal for a Bachelor of Science in Data Science

A. **Centrality to Institutional Mission and Planning Priorities:**

1. **Provide a description of the program, including each area of concentration (if applicable), and how it relates to the institution's approved mission.**

Coppin State University (CSU)'s Bachelor of Science in Data Science degree program within the College of Business aims to produce graduates who can combine business expertise, quantitative reasoning and computer software skills to extract meaningful insights from data. These skills prepare students to interpret business data in the 21st century, to compete in the marketplace with combined business and data science skills, and to apply these insights to answer business questions and solve business problems. Through course study and hands-on projects, students will master data science skills, including structured and unstructured data, statistical measurement, machine learning and deep learning, on-premises and cloud computing, and data visualization. The new program will prepare students for career opportunities such as data analyst, business analyst, business intelligence analyst, data scientist, operations analyst, or other critical business analyst positions, and to pursue graduate studies in data science related fields.

According to our institution's mission statement[1], "Coppin State University, a Historically Black Institution in a dynamic urban setting, serves a multi-generational student population and provides education opportunities while promoting lifelong learning. The university fosters leadership, social responsibility, civic and community engagement, cultural diversity and inclusion, and economic development". The new B.S. degree in Data Science housed within the College of Business is aimed at exposing our multi-generational student population to a highly demanded field of study and fostering economic development. It is in direct alignment with the mission of CSU.

A report, "Keeping Data Science Broad"[2], defines diversity "…in terms of race, gender, religious affiliation, socioeconomic status, ethnicity, and being the first-generation in college"; and the report states that "the variety of perspectives such diversity provides is as essential as that provided by the transdisciplinary nature of data science for innovation and growth of the field" (Rawlings-Goss, 2018, p. 29). CSU serves underrepresented students from diverse cultural, racial, and ethnic backgrounds, with a high percentage of first-generation college students. CSU can supply the diversity that will be essential to develop a high-demand, comprehensive program in the dynamic urban setting.

2. **Explain how the proposed program supports the institution's strategic goals and provide evidence that affirms it is an institutional priority.**

CSU's academic program development priorities continue to be directed toward supporting the workforce demands as identified by the USM[1]. In recent years, numerous articles in notable journals have made a strong case for recognizing the severe shortage of data scientists throughout the United States and world-wide. In addition, a recent program viability study conducted by Blackboard for CSU[3] recommended data science, given high student and workforce demand, as one of the potential growth programs for CSU. Increasing enrollment is the top institutional goal of CSU[4]. This new, high-demand data science

program with a business emphasis is aligned with the University's strategic priorities; and it will assist the University in increasing enrollment as it develops a unique niche in the marketplace with growing emphasis on data-enabled decision making. This new program will bring in local businesses and other organizations to provide internship opportunities. The curriculum is being built on market-demanded skills, and graduates will be equipped with workforce required skill sets. In addition to attracting new students and transfer students from community colleges and other institutions, the proposed program will also open the doors for interdisciplinary or multidisciplinary collaborations on and off campus.

3. **Provide a brief narrative of how the proposed program will be adequately funded for at least the first five years of program implementation. (Additional related information is required in section L).**

CSU received USM Workforce Development funds of $525,000 for the proposed program. The program is developed based on the existing business curriculum with additions of ten new courses. A newly hired data science faculty and the existing faculty members from the business, management information systems, and computer science programs will be teaching the relevant business and data science courses. With the initial committed funding support, existing resources, and active recruitment throughout the first five years, the proposed program will be adequately funded.

4. **Provide a description of the institution's a commitment to:**

   a) **ongoing administrative, financial, and technical support of the proposed program**

   The proposed program has the ongoing committed administrative, financial, and technical support from the institution. The types of support include, but not limited to, faculty salaries, recruitment activities and other initiatives with internal and external partners, state-of-the-art smart classrooms and IT infrastructure, faculty professional development, technical support from the campus IT Division, library resources, and a new building under renovation.

   b) **continuation of the program for a period of time sufficient to allow enrolled students to complete the program.**

   Given the high demand for and the strategic importance of the program, the program will be continued, and CSU is committed to allow sufficient time for enrolled students to complete the program. Once the program gets approved, we will start active recruitment through different platforms, establish external partnerships with local businesses, community colleges and high schools, create career development and placement prospects for program students, and seek interdisciplinary or multidisciplinary collaboration opportunities with other CSU programs.

5. **Provide a description of the institution's a commitment to:**

   a) **ongoing administrative, financial, and technical support of the proposed program**

The proposed program has the ongoing committed administrative, financial, and technical support from the institution. The types of support include, but not limited to, faculty salaries, recruitment activities and other initiatives with internal and external partners, state-of-the-art smart classrooms and IT infrastructure, faculty professional development, technical support from the campus IT Division, library resources, and a new building under renovation.

b)   continuation of the program for a period of time sufficient to allow enrolled students to complete the program.

Given the high demand for and the strategic importance of the program, the program will be continued, and CSU is committed to allow sufficient time for enrolled students to complete the program. Once the program gets approved, we will start active recruitment through different platforms, establish external partnerships with local businesses, community colleges and high schools, create career development and placement prospects for program students, and seek interdisciplinary or multidisciplinary collaboration opportunities with other CSU programs.

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

1.   Demonstrate demand and need for the program in terms of meeting present and future needs of the region and the State in general based on one or more of the following:

a)   The need for the advancement and evolution of knowledge

Before developing the proposed program, extensive research has been conducted on workforce demanded skill sets for data science graduates. Here are just a couple examples: According to the Career Explorer report of Occupation Insight[5], data science skills such as data analysis, data management, SQL, Python, Microsoft Excel, machine learning, and communication are among the top skills required by several relevant job positions; job descriptions from some popular employers such as Amazon[6] requires communication and problem solving skills using Tableau, Power BI, R and Python. The curriculum has been built to meet these workforce needs. Based on the workforce demand orientated curriculum and the program viabilitystudy conducted by Blackboard for CSU[3], the proposed data science program is believed to address the regional and state-wide need for the advancement and evolution of data science related knowledge and skills.

b)   Societal needs, including expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education

Offering the proposed Data Science program at an HBI itself provides minority and educationally disadvantaged students access to a new program with increasingly high workforce demand and prepares the underrepresented student populations toward successful careers or graduate studies.

CSU's institutional goals include Increase Enrollment, Academic Transformation, Student Experience, External Relationships, Resource Development and Stewardship, Information Technology, Middle States Reaffirmation, Data-Support Decision Making, and Communications & Marketing[4]. This new program is in full alignment with CSU's cultural diversity goals and initiatives. Specifically, the new program will not only target traditional students but also non-traditional working adults; will partner with community colleges, industry professionals, and other community organizations to promote academic transformation and expand student career paths and networks; with the enhancement of the campus state-of-the art information technology infrastructure, the new program will improve student experience by addressing the needs of our diverse student population and by embedding the student learning outcome assessment into the program from the very beginning. CSU promotes campus-wide data-supported decision making, and the offering of the proposed program at an HBI further exemplifies the important role of data in this age of big data. Furthermore, the urban location of CSU is crucial for attracting minority and educationally disadvantaged populations who may find it very difficult to access such programs elsewhere due to social and financial constraints.

c) The need to strengthen and expand the capacity of historically black institutions to provide high quality and unique educational programs

The proposed program at CSU, a historically black institution (HBI), addresses the need to strengthen and expand the capacity of HBIs directly. Based on a search on the MHEC's website[7], as of September 7, 2020, no other HBI in Maryland offers a B.S. degree in Data Science. CSU's unique data science program with a business emphasis will fill in the gap and strengthen the capacity of the institution.

2. **Provide evidence that the perceived need is consistent with the Maryland State Plan for Postsecondary Education.**

Below are the major highlights of the Maryland State Plan for Postsecondary Education[8]:

The 2017-2021 State Plan for Postsecondary Education: Student Success with Less Debt outlines three primary goals for the postsecondary community in Maryland:
Access: Ensure equitable access to affordable and quality postsecondary education for all Maryland residents.
Success: Promote and implement practices and policies that will ensure student success.
Innovation: Foster innovation in all aspects of Maryland higher education to improve access and student success.

CSU's proposed data science program is consistent with these three goals by providing an affordable, high quality program with emphases on student access, student success and workforce demanded knowledge/skills.

In alignment with the institution's mission, the proposed program provides educational access to minority and educationally disadvantaged students whose promise may have been hindered by a lack of social, professional, or financial opportunities. CSU has policies and practices that are student-focused and ensure student success. Plans are in place for student

advisement and individualized supervision of every student attending CSU. CSU also has robust plans for non-traditional students' success. As stated in Higher Education Tomorrow; 2017-2021 State Plan Goals and Strategies, CSU will continue to ensure equal educational opportunities for all Marylanders by supporting all postsecondary institutions (Strategy 4), ensure that statutes, regulations, policies, and practices that support students and encourage their success are designed to serve the respective needs of both traditional and non-traditional students (Strategy 5), improve the student experience by providing better options and services that are designed to facilitate prompt completion of degree requirements (Strategy 6), and enhance career advising and planning services and integrate them explicitly into academic advising and planning (Strategy 7). The proposed program is designed to have the career development needs of students in mind. Through course study, hands-on projects with real-world data and professional activities, students will be prepared for career opportunities and/or graduate studies.

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

1. **Describe potential industry or industries, employment opportunities, and expected level of entry (*ex: mid-level management*) for graduates of the proposed program.**
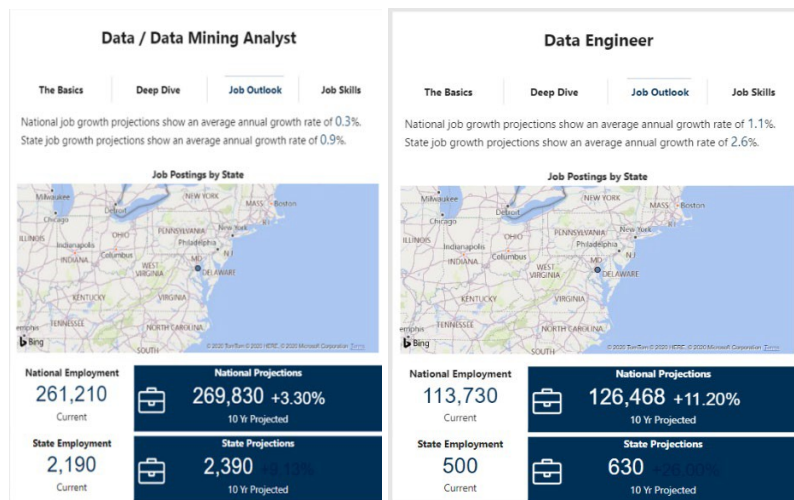
Graduates of the proposed program are expected to be able to identify problems in an organization, mine and analyze data, use visualization techniques to gain insights from the data, apply optimization and machine learning algorithms, compare different algorithms, andfind the best one, summarize and present their findings to diverse audiences, and make recommendations for product development, marketing techniques, and other business strategies. These business-oriented data science knowledge and skills apply to all types of organizations and industries. The proposed program will prepare students for entry level positions in careers such as data analyst, business analyst, business intelligence analyst, data scientist, operations analyst, or other critical business analyst positions, to name a few.

2. **Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program.**

According to an article titled "IBM Predicts Demand for Data Scientists Will Soar 28% By 2020"[9], data scientist jobs pay an average of $105,000, and "Data Science and Analytics (DSA) jobs remain open an average of 45 days, five days longer than the market average". According to the Occupational Outlook Handbook of U.S. Bureau of Labor Statistics[10], data scientists are among the top 20 fastest growing occupations between 2019-29. From the College Atlas website[11], the big data-oriented job position, market research analysts, is among the "Top 10 Best Jobs of the Future". When it comes to our location, "Maryland is one of the top destinations in the country for data scientists. Tremendous job opportunity, enticing employers, and easy access to the nation's capital all contribute to the state's overall appeal. In the Washington D.C. area, annual wages for data scientists soar above national averages. Companies like Amazon, Mozilla, and GE actively seek those with strong data analytics skill."[12]

Searches on popular online career sites and job boards also show the high market demand for data science relevant job opportunities, especially with business training and experience. Just using two job positions, Data/Data Mining Analyst and Data Engineer, as an example, the

Career Explorer report from Campus Nexus Occupation Insight[13] shows the following 10 year national and Maryland state job projections:

9   https://www.forbes.com/sites/louiscolumbus/2017/05/13/ibm-predicts-demand-for-data-scientists-will-soar-28-by-2020/#6e41399c7e3b
10 https://www.bls.gov/ooh/fastest-growing.htm
11 https://www.collegeatlas.org/top-jobs-of-the-future-2022
12 https://www.discoverdatascience.org/states/maryland/

A search for Data Mining Analyst on Glassdoor.com returned 242 jobs in Baltimore, and a search for Data Engineer on the same website returned 3850 results in Baltimore. The marketdemand is evident with these and other searches for a wide range of data science related career opportunities.

3. **Discuss and provide evidence of market surveys that clearly provide quantifiable and reliable data on the educational and training needs and the anticipated number of vacancies expected over the next 5 years.**

In addition to the market demand analysis in the previous section C.2., Maryland Department of Labor Workforce Region Occupational Projections - 2016-2026[14] provides the anticipated number of vacancies in 2026 by the 12 different regions in Maryland: Using one potential career opportunity for data science graduates as an example, the table in the following lists the number of positions that will be available in the different regions in 2026 compared with 2016:

Regions	Number of Positions for Operations Research Analysts (or Business Operations Specialists for 3 regions) in 2016	Number of Positions for Operations Research Analysts (or Business Operations Specialists for 3 regions) in 2026	Percentage Increase in 10 years
Anne Arundel	647	845	30.6%
Baltimore City	257	315	22.6%
Baltimore County	304	365	20.1%

Frederick	174	237	36.2%
Lower Shore	134	148	10.4%
Mid-Maryland	287	437	52.3%
Montgomery	887	1019	14.9%
Prince George's	230	296	28.7%
Southern Maryland	616	656	6.5%
Susquehanna	382	444	16.2%
Upper Shore	145	162	11.7%
Western Maryland	214	228	6.5%
Total	4277	5152	20.5%

Source: https://www.dllr.state.md.us/lmi/iandoproj/wias.shtml; retrieved on December 25, 2020.

Based on the table, for this one career opportunity only, there is an increase of 875 vacancies (20.5%) from 2016 to 2026. As the data science and analytics field grows further, new types of jobs and positions/roles may emerge based on the existing ones to drive the exponentially growing big data[15], and the demand for career-ready data science graduates can be explodingin the next five years.

Additional long-term projections data for 2018-2028 with similar patterns is also available from the Maryland Department of Labor website.

Regarding the educational needs, a preliminary Data Science Program Interest Survey was conducted with Coppin students from different majors in April 2020. Regarding the question whether they would have considered enrolling in the data science program if they were given a chance at admission, below are the responses from 92 students who answered the question, and only 13 out of the 92 students picked "Definitely no" for a data science program:

ANSWER CHOICES	RESPONSES	
Definitely yes	14.13%	13
Maybe	44.57%	41
Not sure	27.17%	25
Definitely no	14.13%	13
TOTAL		92

We expect the similar level of interests from high schools, community colleges, and other potential student populations.

4. Provide data showing the current and projected supply of prospective graduates.

According to Blackboard's program viability study conducted for CSU in 2019[3], data science program was deemed to have high student demand, high workforce demand, and moderate competition in Maryland and the nation (page 45); the number of conferrals of data science programs at all levels (certificates, master's, and bachelor's) in 2017 in Maryland was 367 (page 46). With the predicted growth of data science and emergence of newer job roles and even industries over the next decade[16], the proposed program will supply the market needs that have not been fulfilled by other

institutions in the region. In addition, the proposed program will prepare students for more advanced studies or graduate degrees in data science that are offered by some other Maryland universities.

D. Reasonableness of Program Duplication:

1. **Identify similar programs in the State and/or same geographical area. Discuss similarities and differences between the proposed program and others in the same degree to be awarded.**

There are several other institutions in Maryland that offer a B.S. degree in data science or analytics, but they all have different foci than the CSU's proposed program, and none of the institutions is an HBI. The proposed program does not duplicate any of these programs. The essential diversity, affordability, business emphasis and workforce skill set focus supplied by our proposed program make it new and unique. The B.S. in Data Science program will prepare students, especially minority and educationally disadvantaged students, to meet the future work force demands in a field with high demand and high growth. The program will strengthen CSU's mission and engagement with the local communities, businesses, and community colleges.

Below is a detailed comparison of similarities and differences between the CSU's proposed program and other data science or relevant bachelor's degree programs in the State or same geographical area:

Coppin State University, B.S. in Data Science – The Proposed Program
The proposed program is housed in the Department of Accounting and Management Information Systems within the College of Business. The curriculum is built on the existing business core curriculum with additions of the following ten new courses: Introduction to Data Science, Data Science Programing, Data and Text Mining, Data Science Cloud Computing, Data Visualization, Time Series Modeling and Forecasting, Machine Learning, Special Topics in Data Science, Internship in Data Science, and Data-driven Decision Making. The total number of credits required for graduation are 120 (GER: 40 credits; business core requirements: 42 credits; data science program requirements: 30 credits; University requirements and free electives: 8 credits).

Loyola University of Maryland, B.S. in Data Science
https://www.loyola.edu/academics/data-science/undergraduate/major
The program is housed within the Loyola College of Arts and Sciences. The interdisciplinary program has 15 data science major courses (12 required; 3 electives). There are some similarities in the program focus with an overlap of a couple courses (e.g., database, data mining, business statistics, and capstone). However, except for the capstone course the curriculum was built on courses from several disciplines such as math, computer science, information systems, statistics, etc.; the curriculum focuses are math and statistics; compared with the CSU's curriculum, they do not have Introduction to Data Science, Data Science Programing, Data Science Cloud Computing, Machine Learning, and Special Topics; Data Visualization and Text Mining courses are electives at Loyola, while these courses are part of the CSU's program core requirements.

Capitol Technology University, B.S. in Data Science
https://www.captechu.edu/degrees-and-programs/bachelors-degrees/data-science-bs

"The B.S. in Data Science degree is a total of 122 credits, which covers business management, business analytics, mathematics and sciences, English and social science courses." There are some overlapping of business management and business analytics courses; however, they do not offer a cloud computing course, and they have some computerscience and other courses (e.g., Programming in C, Data Identification and Collection Strategies, and Computer Vision) that CSU does not require; and Capitol Technology requires more math courses.

University of Maryland, College Park, B.S. in Operations Management & Business Analytics
https://www.rhsmith.umd.edu/programs/undergraduate-programs/academics/academic-majors/operations-management
https://www.rhsmith.umd.edu/files/Documents/Programs/Undergraduate/OperationsManagement/om2015-revised.pdf. The program is housed in the Decision, Operations & Information Technologies (DO&IT) Department within the Robert H. Smith School of Business. There is a similarity with respectto the business focus, but the curriculum is very different from CSU's, and their focus is more on operations management and quantitative models.

Goucher College, B.S. in Integrative Data Analytics
https://www.goucher.edu/learn/undergraduate-programs/integrative-data-analytics/major
"Students can choose to study purely in data and mathematical sciences or specialize in another discipline such as economics. Students choosing to specialize in another discipline will apply data analysis, mathematical modeling, and computational techniques in courses such as Artificial Intelligence and Machine Learning to solve complex problems in that discipline." Except for a couple courses with similar names, Goucher's program set up is very different from the proposed program, and courses taken by students vary depending on their choices. All the courses listed on the website are 4 credit hour courses, which is different from CSU and the other institutions.

Salisbury, B.S. in Data Science
https://www.salisbury.edu/explore-academics/programs/undergraduate-degree-programs/majors/data-science-major.aspx
The program is housed in the Department of Mathematics and Computer Science within the Richard A. Henson School of Science and Technology. The program includes 6 tracks: Astrostatistics, Bioinformatics, Chemometrics, Computational Data Science, Geoanalytics, and Mathematical Data Science. The program core is heavily math and computer science oriented. Except for a course with the same title, Introduction to Data Science, Salisbury's program focus is totally different from the CSU's proposed program.

Mount St. Mary's University, B.S. in Data Science
https://msmary.edu/academics/majors-minors/data-science.html
The program is housed in the Mathematics and Computer Science Department within the School of Natural Science and Mathematics. The total number of credits required for graduation are 120, among which the data science major requirements are 49 credits including 15 credits for a chosen application area; the application areas include Computational Science, Data Engineering, Operations Research, and Analytics for Business. The program curriculum is heavily math and computer science focused and is very different from the CSU's program emphasis; even the accounting, business and economics courses listed under the Analytics for Business application area are very different from what is required for the CSU's proposed program.

2. Provide justification for the proposed program.

The proposed B.S. in Data Science program is created as a new, unique business curriculum. The goal of the program is to produce graduates equipped with workforce demanded skill sets to solve real world business problems.

The curriculum was developed by a multidisciplinary curriculum team from both academia and industry, including the CSU Data Science Team of data science, management information systems (MIS), and computer science faculty, a data scientist working with Blackboard, and a curriculum specialist from Blackboard. The team reviewed the existing business, MIS, computer science and math courses; explored the Microsoft professional program in data science certificate courses, and several team members took a couple of those certificate courses through edX; investigated the skills required by Microsoft[17] and other top professional data science related certifications[18]; looked into some related job descriptions on a couple popular job sites; and conducted further research on data science curriculum design. The resulting curriculum has ten new courses in addition to the existing College of Business core requirements.

The proposed program prepares undergraduates with the workforce skills to interpret business data in the 21st century and to compete in the marketplace with combined business and data science skills. More specific workforce skill sets are as follows:

Technical skills: Analytics
- Provides robust hands-on experience with the Python, R, and SQL programminglanguages due to their popularity in the marketplace and exponential growth.
- Understanding of general theory and applied math and statistics skills.
- Experience in the summary of data and analytics and the ability to present in visual formats using Power BI, Tableau, and Microsoft Excel.
- Experience analyzing data on premise and from the cloud.
- Exposure to the Agile Software development process.

Technical skills: Programming
- Beginning level of skill set with Python coding and SQL database coding.

Technical skills: Data
- Ability to work with both structured and unstructured data on premise and from the cloud.
- Ability to wrangle and manage data.
- Ability to work with massive data sets.

Non-technical skills
- Read, write, speak.
- Business acumen.
- Intellectual curiosity.

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[17] https://docs.microsoft.com/en-us/learn/certifications/data-analyst-associate

[18] https://towardsdatascience.com/top-9-data-science-certifications-in-2020-40b0192ade43

- Working alone and with teams.

Story telling skills
- Verbal - one on one, to an audience, video.
- Written - manuscript, white papers, blog.

Business skills
- Accounting, Management, Marketing, and Information Systems knowledge and experience.
- Financially savvy and good with numbers.
- Able to lead and motivate your colleagues.
- Able to manage projects and time.

The unique workforce-oriented curriculum, essential diversity and unique location supplied by CSU will deliver a high-demand, quality program for underrepresented students to pursue higher education, which will have a significant impact on reducing the achievement gap, increasing employment potential, and elevating the socioeconomic status.

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

1. **Discuss the program's potential impact on the implementation or maintenance of high-demand programs at HBI's.**

Currently, no other HBCU in Maryland offers a B.S. degree in Data Science. CSU is an HBCU, and the mission and strategic goals of the institution are always programmed towards educating all students, especially African American and minority student populations. CSU is proposing this program so that the institution continues to provide opportunities, mainly for minority and educationally disadvantaged students, who have the desire to pursuing academic careers in data science. Coppin is uniquely situated to be able to operate this program.

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

1. **Discuss the program's potential impact on the uniqueness and institutional identities and missions of HBIs.**

Offering the proposed program at CSU is consistent with the identity and mission of the institution. This proposed academic program makes the major unique to the HBIs and will have a significant impact on CSU in fulfilling its mission. HBIs are engaged in creating high-demand programs that serve the workforce demand of their states. CSU, as one of the HBIs, is proposing this new program as there is a critical need, especially of African Americans (and minorities, at large), in the workforce, mainly in the field of data science.

G. **Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes** (as outlined in COMAR 13B.02.03.10):

1. **Describe how the proposed program was established, and also describe the faculty who will oversee the program.**

As stated in the program justification in section D.2., the proposed program was established by a multidisciplinary team from both academia and industry, including the CSU Data Science Team of data science, management information systems (MIS), and computer science faculty, a data scientist working with Blackboard, and a curriculum specialist from Blackboard. The curriculum requirements were developed based on workforce demanded skill sets, existing CSU courses and research.

The program is housed in the Department of Accounting and Management Information Systems within the College of Business. The newly hired data science faculty and the MIS faculty in the department will oversee the program.

2. **Describe educational objectives and learning outcomes appropriate to the rigor, breadth, and (modality) of the program.**

Educational Objectives and Program Goals:

The educational objectives of the program are to prepare undergraduates with the workforce skills to understand and apply algorithms, models, statistics, and visualization techniques to develop theories and evidence from data. Through course study and hands-on projects, students will master data science skills, including structured and unstructured data, statistical measurement, machine learning and deep learning, on-premises and cloud computing, and data visualization.

Program graduates are expected to be able to

- Demonstrate knowledge about business functions and processes.
- Collect, clean, prepare, and maintain data from different sources with relevant technologies.
- Analyze data using popular statistical tools and programming skills and generate reports.
- Visualize data using Power BI, Tableau, and Microsoft Excel and communicate the results effectively to address business questions and make recommendations.
- Understand the role of data governance and the ethical use of data in data science.
- Demonstrate knowledge about enterprise systems.

Student Learning Outcomes:

College of Business has a list of ten student learning outcomes (SLOs), which include the institutional SLOs that the college adopted and the SLOs that are unique to the college. The proposed B.S. in Data Science program will focus on the following eight highlighted SLOs out of the ten:
SLO #1. Written Communication
SLO #2. Oral Communication

SLO #3. Critical Thinking
SLO #4. Quantitative Literacy
SLO #5. Information Literacy
SLO #6. Global Awareness
SLO #7. Leadership
SLO #8. Teamwork
SLO #9. Ethical Reasoning
SLO #10. Reflective Practice

Below are the descriptions of the eight SLOs that the proposed program is mapped to:
SLO #1. Written Communication
- Writing clear expository and persuasive prose
- Use of valid research-based arguments to support written positions
- Expression of ideas in language appropriate to the topic and audience
- Writing proficiently for various audiences

SLO #2. Oral Communication
- Use of valid research-based arguments to support oral positions
- Oral expression of ideas in language appropriate to the topic and audience
- Speaking proficiently for various audiences

SLO #3. Critical Thinking
- Thinking critically and analytically to respond to various issues and problems/concerns
- Applying applications of classical and/or current theories and principles from specific content areas.
- Using critical judgments from a combination of evidence and assumptions to reach viable conclusions

SLO #4. Quantitative Literacy
- Collecting, analyzing, and interpreting data via computational literacy and scientific reasoning

SLO #5. Information Literacy
- Proficiency in the use of technology and its appropriate applicability
- Use of multiple information sources such as online databases, videotapes, government documents, and journals in conducting research and/or in problem solving (e.g., electronic and print periodicals, chapters in books, government documents, archival material, and microfilm)

SLO #8. Teamwork
- Listen to and respect different perspectives
- Advance the work of the team by collaboratively and constructively building
- Focus on the team objectives, observe deadlines, and resolve conflicts within the team

SLO #9. Ethical Reasoning
- Assess own ethical values
- Recognize ethical issues in a variety of settings
- Consider the social contexts of ethical issues
- Think about how different ethical perspectives might be applied to ethical dilemmas

- Consider the implications of alternative decisions/actions

SLO #10. Reflective Practice
- Personal responsibility for intellectual growth through reflective practice in order to engage in continuous personal and academic development
- Use of professional organizations to develop a comprehensive understanding of the expectations of the chosen profession; and
- Development of professional competence through continuous learning experiences

3. **Explain how the institution will:**
   a) **provide for assessment of student achievement of learning outcomes in the program**

      Coppin students' experiences and instruction will be anchored within an academic framework of the University's Student Learning Outcomes (SLOs) such as Oral and Written Communication and Analytical Reasoning. These SLOs, by definition, represent the university's commitment to provide students with academic experiences that support their ability to write clear expository and persuasive prose; to use valid research-based arguments as support for their written or oral positions; to express their ideas in language that is both appropriate to the topic and for the target audience, and to write and speak proficiently for those various audiences. Moreover, students will be trained to apply classical and/or current theories and principles from specific content areas; to use critical judgments from a combination of evidence and assumptions to reach viable conclusions; and to collect, analyze, and interpret data via computational literacy and scientific reasoning.

   b) **document student achievement of learning outcomes in the program**

      Through the Assessment Committee utilizing Blackboard Outcomes and the Nuventive software platform, assessment of student learning will be regularly monitored, reviewed, and if necessary, enhancements to the curriculum will be provided to ensure student success. The Assessment schedule of the university will drive routine and systematic assessment of learning.

4. **Provide a list of courses with title, semester credit hours and course descriptions, along with a description of program requirements**

B.S. in Data Science - Overall Curriculum Requirements for Graduation (120 Credits):

Requirements	Credits
GER (13 Courses)	40
University Requirements (1 Course: FRSEM 101 Freshman Seminar)	1
College of Business Core Requirements (14 Courses)	42
Data Science Program Requirements (10 Courses: 9 Core Courses; 1 Elective Course)	30
Free Electives (2-3 courses): • Recommendation: COSC 199 Introduction to Computer Programing (3 Credits) • Recommendation: One or two other COSC, MATH, or MISY courses (4 Credits)	7
Total Credits:	120

College of Business Core Requirements (42 Credits):

College of Business Core Courses with Course Descriptions (14 Courses)	Credits
• ACCT 201 Principles of Financial Accounting This course examines procedures for current and recommended concepts of accounting. Major emphasis is on basic principles underlying the preparation of financial accounting reports. Special attention is given to financial statements, their interrelationships to one another and their related significance to financial problems. Prerequisite(s): ECON 103	3
• ACCT 202 Principles of Managerial Accounting This course examines the basic principles underlying the preparation of managerial accounting reports. Special attention is given to financial statements, their interrelationships on one another and their related significance to financial problems of a corporate entity. Prerequisite(s): ACCT 201	3
• BDSC 322 Business Statistics This course introduces students to the fundamental concepts and application of statistics to decision-making in business. Major topics include measures of central location, variability, and correlation between two variables; probabilities; discrete and continuous probability distributions; sampling distributions; confidence intervals; and hypothesis testing. Prerequisite(s): MATH 131	3
• BDSC 340 Operations and Production Management This course introduces the principles and concepts of operations management. Students will learn how to apply these principles and concepts to real-life business-related problems. Students will be trained to collect, analyze, data in order to solve the real-life problem. They will also learn how to interpret data and draw meaningful conclusions. Students also are trained to demonstrate proficiency in the use of business-related computer software. Specific topics included are Forecasting, Locations Strategies, Decision Analysis, Inventory Management and Just-In-Time, Material Requirement Planning, Project Management and Short-Term Scheduling tactics, etc. Prerequisite(s): BDSC 322	3
• BUSI 310 Business Law This course surveys the many legal doctrines that affect business world. Topics include contracts, torts, consumer law, business ethics, proper business structures,	3

and employment law. This class will prepare students to analyze a wide variety of legal issues at a general level while sharpening legal reasoning skills. Prerequisite(s): ECON 103	
• BUSI 320 International Business This course focuses on the knowledge and skills needed to navigate the maze of international markets, to grow and sustain performance in an international business organization. It addresses common international business functions such as market, analysis, management, marketing, finance, exporting, importing, cross-cultural management, direct foreign investment, and sourcing. Prerequisite(s): ECON 103	3
• BUSI 495 Seminar in Business Strategy and Policy This is a capstone course that utilizes an eclectic approach to integrate key concepts and processes of the business curriculum/discipline. Students will explore the processes of how organizations formulate, implement, and evaluate strategies via case analyses. Topics include generic competitive strategies, corporate strategies, competitive international market strategies, company's external environment, resources, cost position, and competitiveness. Prerequisite(s): Senior standing or the consent of instructor(s).	3
• ECON 211 Principles of Economics I This course introduces the foundational concepts of economic principles, such as opportunity costs, supply, and demand. However, the course focus is to explore primary macroeconomic principles, including measurement, the nominal and real economy, money supply effects, macroeconomic fluctuations, and policy issues. You will be presented with real world contemporary examples that apply theory to practice, demonstrating the relevance of macroeconomic thought.	3
• ECON 212 Principles of Economics II A systematic study and examination of the elements of micro-economic theory, presenting an analysis of the household, business organizations, markets, and industry.	3
• FINM 330 Principles of Business Finance Within this course, we will develop the tools that are typically used in a typical finance setting. You will learn how and why businesses can be organized in various forms and how they raise the capital needed to expand. Financial decisions are made using a variety of tools, such as cash flow analysis, and net present value. These tools are widely applicable, beyond business settings. As an example, you will learn how to compute the payments on a mortgage or find the value of any asset that generates cash flows. You will also learn the basics of investment management. Prerequisite(s): ECON 103	3
• MGMT 305 Business Communications This course introduces the fundamentals of communication in an organizational environment. The topics to be discussed, but are not limited to study the principles, strategies, and techniques of effective written, oral, and digital business communication. Emphasis is placed on reviewing grammar and mechanics a's students create successful written messages including e-mails, memos, letters, reports, and resumes. Students learn productive techniques for business meetings, presentations, and interviews, as well as communicating professionally in an increasingly global, digital workplace. Prerequisite(s): ENGL 102 and ECON 103	3

• MGMT 320 Principles of Management This course introduces students to the fundamental concepts and processes of management. Students will explore the functional role of a manager and various topics centered on the four basic functions of management: Planning, Leading, Organizing, and Controlling. Some of the topics covered in this course include individual differences across national cultures, generic and situational leadership styles, and group and team dynamics. Students will develop the skills required to become successful managers in a competitive environment. Prerequisite(s): ECON 103	3
• MISY 341 Small Systems Software This course introduces students to the fundamental concepts and applications of management information systems. Students will develop practical skills in advanced spreadsheet and database management. Some of the advanced spreadsheet skills include charts, formulas, functions, what- if analysis, and data management. Some of the database management skills include creating databases, querying a database, creating forms and reports, and maintaining a database. Prerequisite(s): MISY 150	3
• MKTG 310 Principles of Marketing This course introduces students to the fundamental concepts and processes of marketing. The course will focus on using the four Ps (product, price, promotion, and place) to satisfy the customers' needs and wants and build long-lasting relationships. The course will also focus on marketing challenges, which include cultural differences, government regulations, and opportunities and threats of operating in national and global markets. Students will be exposed to the process and technological tools for gathering and evaluating information. Prerequisite(s): ECON 103	3
Total Credits:	42

Data Science Program Requirements (30 Credits):

The program requires 10 courses, 9 core courses and 1 elective course. Among the 9 core courses, 8 are new data science courses and 1 is an existing MIS course. Regarding the elective course, students are required to select 1 out of 2 new data science courses. In total, there are 10 new courses and 1 existing course with course descriptions listed in the table below:

Data Science Program Requirements with Course Descriptions	Credits
Data Science Core Courses (9 Courses: 8 New Courses; 1 Existing MISY Course)	27
• DSCI 201 Introduction to Data Science This course presents students a managerial approach to Business Intelligence, Analytics, and Data Science, emphasizing the applications and implementations behind the concepts. This approach allows students to understand how Business Intelligence, Analytics, and Data Science work in a way that will help them adopt these technologies in future managerial and Data Science roles. As a first course in Data Science, we follow the Exposure, Experience, Exploration (EEE) approach to introduce concepts. The students will be introduced to several real-life problems. Prerequisite(s): MATH 131 College Algebra for Mathematics and Science Majors	3
• DSCI 310 Data Science Programming	3

This course teaches students the Python and SQL programming languages and the Git version control system. Python is the most popular general-purpose programming language. SQL is the de facto standard language for data. Git is the most popular version control system used by developers and businesses. Working knowledge of these languages helps prepare students for work and research in data science. Students will document their code and knowledge in a GitHub repository (e-portfolio). Prerequisite(s): DSCI 201 Introduction to Data Science	
• DSCI 351 Data Visualization The goal of this course is to expose students to key data visualization design principles, leading analytical techniques, business intelligence tools, and strategic communication skill to bring insights to complex data and drive real value. Students will go through the data discovery journey, focusing on how to present information clearly and effectively translate data into dynamic stories with actionable outcomes. Prerequisite(s): BDSC 322 Business Statistics	3
• DSCI 355 Data and Text Mining Data can be continuous, binary, categorical, and seasonal. This course will focus on data mining and predictive analytics based on continuous response data. Major topics include simple and multiple regression analysis techniques, different model selection methods, and text mining concepts. Prerequisite(s): DSCI 310 Data Science Programing & BDSC 322 Business Statistics	3
• DSCI 356 Data Science Cloud Computing This advanced course provides a comprehensive study of Cloud concepts and capabilities across the various Cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and Business Process as a Service (BPaaS). The course also covers the Cloud security model and associated challenges and delves into the implementation and support of High-Performance Computing and Big Data support capabilities on the Cloud. Prerequisite(s): DSCI 355 Data and Text Mining	3
• MISY 360 Database Management Principles An introduction to the advantages of a database approach to data management. The course covers database systems architecture and design, logical and physical design, relational database, data dependencies and normalization, query languages (including SQL), database security, data dictionaries, and distributed databases. Prerequisite(s): MISY 341 Small Systems Software	3
• DSCI 375 Time Series Modeling and Forecasting Time series data is available in the area of stock price, retail sales, economics, and weather. Learning time series model is an important skill for any decision maker as they will encounter time series data in their daily lives. Visualizing and finding a pattern in a time series is an important task. This course will focus on developing, examining, and improving the forecast accuracy of time series models. Prerequisite(s): DSCI 355 Data and Text Mining	3
• DSCI 420 Machine Learning Response data can be continuous, binary, categorical, and seasonal. This course will focus on analysis of categorical response data using popular machine learning algorithms. An in-depth study of supervised and unsupervised machine learning	3

algorithms will be discussed using real data to classify previously unseen inputs correctly. Prerequisite(s): DSCI 355 Data and Text Mining	
• DSCI 490 Data-driven Decision Making This capstone course will provide hands-on experience where the student must demonstrate the ability to understand the problem, collect raw data, clean data sets, visualize the problem, apply suitable algorithms to the problem, summarize the findings in a formal report, present it, and find areas to improve. This is a capstone design course and draws on materials from the total data science curriculum. The impact of data science program on society will also be discussed. Prerequisite(s): DSCI 351 Data Visualization, DSCI 375 Time Series Modeling and Forecasting, & DSCI 420 Machine Learning	3
Data Science Electives (Select any 1 Course)	3
• DSCI 450 Special Topics in Data Science This course covers important practical topics or current developments in data science. At the discretion of the instructor, major topics may include, but not limited to, data science and business processes, analytical tools, quantitative methods and models, and data science applications. Prerequisite(s): DSCI 420 Machine Learning	3
• DSCI 485 Internship in Data Science This course is structured to assist students in gaining practical experiences as to how to apply the data science theories and tools learned in class to solve real world problems in an actual working situation. Typical positions should relate to some aspects of the data science field. A student must choose an internship that complies with their major of study. To ensure the appropriateness of an internship that is under consideration, contact the instructor for approval before starting the internship work. Students must complete a minimum of 150 hours of internship work for this 3-credit course over the course of a semester. Prerequisite(s): This course is intended for upper-level students only. Approval by the instructor is required.	3
Total Credits:	30

5. Discuss how general education requirements will be met, if applicable.

The general education requirements of 40 credit hours will be met based on six categories as follows:

Categories	Courses	# of Credits
Category 1: English Composition	ENGL 101 English Composition I ENGL 102 English composition II	3 3 Total: 6
Category 2: Arts and Humanities-History/African American Heritage	History I (World, United States, or African American History): HIST 201, 203, or 205 and History II (World, United States, or African American History): HIST 202, 204, or 206	3 3 Total: 6
Category 2: Arts and Humanities (Art, Dance, Theater, and Music)	PHIL 102 Introduction to Logic SPCH 105 Introduction to Speech Communication Select any one from ART 103, MUSC 201, DANC 226, THEA 221, IDIS 102/103, or Foreign Language 101	3 3 3 Total: 9
Category 3: Social and Behavioral Sciences	ECON 103 Introduction to Business & Entrepreneurial Economics PSYC 201 General Psychology	3 3 Total: 6
Category 4: Mathematics	MATH 131 College Algebra for Mathematics and Science Majors	3
Category 5: Natural Sciences	BIOL 101 Biological Science PHSC 101 Physical Science or PHSC 103 Environmental Sciences	4 3 Total: 7
Category 6: Interdisciplinary and Emerging Issues-Local to Global	MISY 150 Technology Fluency	3
Total Number of GER Credits:		40

6. **Identify any specialized accreditation or graduate certification requirements for this program and its students.**

Currently, there are no specialized accreditation or graduate certification requirements for this program and its students.

7. **If contracting with another institution or non-collegiate organization, provide a copy of the written contract.**

The university is not contracting with another institution or non-collegiate organization to administer this program.

8. **Provide assurance and any appropriate evidence that the proposed program will provide students with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/student interaction, assumptions about technology competence and skills, technical equipment requirements, learning management system, availability of academic support services and financial aid resources, and costs and payment policies.**

The Undergraduate Catalog and program brochure will provide students with clear, complete, and timely information on the curriculum, course, and degree requirements. Coursesyllabi will provide clear information on nature of faculty/student interaction, specific courserequirements, modes of instruction, assumptions about technology competence and skills, technical equipment, or software requirements, learning management system (i.e., Blackboard), and academic accommodations. The CSU website and the Blackboard site for each course will list all the academic support services available for students on campus and online. Information on financial aid resources and costs and payment policies will be clearly communicated to students through the corresponding offices on campus, the CSU website, and College of Business advisement center.

The program description, curriculum requirements and services will also be provided on the department's website, as well as the college level page location. It will be noted that the program provides ample opportunities for students to engage in career development and other professional activities on and off campus.

9. **Provide assurance and any appropriate evidence that advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and the services available.**

Once approved, the program will be advertised through brochures, flyers, CSU website, social media and in the Student Handbook, along with the appropriate student supports. The recruitment materials/portals will clearly and accurately promote the program and inform students about academic advising, disability support, counseling, and other services available at CSU.

H. Adequacy of Articulation

1. **If applicable, discuss how the program supports articulation with programs at partner institutions. Provide all relevant articulation agreements.**

To date, there have been no articulation agreements. However, should the need arise for partnerships and other collaborative opportunities, the university will commit resources to ensure partnerships that have a positive impact on student success and contribute to the discipline.

I. Adequacy of Faculty Resources (as outlined in COMAR 13B.02.03.11).

1. **Provide a brief narrative demonstrating the quality of program faculty. Include a summary list of faculty with appointment type, <u>terminal degree title and field</u>, academic title/rank, status (full-time, part-time, adjunct) and the course(s) each faulty member will teach in the proposed program.**

All the full-time faculty in the program are either tenured or tenure-track. Here is a summary list of the program faculty:

Faculty Name	Terminal Degree Title and Field	Academic Title/Rank	Status (Full-Time, Part-Time, Adjunct)	Course(s) Each Faculty Member Will Teach in the Proposed Program
Ha, Lidan	Ph.D. in Information Systems	Associate Professor	Full-Time	BDSC 322, DSCI 450, MISY 341
Iqbal, Gazi	Ph.D. in Industrial Engineering	Assistant Professor	Full-Time	DSCI 201, DSCI 351, DSCI 355, DSCI 375, DSCI 490
Newman, John	Ph.D. in Management Information Systems	Associate Professor	Full-Time	BDSC 340, BUSI 310, DSCI 485
Providence, Stephen	Ph.D. in Computer Science	Assistant Professor	Full-Time	DSCI 310, DSCI 420, DSCI 450
Song, Yangsoon	Ph.D. in Management Science	Assistant Professor	Full-Time	BDSC 322, BDSC 340, DSCI 375
Liangjun, You	Ph.D. in Information Systems	Associate Professor	Full-Time	DSCI 356, DSCI 375, MISY 360
Fufa, Negash	M.ED in Instructional Technology	Adjunct Professor	Adjunct	DSCI 201, DSCI 351

More detailed qualifications of the faculty members are as follows:

Dr. Lidan Ha is a tenured Associate Professor in the College of Business at Coppin State University. She holds a master's degree and a Ph.D. degree in Information Systems from University of Maryland Baltimore County (UMBC), a master's degree in Quantitative Economics, and a bachelor's degree in Management Information Systems from Tsinghua University in Beijing, China. Her major expertise is in the areas of information systems, business statistics, decision support systems, and human computer interaction. Dr. Ha has been teaching for the Management Information Systems program within the College of Business at Coppin since August 2005 and has taught undergraduate and graduate level courses in the fields of information systems as TA and Associate Faculty from 2001 to 2005 at UMBC.

Dr. Gazi Iqbal is an Assistant Professor of Accounting & Management Information Systems in the College of Business at Coppin State University (CSU). He finished his Ph.D. in Industrial Engineering under the supervision of Dr. Jay Rosenberger from University of Texas at Arlington. He also holds the degree of M.S. in Industrial Engineering from University of Southern Mississippi and B.S. in Industrial and Production Engineering from Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh. Prior to joining CSU, Dr. Iqbal worked at New York University (NYU) Tandon School of Engineering as a Visiting Assistant Professor. Dr. Iqbal worked at University of Maryland School of Medicine as a Post-Doctoral Research Fellow for almost two years. He is an active member of INFORMS and IISE.

Dr. John Newman holds terminal degrees from the University of Baltimore School of Law (Juris Doctorate, December 1974); Loyola University (Executive MBA, June 1987); University of Maryland Baltimore County (Master's Degree: Operation Management, December 1991); University of Maryland Baltimore County (PhD: Management Information Systems, May 1993). His areas of interest include the field of data science; he is currently involved in the development of a data science program at Coppin. Dr. Newman believes in bringing his real-world experience into the classroom whether the classes are taught face to face, online, or some combination thereof. He has had years of experience in the private sector and at various universities. He is a tenured Associate Professor at Coppin State University.

Dr. Stephen Providence holds bachelor's, master's, and doctorates in computer science fromthe City University of New York. His expertise is in algorithms for quantum & information science with IBM, computational biology & genomics with ARL and the Broad Institute, plus parallel and serial computer algorithms, high-performance computing, parallel & distributed computing, and computer & network architecture. Dr. Providence has taught computer science at the senior college level for eighteen academic years and has advised six graduate students toward master's degrees in computer science. Dr. Providence has conducted research as visiting faculty at Vanderbilt's, EECS Institute of Software Integrated Systems to develop Computer Aided Software Engineering tools as a PaaS for faculty teaching computer architecture.

Dr. Yangsoon Song holds a Ph.D. degree in Management Science from the Penn State University and a master's degree in Finance from Korea University in Seoul, Korea, and a bachelor's degree in Electronic Communication Engineering from the Seoul National University (SNU) in Seoul, Korea. His major expertise is in the areas of operations management, optimization in decision making system, and competitive bidding. Dr. Song has been teaching in operations management and business statistics for the Management Information Systems program within the College of Business at Coppin State university since August 1993 and has taught undergraduate and graduate level courses in the fields of operations management and finance as an Assistant Professor from 1986 to 1993 at the Penn State University at Harrisburg, PA.

Dr. Liangjun You, full time faculty, associate professor, holds a Ph.D. in Information Systems from University of Texas at Arlington, Texas and Master of Science in Computer Science from St. Cloud State University, St. Cloud, MN. Dr. You has considerable background in computer and information security studies, both as an instructor and researcher. As an instructor, Dr. You teaches MISY356 (Introduction to Computer and Information Security), MISY 150 (Technology Fluency), MISY360 (Database Management Principles), MISY355 (Visual Basic Programming). He brings his skills and knowledge from different areas and integrates the disciplines of as computer science, management, and management information systems. As a researcher, Dr. You published a research paper on

computer and information security titled, "A Security Communication Prototype Protocol to Support Client/Server Computing", at the SW Decision Science Institute 2007 Annual Meeting and published, " Using the packet analysis method to teach secure communication in client/server computing" in the Journal of Informatics Education Research in 2009.

Negash Fufa, adjunct faculty, holds a M.ED in in Instructional Technology from American InterContinental University (AIU), Hoffman Estates, IL. He is an IT professional with 10+ years of experience and has received multiple certificates related to the data science field. His major skills include Data Science with Tableau, Python and R (Basics), Data Analytics with T-SQL (Basics), Data Analytics: Using Excel, GIS and SPSS, Math and Basic Statistics, Big Data & Cloud Computing Concepts (IaaS, SaaS, PaaS), Basic to Core Java (Software Developer), Basic Front End: CSS, HTML, JS, File and Data Management, Data Storage and Collaboration, Computer and Information Processing, Hardware, Software, Windows OS, Computer Security, Troubleshooting & Maintenance, Internet & Network (WAN and LAN), Querying Data with Transact – SQL, Database Management with T-SQL, Query Data with Advanced T – SQL, and Program Databases using T – SQL. In July 2020, he published a book on Amazon with a title of "The Value of Big Data Analytics in Higher Education and Beyond: Data Analytics & Strategies to Upgrade Educational Institutions".

2. **Demonstrate how the institution will provide ongoing pedagogy training for faculty in evidenced-based best practices, including training in:**

    a) **Pedagogy that meets the needs of the students**

    The Innovation, Development, Education, & Assessment (IDEA) team under the Information Technology Division at CSU has been committed to providing ongoing pedagogy training for faculty in evidence-based best practices and technology tools. The training covers all aspects of pedagogy to meet the needs of and to better the students. The training workshops and other professional development activities include topics such as Blackboard, Blackboard Collaborate, TurnItIn, Panopto (a lecture capturing system), Microsoft Teams, Accessibility, Quality Matters Rubrics, just to name a few. Individual faculty members, departments or colleges can also request need-based training sessions.

    The Faculty Information Technology Committee (FITC) organizes an Information Technology in Teaching and Learning Conference every year to provide a platform for faculty from CSU and other sister institutions to share their evidence-based best practices. In addition, College of Business has its own Faculty Professional Development Committee to provide pedagogy training, research, and other professional development opportunities for faculty. The institution and the college will provide continued support for faculty training and development.

    b) **The learning management system**

    CSU employs Blackboard as the learning management system. Currently all faculty are required to use Blackboard whether teaching a face-to-face, hybrid, or

completely online class. The IDEA team under the Information Technology Division provides faculty with individual or group-based trainings all year long on all aspects of Blackboard to better engage and communicate with students, assess students' knowledge and learning outcomes, and so on. Best practices and new ideas are shared across the campus through these ongoing training workshops and activities.

c) **Evidenced-based best practices for distance education if distance education is offered.**

Not applicable

J. Adequacy of Library Resources (as outlined in COMAR 13B.02.03.12)**.**

1. **Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program.**

Coppin State University has a library on-campus with adequate resources to support the proposed program.

The Parlett L. Moore Library's facilities and resources provide excellent support for scholarship, inquiry, and research for the students and faculty of the College of Business. The library has a diverse collection of print, non-print, and electronic items. Currently, the library collection includes 95,015 books and over 40,000 electronic books. The library subscribes to 363 print serials titles.

The Library is a member of the University System of Maryland and Affiliated Institutions (USMAI), a collaborative effort that permits 13 state higher education institutions to share resources. USMAI provides global circulations functions; a major advantage because of the students' accessibility to information resources including over 1,400,000 titles. Global circulations functions permit registered patrons to borrow from the members of USMAI. If a student cannot locate the book in the Moore Library and it is available at another institution, the student can either pick the book up from that institution or have the book sent to the Moore Library. The document delivery service, having the book sent and returned from a member library, is available to students at no cost.

Parlett L. Moore Library is equipped to support increasing use of web-based collections/electronic resources and web-based services. The use of technology by students and faculty has been successful; the library offers 40 electronic databases, providing full text and indexing and abstracts for more than 35,000 journals. There is extensive indexing for books, monographs, conference papers and other sources. The library uses the SFX and MetaLib software to integrate and improve access to full-text articles. If the source is not available in Parlett L. Moore Library, the software automatically directs the students to Interlibrary Loan to request the article.

Materials, including books, copies of periodical articles, dissertations, etc., which are not in the USMAI catalog or cannot be accessed in our full-text online databases are obtained from other libraries through the Interlibrary Loan (ILL) process. Monographs are usually borrowed in returnable hard copy. Newspaper and periodical requests are received as PDF whenever possible and accessed online through an ILL Express Account. Coppin uses ILL Express, which is the electronic service, students request the item(s) through their account, and when the material arrives, it is sent via e-mail to the student. There is no fee for interlibrary loan services. The library's online catalog, e-books and databases are accessible 24 hours.

K. Adequacy of Physical Facilities, Infrastructure, and Instructional Equipment (as outlined inCOMAR 13B.02.03.13)

1. **Provide an assurance that physical facilities, infrastructure, and instruction equipment are adequate to initiate the program, particularly as related to spaces for classrooms, staff and faculty offices, and laboratories for studies in the technologies and sciences.**

Coppin State University's existing physical facilities, infrastructure, and equipment are adequate to meet the needs of the proposed B.S. in Data Science program.

In addition, the Percy Julian Science Building is currently under renovation for the College of Business with an expected completion date of Spring 2022. The new building will provide additional resources for the new Data Science program. The new facilities and other resources include, but are not limited to, faculty and staff offices, computer labs, classrooms equipped with state-of-the-art technology and a Data Science Lab to support the capstone experience and other related projects. The data science students will also interact with community leaders in a simulated boardroom where students can present their projects to a broader audience including potential employers. There will also be a career center that will serve as a placement office to provide job/internship opportunities and trainings for students.

2. **Provide assurance and any appropriate evidence that the institution will ensure students enrolled in and faculty teaching in distance education will have adequate access to:**

   a) **An institutional electronic mailing system, and**
   b) **A learning management system that provides the necessary technological support for distance education**

   Currently, the program is not applying for the distance education modality. However, students enrolled in and faculty teaching in the program are assigned an email address, access to the institution's Learning Management System, Blackboard, and all other appropriate platforms to support the students' experience. Additionally, students can access 24/7 OIT Student Help desk should needs arise using any of the technology.

L. Adequacy of Financial Resources with Documentation (as outlined in COMAR 13B.02.03.14)
   1. **Complete <u>Table 1: Resources and Narrative Rationale</u>. Provide finance data for the**

first five years of program implementation. Enter figures into each cell and provide a total for each year. Also provide a narrative rationale for each resource category. If resources have been or will be reallocated to support the proposed program, briefly discuss the sources of those funds.

TABLE 1: PROGRAM RESOURCES					
Resources Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Reallocated Funds[1]	0	0	0	0	0
2. Tuition/Fee Revenue[2] (c+g below)	$379,584	$1,206,985	$3,388,313	$6,704,361	$11,188,709
a. #F.T. Students	9	20	28	36	49
b. Annual Tuition/Fee Rate	6716	6716	6716	6716	6716
c. Annual Full Time Revenue (a x b)	$60,444	$134,320	$188,048	$241,776	$329,084
d. # Part Time Students	6	11	19	27	35
e. Credit Hour Rate	2955	2955	2955	2955	2955
f. Annual Credit Hours	18	33	57	81	105
g. Total Part Time Revenue (d x e x f)	$319,140	$1,072,665	$3,200,265	$6,462,585	$10,859,625
3. Grants, Contracts, & Other External Sources[3]	$525,000	0	0	0	0
4. Other Sources	0	0	0	0	0
TOTAL (Add 1 - 4)	$904,584	$1,206,985	$3,388,313	$6,704,361	$11,188,709

*$525,000 - USM

Narrative Rationale: The program is developed in response to funding provided by the USM as part of its workforce initiatives. After the cessation of the external funding, the program will be funded by the tuition revenue. The 5-year enrollment projection is consistent with the CSU's enrollment projection.

2. **Complete Table 2: Program Expenditures and Narrative Rationale. Provide finance data for the first five years of program implementation. Enter figures into each cell and provide a total for each year. Also provide a narrative rationale for each expenditure category.**

TABLE 2: PROGRAM EXPENDITURES					
Expenditure Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Total Faculty Expenses (b + c below)	$97,500	$195,000	$195,000	$195,000	$195,000
a. # FTE	1	2	2	2	2
b. Total Salary	$75,000	$150,000	$150,000	$150,000	$150,000
c. Total Benefits	$22,500	$45,000	$45,000	$45,000	$45,000
2. Total Administrative Staff Expenses (b + c below)	$37,800	$37,800	$37,800	$37,800	$37,800
a. # FTE	1	1	1	1	1
b. Total Salary	$35,000	$35,000	$35,000	$35,000	$35,000
c. Total Benefits	$2,800	$2,800	$2,800	$2,800	$2,800
3. Total Support Staff Expenses (b + c below)	0	0	0	0	0
a. # FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
4. Equipment	0	0	0	0	0
5. Library	$125	$125	$0	$0	$0
6. New or Renovated Space	0	0	0	0	0
7. Other Expenses	$50,000	$50,000	$50,000	$50,000	$50,000
TOTAL (Add 1 - 7)	$185,425	$282,925	$282,800	$282,800	$282,800

Narrative Rationale: Initial funds have been utilized to hire a content expert and faculty to further guide the design and development of the program. As enrollment grows, one additional full-time data science faculty will be hired for Year 2-Year 5. Existing management information systems and computer science faculty will teach the courses that are not covered by the data science faculty. One administrative staff will be hired over the 5 years to support program faculty and students. Other expenses include expenditures on marketing, software licenses, and professional development activities for students and faculty.

M. Adequacy of Provisions for Evaluation of Program (as outlined in COMAR 13B.02.03.15).
   1.   Discuss procedures for evaluating courses, faculty, and student learning outcomes.

The curriculum, program faculty, and student learning outcomes will be routinely evaluated throughout the semester, annually, and as required by the USM's periodic review process. The program, courses, and faculty will be evaluated using student surveys and program committee reviews on a regular basis. The faculty are also evaluated by department Chair. The curriculum and assessment tools will be reviewed periodically to determine effectiveness in achieving the proposed program's objectives and outcomes. Standard rubrics will be used for various assessment methods. Samples are included in the course syllabi or on course Blackboard sites. The student assessment method includes tests, quizzes, hands-on projects, capstone assignments, written assignment, and oral presentation. Faculty evaluations will be conducted once a year, as is the current norm, by the departmental Chair. Faculty members will be evaluated on teaching ability, research publication and scholarship, and community engagement. In addition, faculty evaluations by students will be done twice a year, in the fall and spring semesters.

More specifically within the College of Business, there is also a well-established assessment culture, and the college has been utilizing the Blackboard Outcomes platform to assess the SLOs for all its programs since the ACBSP accreditation in 2015. The proposed program will employ the same existing practices and build the assessment piece into the program from the beginning. New program courses are mapped to the adopted eight SLOs, and within each course, evidence assessment assignments will be created to align with and address the mapped SLOs for the course; after the courses have been offered, the evidence assessment assignments artifacts will be collected by Blackboard Outcomes for evaluation. After the evaluation of the collected artifacts, results will be generated by Blackboard Outcomes for reporting and corrective action purposes. The College of Business Assessment Committee oversees the process.

   2.   Explain how the institution will evaluate the proposed program's educational effectiveness, including assessments of student learning outcomes, student retention, student and faculty satisfaction, and cost-effectiveness.

The Institution through the Assessment Committee will evaluate academic programs for their impact on teaching and learning, and student success. A comprehensive assessment system and process has been established by the acquisition of a new software platform and evaluation committees charged by the institution's President and Chief Academic Officer.

N. Consistency with the State's Minority Student Achievement Goals (as outlined in COMAR 13B.02.03.05).
   1. **Discuss how the proposed program addresses minority student access & success, and the institution's cultural diversity goals and initiatives.**

Of the total student population at CSU, a historically black university, over 80% are minority. The faculty and staff of CSU are well trained to work with multi-generational and minority student population. According to Maryland State Plan for Postsecondary Education, reducing the achievement gap is an important goal not only because it helps to remedy persistent social inequalities, but also because it improves the overall educational attainment of the State's population. Although the achievement gap is not a new issue within the State, Maryland remains committed to improving outcomes for groups that have historically lagged those of their peers. Chief among these groups is: 1) African Americans, roughly 30% of all Marylanders and the State's largest racial/ ethnic minority group; 2) Hispanics, the State's fastest-growing minority population; and 3) Pell Grant recipients (i.e., low-income students), approximately 30% of all undergraduate students in Maryland. In addition to closing gaps in performance among student populations, there is also a commitment to narrowing disparities that exist among postsecondary institutions in the State. Specifically, Maryland must focus on narrowing the retention and graduation gaps that exist between the State's historically black colleges and universities (HBCUs) and its traditionally white institutions (TWIs).

The proposed program provides minority students access to a high-demand area of study and will work to help increase student success through improving their workplace competitiveness. Offering the program at CSU, an HBCU, is consistent with the State's minority student achievement goals.

O. Relationship to Low Productivity Programs Identified by the Commission:
   1. **If the proposed program is directly related to an identified low productivity program, discuss how the fiscal resources (including faculty, administration, library resources and general operating expenses) may be redistributed to this program.**

The proposed program is not related to an identified low productivity program.

P. Adequacy of Distance Education Programs (as outlined in COMAR 13B.02.03.22)
   1. **Provide affirmation and any appropriate evidence that the institution is eligible to provide Distance Education.**

The program will not be offered via distance education.

   2. **Provide assurance and any appropriate evidence that the institution complies with the C-RAC guidelines, particularly as it relates to the proposed program.**

Not applicable