

PROPOSAL FOR:

- NEW INSTRUCTIONAL PROGRAM**
- SUBSTANTIAL EXPANSION/MAJOR MODIFICATION**
- COOPERATIVE DEGREE PROGRAM**
- WITHIN EXISTING RESOURCES** or **REQUIRING NEW RESOURCES**



**CAPITOL
TECHNOLOGY
UNIVERSITY**

1927

Institution Submitting Proposal

Fall 2018

Projected Implementation Date

Bachelor of Science
Award to be Offered

Cyber Analytics

Title of Proposed Program

0901

Suggested HEGIS Code

11.1003

Suggested CIP Code

Business and Information Sciences
Department of Proposed Program

Dr. William Butler
Name of Department Head

Dr. Helen Barker
VP Academic Affairs,
CAO

hgbarker@captechu.edu
Contact E-Mail Address

240-965-2510
Contact Phone Number

Previously Submitted
Signature and Date

President/Chief Executive Approval

Previously Submitted
Date

Date Endorsed/Approved by Governing Board

Proposed Bachelor of Science in Cyber Analytics
Department of Business and Information Sciences
Capitol Technology University
Laurel, Maryland

A. Centrality to institutional mission statement and planning priorities:

1. Program description and relationship to university mission and how it relates to the institution's approved mission.

Bachelor of Science in Cyber Analytics Program Description:

This is a request for a new Bachelor of Science degree in Cyber Analytics. This is a different degree from the existing one at Capitol Technology University (i.e., the Bachelor of Science in Cyber and Information Science). This new degree is focused on Cyber Analytics – an emerging field with critical implications for the computing infrastructure in Maryland, the nation, and around the world. This new Bachelor of Science degree in Cyber Analytics delves deep in to the analytics required in the Cyber world while simultaneously meeting the requirements to become a Cyber Analytics technical expert and the general education requirements of the state Maryland.

The Bachelor of Science (B.S.) Cyber Analytics curriculum is designed to meet the needs of government, industry and non-profits to evaluate the statistical data generated by their computing infrastructure to determine the state of the organization's security posture on an on-going basis. These statistics are often referred to generically as Big Data but the reality is this information must be combined with relevant facts specific to the entity such as competitors, market position and sociopolitical factors to determine the threat landscape. This program combines a strong foundation in cybersecurity with hands-on project based coursework providing analytic experience that can be applied to a wide range of going concerns.

Relationship to Institutional Approved Mission:

The B.S. in Cyber Analytics is consistent with the University mission to educate individuals for professional opportunities in engineering, computer science, information technology, and business. We provide relevant learning experiences that lead to success in the evolving global community. Fundamental to the degree programs in the Department of Business and Information Sciences are opportunities to produce skilled systems-oriented Cyber Analytic professionals. The B.S. in Cyber Analytics is consistent with that philosophy. This same philosophy is supported by existing degree programs and learning opportunities. The degree is an integral part of the strategic plan for FY 2019-2020 and forward. Funding to support the new degree has been included in institutional and departmental budgets for FY 2018-2019 and forecasted budgets going forward.

The degree will be offered online. This results in the convenience required by the 21st century learner, and provides live interaction with faculty and fellow students critical to the high-level learning experience. The curriculum provides students real-world opportunities through labs, case studies, and an internship, thereby providing the student the necessary practical experience the University believes critical to success in the modern aviation environments. The degree is

consistent with the interdisciplinary nature of the University as well as the field of Business and Information Sciences. This opportunity will be available to all University students.

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

Capitol Technology University operates on five strategic goals:

1. **Elevating Education and Academic Quality:** *The University is an institution that offers career relevant curriculum with quality learning outcomes.*
2. **Expand Enrollment and Reputation:** *The University will become more globally renowned and locally active through student, faculty, and staff activities.*
3. **Diversify and Increase Financial Resources:** *The University will enhance its financial resources by expanding the range and amount of funding available to the institution, aligning costs with strategic initiatives, and expanding corporate relationships.*
4. **Maintain Institutional Viability:** *The University is committed to providing relevant learning in a quality learning environment.*
5. **Extend Our Family of Organizational Partners:** *The mission of Capitol Technology University is to provide relevant learning experiences that lead to success in the evolving global community.*

This new instructional program supports all those goals. It does so, in part, because of the cross disciplinary nature of the program. This approach builds upon already successful areas of study such as the Management of Cyber and Information Technology B.S. degree, which integrates business and cyber security. Capitol Technology University’s programs are structured to teach students the leadership and technical skills necessary to meet the needs of a modern technology-dependent society. These programs have been preparing professionals for rapid advances in technology, intense global competition, and more complex business environments for decades. The Cyber Analytics degree allows these students to move their skills and careers to the next level within the evolving global community.

The new B.S. in Cyber Analytics is fully supported by the university’s Vision 2025 and Strategic Plan 2018-2021. Funding to support the degree has been included in forecasted budgets going forward.

The University has active partnerships (e.g., Leidos, Patton Electronics, Lockheed Martin, Northrup Grumman, and Cyber Security Forum Initiative, IRS, SAS) at the private and public level. The Cyber Analytics degree will provide new opportunities for partnerships as well as research. Potential partnerships for internships were identified at the most recent job fair held at the University. The increase in partnerships and placement of our interns and graduates in our partner institutions will serve to expand the university’s enrollment and reputation. While additional enrollment will increase financial resources, additional partnerships and grants in this field of study will help diversify and increase financial resources.

With more and more companies relying on the analysis and interpretation of large amounts of data, the demand for specialists in the field of analytics who can identify patterns within that data,

draw conclusions, and provide business insights is rapidly growing and resulting in a shortage of potential employees. With more and more companies relying on that data as a corporate asset it has becoming critical to secure this asset. Graduates with the Cyber Analytics degree are supported by this need making the degree extremely relevant now and in the future.

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 advancement and evolution of knowledge.

Our nation, state, and society are on the verge of a huge explosion of growth and change due to the emergence of Cyber Analytics. Capitol Technology University believes it is imperative to position the state to take advantage of the coming changes, rather than waiting on the sidelines. A recent article on the Economist.com website explains the forces at work right now and predicts the upcoming transformation will happen relatively quickly when compared to other technological changes in the past.

Expect to see a bigger splash from pure-play big data and business intelligence vendors as the cybersecurity analytics market grows. Large firms engaged in cyber analytics include JP Morgan & Chase, Teradata, Novetta, IBM, and ORCA.

Source: <http://www.csoonline.com/article/2942083/big-data-security/cybersecurity-is-the-killer-app-for-big-data-analytics.html>

Sample section of employment ad for JP Morgan:

Cyber Security Data Analytics Lead - Connectivity Assurance

Our Cyber Security group is currently looking for a representative for the **Connectivity Assurance** team. Primary responsibility is to perform **Data Analytics** of connectivity information, with subject matter expertise in securing networking technologies and IP communications.

Source: <https://en.wizbii.com/company/j-p-morgan/job/cyber-security-data-analytics-lead-connectivity-assurance>

“Cyber attacks are getting worse but only 20 percent say their organizations are more effective at stopping them. Greatest areas of cyber security risk are caused by mobility, lack of visibility and multiple global interconnected network systems.

Less than half of organizations are vigilant in preventing (42 percent) anomalous and potentially malicious traffic from entering networks or detecting such traffic (49 percent) in their networks

Fifty-six percent are aware of the technologies that provide big data analytics and 61 percent say they will solve pressing security issues but only 35 percent have them. The outlook is good because 61 percent say big data analytics is in their future.

Big data analytics + security technologies = stronger cyber defense posture.

Eighty-two percent would like big data analytics combined with anti-virus/anti-malware and 80 percent say anti-DoS/DDoS would make their organization more secure.”

Source:http://www.ponemon.org/local/upload/file/Big_Data_Analytics_in_Cyber_Defense_V12.pdf

“Big data analytics tools will be the first line of defense, combining machine learning, text mining and ontology modeling to provide holistic and integrated security threat prediction, detection, and deterrence and prevention programs, according to recent predictions by The International Institute of Analytics (IIA). “With the rate, pace and sophistication of cyber-attacks continuing to grow exponentially, security has become a big data problem. Real-time analytics are required as the foundation of today’s security strategy. IBM partners with our clients across their C-Suite and Line of Business to develop integrated and comprehensive analytics-driven protection strategies,” adds Hannigan.”

Source: <http://www.csoonline.com/article/2942083/big-data-security/cybersecurity-is-the-killer-app-for-big-data-analytics.html>

Governments and industry bodies are getting more prescriptive around compliance. Combined with exponentially more complex IT environments, cyber security management & leadership is becoming increasingly challenging. “Big Data Cyber Security Analytics” and reviews this as an additional option to significantly improve online safety, reduce cybercrime, fraud and industrial espionage.

Source: <https://www.brighttalk.com/webcast/574/81525/predictive-cyber-security-big-data-analytics>

According to IDC, the hot areas for growth are security analytics / SIEM (10%); threat intelligence (10% +); mobile security (18%); and cloud security (50%). The global managed security services market is projected to reach nearly \$30 billion by 2020,

Source: <https://www.forbes.com/sites/stevemorgan/2015/12/20/cybersecurity%E2%80%8B-%E2%80%8Bmarket-reaches-75-billion-in-2015%E2%80%8B%E2%80%8B-%E2%80%8Bexpected-to-reach-170-billion-by-2020/#1a969df510c3>

The following link provides access to an article that speaks extensively to the need to connect cyber and analytics in the defense of our organizations, etc.

https://www.sas.com/content/dam/SAS/en_us/doc/whitepaper2/sans-using-analytics-to-predict-future-attacks-breaches-108130.pdf

In addition, the following speaks to the shortage of management science professionals.

Organizations today depend and thrive on timely, accurate and strategically relevant information. But as technology enables the creation and capture of ever-increasing amounts of data, effective management and analysis of that information are becoming enormous challenges. “Adding trained data scientists may be more difficult than it appears. McKinsey and Company has predicted that by 2018, there will be a shortage of 140,000-190,000 (a 50 to 60 percent gap between supply and demand) professionals with deep analytical skills.

Potentially more significant will be the 1.5 million-person shortage of managers and analysts with the know-how to use data analytics to make effective decisions. To emphasize, it's not just having the right technology, IT infrastructure, and software tools - it takes the right training, knowledge, and expertise to interpret the results of the data."

Source: <http://solutions-review.com/big-data/mckinsey-global-expects-shortage-of-big-data-analysts/>

"Also by 2018, the U.S. alone will face a 50 to 60 percent gap between supply and the demand" of analytic talent for data analysis.

Source: <http://solutions-review.com/big-data/mckinsey-global-expects-shortage-of-big-data-analysts/>

According to IQ4I Research and Consultancy and current federal mandates, the emergence of Big Data, aging populations, and the pervasiveness of chronic diseases, will drive the global healthcare analytics market to \$20.8 billion by 2020. Executives of some of largest U.S. health systems identified analytics as their highest Information Technology priority. Of the survey participants, all College of Healthcare Information Management Executives members, 90 percent identified analytics as extremely or very important to their organization within the next few years.

Source: <http://www.information-management.com/news/Healthcare-Analytics-Market-to-Reach-More-Than-20-Billion-Dollars-by-2020-10026108-1.html>

These examples are clear in expressing the exponential increase in data and the technologies to process this data. It is also made clear that this data is a corporate asset that needs to be protected and as such will require unique cross-disciplinary skills to secure that asset. For this reason, the university believes the BS degree in Cyber Analytics supports an innovative approach to preparing students to enter a changing marketplace.

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

Capitol Technology University has a long history of serving the minority population. The university has a 51% minority student population with 7% undisclosed. Thirty-four percent of our minority population is African American.

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

The 2013-2017 Maryland State Plan for Postsecondary Education articulates six goals for postsecondary education:

1. Quality and Effectiveness
2. Access, Affordability, and Completion
3. Diversity
4. Innovation
5. Economic Growth and Vitality
6. Data Use and Distribution

Goal 1

The B.S. Cyber Analytics program, with its rigor, will produce highly qualified cyber and decision science based professionals for an emerging field of study and employment. The university has a proven record of quality education. In addition to regional accreditation, the cyber programs are designated as Centers of Academic Excellence under the NSA/DHS and the International Accreditation Council for Business Education (IACBE) accredits the business degrees, which includes our analytics courses. The B.S. in Cyber Analytics program is consistent with the criteria for the delivery of high quality education. Faculty and staff are engaged in faculty development to remain current in their field of teaching as well as to expand knowledge across disciplines. The university has in place services and learning tools to guide students to successful degree completion. Programs such as Early Alert provide staff and faculty opportunities for early student intervention in the pathway to graduation. This applies to all students regardless of mode of course delivery. Capitol is a transfer friendly institution and participates in multiple programs for government and military credit transfer. Capitol participates in the Articulation System for Maryland Colleges and Universities (ARTSYS) and has multiple transfer agreements with local institutions at all degree levels.

Goal 2

The courses for the B.S. in Cyber Analytics will be offered in the online format. This provides learning opportunities for students unable or unwilling to attend an on-campus institution of higher education. The University provides a tuition structure that is competitive with its competitors. The University tuition structure does not differentiate between in-state and out-of-state students. Student services are designed to provide advising, tutoring, virtual job fair attendance, and other activities supporting student completion and employment for both on-ground and online students.

Students receive information through admissions regarding the cost to attend the university. The information is also publicly available on the university website. Admissions and financial aid identify for the student potential grants, scholarships, and state plans to reduce potential student debt. The net cost vs gross costs are identified clearly for the student. Students receive advising from financial aid prior to enrolling in classes for the first time. Admissions, student services and departmental chairs advise students as to academic readiness and degree requirements. The specific success pathway is developed for each student.

The university tuition increases have not exceeded 3%.

The university has in place services, tutoring, and other tools to help ensure student graduation and successful job placement. The university hosts a career (job) fair twice a year. The university has an online career center available to all students covering such topics as career exploration, resume writing, job search techniques, social media management, mock interviews, and assistance interpreting job descriptions, offers, and employment packages.

The university works with its advisory boards, alumni, partners, and faculty to help ensure that the degrees offered at the university are compatible with long term career opportunities in support of the state's knowledge based economy.

Goal 3

The Capitol Technology University community is committed to creating and maintaining a mutually respectful environment that recognizes and celebrates diversity among all students, faculty, and staff. The university values human differences as an asset and works to sustain a culture that reflects the interests, contributions, and perspectives of members of diverse groups. The university delivers educational programming to meet the needs of diverse audiences. We also seek to instill those values, understanding, and skills to encourage leadership and service in a global multicultural society.

The university supports various clubs that identify with diverse groups including race, gender, military/veterans, and sexual orientation. The university has a 47% minority student population with 7% undisclosed. The Black/African American population is 34%. For our size, the university has military/veteran population of 22%. We have a 17% female population, which is significant given that we are a technology university.

Achievement gaps: The university provides leveling courses in support of individuals attempting a career change to a field of study not necessarily consistent with their current skills. There are situations where additional undergraduate courses best serve student needs in subject areas. The university makes these courses available.

The university engages in diversity training for its institutional population, including students. Diversity and inclusiveness are built in to the curriculum allowing graduates to operate effectively in a global environment. The university supports such things as team projects and grants across degrees. This has proven effective at supporting multiple aspects of diversity.

Goal 4

Capitol Technology University's past, present, and future is inextricably intertwined with innovation. The university has a long tradition of serving as a platform for the use of new and transformative approaches to delivering higher education. New technology and cutting-edge techniques are blended with proven strategies with the goal of enabling student success in the classroom as well as in a successful career after graduation. As a small institution, Capitol can quickly integrate new technologies into the curriculum to better prepare students for the work environment. The university designs curriculum in alliance with accreditation and regulating organizations/agencies.

The university employs online virtual simulations in a game-like environment to teach practical hands-on application of knowledge. The university is engaged with a partner creating high level virtual reality environments for some courses in the degree. This all occurs in parallel with traditional proven learning strategies. These elements of the university learning environment are purposeful and intended to improve the learning environment for both the student and faculty member. In addition, these elements are purposely designed to increase engagement, improve outcomes, and improve retention and graduation rates. The university believes that innovation is the key to successful student and faculty engagement.

Example: The university engages its students in 'fusion' projects, which allows students to contribute skills in interdisciplinary projects such as those in our astronautical engineering and cyber labs where business students become project managers (to send a CubeSAT on a NASA rocket) and data analysts (to analyze rainforest data for NASA). We are recruiting

partners for this potential degree for which real projects will provide students integrative learning opportunities.

The university supports transfer of a limited number of graduate level courses appropriate to the degree. The university has some agreements with articulation partners for the transfer of graduate work (e.g., National Defense University).

Goal 5

One of the overarching principles of Capitol Technology University's approach to education is to instill a zeal for life-long learning in our students, which promotes economic growth and vitality of the student. Analytics inherently supports a knowledge based economy. University partnerships both current and future will provide economic growth opportunities for its students, the university, and its partners. The university's PhD in Management and Decision Sciences provides opportunities for undergraduate and graduate students to engage in high level research partnerships. The university is committed to partnering with Maryland institutions to employ our graduates to keep the talent in the state. The university instills in students an entrepreneurial attitude preparing them to bring skills to startup businesses or start a business of their own.

Goal 6

Capitol Technology University is committed to data collection and disclosure beyond the requirements of regulations and accreditation. Data is publicly available on the university website. Assessment for the university is the responsibility of the VP of Academic Affairs. Highly skilled personnel are required in a timely manner to accumulate the data, analyze the data, distribute the results, and recommend potential decisions to achieve the desired outcomes. In addition, data is evaluated by the dean, chairs, faculty, advisory boards, trustees, university executives, etc. to make the best decision possible.

C. Quantifiable & reliable evidence and documentation of market supply and demand in the region and State:

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

Literature continues to speak to the shortage of cyber professionals. The same is said of data analytics specialists. The area of literature speaking directly to cyber analytics is limited as it is new in the sense that we are recognizing the importance of merging the two fields. The following speaks to the needs in the two fields in general. The following definition of cyber analytics speaks to the need for the merger of the fields of study.

Security analytics analyzes large datasets with technologies that enable rapid and accurate analysis, correlation and reporting to identify events and patterns of interest that may indicate malicious behavior in the environment. With more data to work with, security teams can analyze the environment based on:

1. Timing of events
2. Sequences of occurrence (and time)
3. Differences in data from various sources

4. Real statistical analyses (time series plots of risk and behavior, machine learning, etc.)
For example, security analytics could allow more advanced visibility into indicators of compromise, such as:
5. Phishing in mail logs, using trends and correlation capabilities to assess the affinity of senders to the organization
6. Slow data exfiltration in proxy/firewall logs, looking at the number of bytes and sessions over time
7. HTTP-based malware command and control channels (C&C) in Web proxy logs, looking for long URLs without referrer fields and Base64 POST variables in the headers

Source: https://www.sas.com/content/dam/SAS/en_us/doc/whitepaper2/sans-using-analytics-to-predict-future-attacks-breaches-108130.pdf

Maryland needs a dedicated group of cyber experts to serve as first responders in the event of a cyber emergency, not unlike the reserves governments turn to in the wake of a natural disaster. That's one recommendation of the Maryland Cybersecurity Council, established by the General Assembly and chaired by Attorney General Brian Frosh, which submitted a preliminary.

Source: <http://thedailyrecord.com/2016/07/01/md-cybersecurity-report/>

While some federal agencies like the National Security Agency and the Defense Information Systems Agency have made strides to assemble the cyber workforce, overall the federal government is “regularly falling short of cyber hiring goals,” the report stated. In particular, the Fort Meade region is feeling these staffing shortages more acutely, since it has become a national center for cyber activity.

The report also suggests that there is a “critical need” for partnerships between government, industry, educators and the community, in order to “continually bring fresh concepts and new critical thinking to the issues facing our cyber world.”

“Business analytics services spending will total \$51.6 billion in 2014 and grow to \$89.6 billion in 2018, representing a 14.7 percent compound annual growth rate, according to a new study from International Data Corp.”

Source: <http://www.information-management.com/news/business-analytics-services-spending-to-reach-89-billion-in-2018-10026081-1.html?CMP=OTC-RSS>.

McKinsey and Company has predicted that by 2018, there will be a shortage of 140, 000-190,000 (a 50-60 percent gap between supply and demand) professionals with deep analytical skills. Potentially more significant will be the 1.5 million-person shortage of managers and analysts with the know-how to use data analytics to make effective decisions.

Source: <http://solutions-review.com/big-data/mckinsey-global-expects-shortage-of-big-data-analysts/>.

In a recent report by the SANS Institute called *Using Analytics to Predict Future Attacks and Breaches*, SANS analyst David Shackelford noted that in most of these cases, sophisticated attackers targeted the companies and organizations and deliberately went after some of their most sensitive data. It's clear that the security strategies we've used in the past are increasingly less effective against these new types of attacks. The argument is made clear for the marriage of cyber security and analytics. Leveraging more advanced data analytics platforms to take in more and

different types of data, focusing on increased network threat visibility, and automating detection and response actions may help security teams now and in the future as they evolve to meet these challenges.

2. 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.

Data collected by McKinsey and Company shows a shortage of individuals to fill data analytics and decision-making positions within the next 5 years; a 50 to 60 percent gap between supply and demand.

Source: <http://solutions-review.com/big-data/mckinsey-global-expects-shortage-of-big-data-analysts/>.

Employment of market data analysts is projected to grow 32 percent from 2012 to 2022.

Source: <http://www.bls.gov/ooh/business-and-financial/market-research-analysts.htm>.

“Business analytics services spending will total \$51.6 billion in 2014 and grow to \$89.6 billion in 2018, representing a 14.7 percent compound annual growth rate, according to a new study from International Data Corp.”

Source: <http://www.information-management.com/news/business-analytics-services-spending-to-reach-89-billion-in-2018-10026081-1.html?CMP=OTC-RSS>.

According to a recent survey published by Connotate, a web-data monitoring and collection company, 45 percent of businesses stated the main challenge of big data was having time and people able to analyze the data.

According to Simply Hired, there are approximately 20,000 open positions with the U.S. government for jobs related to data analytics.

Source: <http://www.simplyhired.com/k-data-analyst-federal-government-jobs-jobs.html>.

The Obama Administration announced its Big Data Research and Development Initiative in 2012. Additional initiatives were revealed later in 2012. These initiatives were supported by a \$200 million commitment dedicated to new tools and techniques.

The number of jobs currently on one online employment vendor (Indeed.com) relating to analytics is approximately 90,000. *All these positions are in companies that require the security of that data or have security professionals who are attempting to find new ways through analytics to identify and mitigate vulnerabilities.*

Jobs2careers.com revealed the information provided in the following table:

Sample of job opening by state under the heading ‘manager of healthcare analytics’:

Maryland	3,915
Illinois	17,553
Florida	9,151

Virginia	5,202
North Carolina	5,624
California	21,378
Georgia	6,400

Sample of job openings by state under the heading ‘manager of financial analytics’:

Maryland	3,500
Illinois	696
Florida	7,582
Virginia	4,992
North Carolina	4,442
California	1,333
Georgia	5,403

These are just two areas where analytics is becoming increasingly critical. The information does not represent employment opportunities for similar jobs, but different titles. IT leaders and IT professionals report the following titles are now associated with big data initiatives: data scientists, chief data officers, metricians, data librarians, data curators, data stewards and forensic librarians.

Source: <http://www.staffingindustry.com/Research-Publications/Daily-News/Big-data-important-but-there-s-a-shortage-of-skills-survey-finds-27366#sthash.VKsfVzf2.dpuf>.

Although the U.S. is in the top tier for educating new cybersecurity workers, the small talent pool is still a significant challenge for industry and government, according to a new survey.

"Hacking the Skills Shortage: A Study of the International Shortage in Cyber Skills," states that 82 percent of the executives said they do not have enough cybersecurity workers, and 71 percent said the shortage is doing direct and measurable damage to their operations.

Source: <https://fcw.com/articles/2016/07/27/cyber-workforce-study.aspx>

On Indeed.com there are 500 new cyber analytics jobs.

3. Data showing the current and projected supply of prospective graduates.

There is no data on the current or projected supply of graduates that was available for this report. This is a new field in that job classifications and degree majors are under development. We do know that there is a limited talent pool in both areas, thus a limited talent pool of the combination of cyber analytics. In response to this need the U.S. Army Research Lab (ARL) opened the Army Cyber-Research Analytics Laboratory on July 19, 2017. The ARL expects to continue collaborative projects with, among others, universities. The U.S. Army command noted the ACAL not only “represents a new capability, but a new direction in the way we develop and deploy capabilities to defend Army networks.” It is expected that this will lead the way in the development of this field and create a significant need for cyber analytic professionals. There are over 500 new job classified under cyber analytics on Indeed.com. Our university, with the approval of this degree and our undergraduate programs, is positioned to provide graduates in this field.

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 no similar programs in the State or same geographical area.

- 2. Provide justification for the proposed program.**

The program is strongly aligned with the university's strategic priorities and is supported by adequate resources. The new B.S. in Cyber Analytics degree will strengthen and expand upon existing cyber and business degree programs at the university. In addition, the analytics courses will be an option for all students as the field integrates well with the market needs of the university's other technical programs. The degree will represent study in a rapidly changing and expanding discipline. Research shows a current and growing shortage of cyber professionals as well as managers and leaders grounded in decision sciences (analytics). There is a growing shortage of individuals with the necessary combined cyber and analytic skills. This is an interdisciplinary academic field that helps fill those gaps. There is a thorough discussion of the need in sections B and C of this document.

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 HBIs.**

The university is not aware of any similar high-demand programs at the Maryland HBIs.

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.**

The university is not aware of any impact on the uniqueness and institutional identities and missions of Maryland HBIs.

G. Adequacy of curriculum design and delivery to related learning outcomes consistent with Regulation .10 of this chapter:

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

Program description, as it will appear in the catalog:

This is a request for a new Bachelor of Science degree in Cyber Analytics. This is a different degree from the existing one at Capitol Technology University (i.e., the Bachelor of Science in Cyber and Information Science). This new degree is focused on Cyber Analytics – an emerging field with critical implications for the computing infrastructure in Maryland, the nation, and around the world. This new Bachelor of Science degree in Cyber Analytics

delves deep in to the analytics required in the Cyber world while simultaneously meeting the requirements to become a Cyber Analytics technical expert and the general education requirements of the state Maryland.

The Bachelor of Science (B.S.) Cyber Analytics curriculum is designed to meet the needs of government, industry and non-profits to evaluate the statistical data generated by their computing infrastructure to determine the state of the organization's security posture on an on-going basis. These statistics are often referred to generically as "big data" but the reality is this information must be combined with relevant facts specific to the entity such as competitors, market position and socio-political factors to determine the threat landscape. This program combines a strong foundation in cyber-security with hands-on project based coursework providing analytic experience that can be applied to a wide range of going concerns.

Description of program requirements:

Entrance requirements: Have earned a high school diploma or GED. Students must have achieved a minimum of a 2.2 GPA in high school. Submit official transcripts of all prior academic work completed at community colleges, colleges, or universities you've attended. Submit SAT (minimum 800) or ACT (minimum 15) scores. Interview with a Capitol admission counselor. There are no special criteria for this degree.

To be eligible to be graduated by the university students must have successfully completed all program course requirements, be in good academic standing (GPA 2.0 or higher), satisfied all financial obligations, any other outstanding obligations to the university.

Degree Requirements:

The following is a list of courses for the B.S. in Cyber Analytics degree. Students expecting to complete this degree must meet all prerequisites for the courses listed below.

PROGRAMMING AND COMPUTER SCIENCE COURSES - 33 CREDITS

CS-150 Introduction to Programming using C (3 Credits)

This introductory course in programming will enable students to understand how computers translate basic human instructions into machine executable applications. The language of choice for this course is C. The C syntax that will be covered includes functions; variables and memory allocations including pointer notation; conditional statements and looping. Students will also learn binary to hexadecimal and decimal conversions along with basic computer architecture. Memory management, data input output and file manipulations will be among some other topics discussed and applied during this course. Prerequisite: MA-112 and CS-100.

CS-200 Programming in C++ (3 Credits)

Students learn how to program in C++ using an object-oriented approach. Design of classes and objects. Inheritance and polymorphism: Use of pointers and data structured based projects. Prerequisite CS-130 or CS-150.

CS-220 Database Management (3 Credits)

An overview of database systems, with an emphasis on relational databases. Terminology, basic analysis and design using Entity-Relationship diagrams and relational schemas are examined. Topics include database implementation, queries and updates in a modern relational database management system, database administration, transactions and concurrency as well as data warehouses. Projects, which are assigned as homework, are implemented in Oracle. Prerequisite: CS-100 or placement test score.

CS-230 Data Structures (3 Credits)

This course explores advance pointers, dynamic memory usage, concepts of object-oriented design and programming. The course includes classes, friend functions, templates, operator overloading, polymorphism, inheritance, exception handling, containers, iterators and the standard template library. Applications involve the use of simple data structures such as stacks, queues, linked lists and binary trees. Recursion, searching and sorting algorithms. The above concepts are implemented through a series of hands-on programming projects, all of which are completed as part of the homework requirements. Prerequisite: CS-225 or CS-200 or completion of CS-150 with a grade of A. Corequisite: MA-124.

CS-250 Introduction to Network Programming Using C (3 Credits)

An introductory network programming course using the C programming language. Students will be provided an overview of the principles of computer networks with a detailed look at the OSI reference model and the TCP/IP stack. The emphasis is on understanding UNIX interprocess communication and developing network programs using connectionless and connection-oriented sockets. Extensive programming assignments will include the development of client/server and peer-to-peer network applications. Prerequisites: CS-230.

CS-300 Secure Coding (3 Credits)

This course introduces the secure coding process including designing secure code, writing code that can withstand attacks, and security testing and auditing techniques to detect secure coding weaknesses. The course focuses on the security issues confronting a programmer, including common code security weaknesses and modern security threats. The course explores core secure coding principles, strategies, coding techniques, and tools that aid programmers in developing more resilient and robust code. Students will develop and analyze C language code that demonstrates mastery of these secure coding principles. Prerequisite: CS-250

CS-418 Operating Systems (3 Credits)

Principles underlying computer operating systems are presented from a computer designer's perspective. Concepts explained include process concurrency, synchronization, resource management, input/output scheduling, job and process scheduling, scheduling policies, deadlock, semaphore, consumer/producer relationship, storage management (real storage management policies in a multiprogramming environment), virtual memory management (segmentation and paging), secure memory management, access control lists and kernel protection. An overview of contemporary operating systems with these principles. Students program in a high-level language. Projects are assigned as part of the homework requirements. Prerequisites: CS-150, CT-152, CS-230 and senior status.

CT-152 Introduction to UNIX (3 Credits)

This course focuses on the Unix file and operating system. Understanding multi-user and multitasking concepts. Editors, X-windows, Awk, email, Internet commands, shell commands

and shell scripts. Projects, which provide practical experience, are completed as part of the homework requirements. Prerequisite: CS-100.

CT-206 Scripting Languages (3 Credits)

Introduces students to the use of scripting and the scripting languages of Perl, Python, and Ruby on Rails. The class will cover the use of scripting to solve short problems, automate routine tasks, integrate across pieces of software, and prototype code ideas. The merits of code-complete design versus on-the-fly coding as well as coding and code documentation styles will be discussed. Tasks involving input/output, regular expressions, and file operations are included. Students are expected to fully script solutions for real-world tasks assigned as part of the course. Prerequisites: CS-100 or placement test score.

CT-240 Internetworking with Routers and Switches (3 Credits)

Configuring routers and switches to build multiprotocol internetworks. OSI reference model, basic LAN and WAN design, dial access services, TCP/IP protocol suites, IP addressing, subnetting, static and dynamic routing, WAN technologies such as HDLC, PPP, Frame Relay, ATM and ISDN. Prerequisites: NT-150 or professor approval.

IAE-458 Senior Design Project (3 Credits)

Student proposes, designs, builds and tests a working software project. Students write a report according to specifications and deliver an oral presentation for review. This is for CIS and MCIT seniors or must have Dean approval. Prerequisite: EN-408 and senior standing.

INFORMATION ASSURANCE COURSES - 27 CREDITS

IAE-201 Introduction to IA Concepts (3 Credits)

This course covers topics related to administration of network security. Topics include a survey of encryption and authentication algorithms; threats to security; operating system security; IP security; user authentication schemes; web security; email security protocols; intrusion detections; viruses; firewalls; Virtual Private Networks; network management and security policies and procedures. Laboratory projects are assigned as part of the homework requirements. This course prepares students for the (ISC)2 Systems Security Certified Practitioner (SSCP) Certification. Corequisites: MA-110 or MA-112 or MA-114 or MA-261.

IAE-301 Comprehensive Computer and Network Security (3 Credits)

Building on IAE-201, this course provides learners with detailed and hands-on knowledge of computer and network security. The course emphasizes current topics such as network security, compliance and operational security, threats and vulnerabilities, application security, access control, as well as cryptography. Additionally, underlying theory and concepts are presented in order to extend learners' understanding of computer and network security. Weekly laboratory exercises are utilized to reinforce practical, real-world security techniques. Classes are a mixture of lecture, current event discussions, and laboratory exercise review and will prepare learners for the CompTIA Security+ certification. Prerequisite: IAE-201.

IAE 315 Secure System Administration and Operation (3 Credits)

This course introduces students to security settings and requirements of Linux and Windows-based systems and web services. It also introduces students to Linux and Windows-based web services, including methods of configuring, testing the security and the implementing of

countermeasures to discovered vulnerabilities. Topics include Linux security settings, IP tables, securing IIS web service, securing Apache web service, access control methods and host auditing and tools. Prerequisites: CT-152 and IAE-301.

IAE-321 Applied Wireless Network Security (3 Credits)

This course will explore the unique challenges presented by wireless networking, including the management of dual network devices (Bluetooth, 3G, 4G, and WiFi). Students will evaluate emerging business and technical initiatives, such as bring your own device (BYOD) and securely implement mobile IP networks based on IPv4, IPv6 and the 3GPP. Students will learn penetration testing strategies to effectively evaluate currently implemented security controls, utilizing cutting edge tools such as BackTrack 5, Vistumbler, Wireshark, and inSIDDer for network discovery and packet analysis. Additionally, students will be exposed to the site survey, network management and analysis capabilities of industry leading software such as Air Magnet, Ekahau and OmniPeek. Students are required to purchase an Alfa wireless adapter and acquire a wireless router for this class. This course prepares students for the Certified Wireless Security Professional (CWSP) Certification. Prerequisites: IAE-301, CT-152

IAE-325 Secure Data Communications and Cryptography (3 Credits)

This course follows the protocol education provided in IAE-301 with a more detailed and practical look at secure transactions and correspondence, as well as protection of data in storage. Within the confines of the ISO-OSI model, this course discusses data communication with emphasis on the security available at the layers, secure sockets layer, and both wired and wireless security topics. One-way message digests/ hashes and encryption history and protocols are explored in-depth. Topics include virtual private networks, one-way hashes/message digests, digital signatures, secret-key and public key cryptography processes and algorithms. Prerequisite: IAE-301 and CT-152.

IAE-402 Introduction to Incident Handling and Malicious Code (3 Credits)

This course provides a detailed understanding of incidents from attacks of malicious software. This course addresses the history and practice of coding that occurs in viruses, worms, spyware, Trojan horses, remote management back doors and root kits. Students learn preventative measures and tools, and explore how to rid systems of malicious software and prevent re-infection. Recovery processes and backup methods are explored. In addition to covering basic incident handling preparation, response and recovery practices, and the course goes into detail regarding malicious software. Prerequisite: IAE-315.

IAE-405 Malware Analysis/Reverse Engineering (3 Credits)

This course introduces students to malware research and analysis. The course will provide students an overview of malware research, intelligence gathering related to malware, and provide students basic skills required to analyze and dis-assemble malicious programs. Students will explore the tools required for analysis and reverse engineering of malicious code, learn malware defense techniques, how malware functions, and will perform live analysis and reverse engineering exercises. Prerequisite: IAE-402.

IAE-406 Digital Forensics and the Investigative Process (3 Credits)

Students explore forensics and the investigation processes. Students explore current computer forensics tools, conduct live computer forensic analysis, conduct e-mail investigations, recovery of graphics files and data carving, and engage in report writing for high-tech investigations. This

course prepares students for the AccessData Certified Examiner (ACE) and Mobile Phone Examiner Plus (MPE+) Certifications. Lab fee required. Prerequisites: IAE-315 and IAE-402.

IAE-410 Penetration Testing (3 Credits)

This course explores the foundational concepts, methods and techniques in preparing and conducting penetration tests. Throughout the course students are introduced to various tools as well as unravel complex methods for exploiting client-side, service side and privilege escalation attacks. Most importantly students learn how to construct a final report outlining discovered vulnerabilities, make suggested recommendations to remediate and/or mitigate those vulnerabilities. Students also learn how to describe the findings wherein non-technical personnel understand the ramifications of these vulnerabilities in a business sense. This course prepares students for the EC Council Certified Ethical Hacker (CEH) certification. Prerequisites: CT-240 and IAE-315. Recommended Corequisite: IAE-402.

ANALYTICS COURSES - 18 CREDITS

BUS-114 Advanced Excel (3 Credits)

This course stresses the ten core areas of advanced Excel usage: advanced formula; tables and formatting; conditional formatting; advanced charting; pivot tables and pivot reporting; VBA and macros; using Excel productively; data tables, simulations and solver; Excel integration with other tools; and optimizing Excel. Practice with data sets will allow students to use Excel in realistic simulations.

BUS-240 Introduction to Business Analytics (3 Credits)

This course will provide an understanding of data organization, and examine the processes and techniques used in transforming data to knowledge and value. Students will also develop skills to analyze data using generally available tools (e.g., EXCEL). The class format consists of discussion of many articles/cases, presentations by business professionals, class lectures and discussions on data modeling and design, and hands-on work with Excel. Prerequisite: BUS-114.

BUS-247 Research Methods (3 Credits)

The course covers decision-making frameworks as well as data capture, analysis and presentation techniques. Statistical software and the use of spreadsheets are integrated throughout so that students better comprehend the importance of using modern technological tools for effective model building and decision-making. Topics such as budgeting, forecasting and regression are explored using Excel and other relevant software or analytical tools. Prerequisites: MA 128.

BUS-284 Data Identification and Collection Strategies (3 credits)

This course introduces students to the location, collection, classification of data given business purposes. Sources, tools, processing, systems and legal parameters are examined. Prerequisite: BUS-240.

BUS-310 Data Mining for Effective Decision Making (3 credits)

This course applies analytics to create useful information that provides insights, fosters inquiry, and supports effective decision-making and problem solving. The Students learn and practice utilizing analytics as a tool for achieving a desired outcome. This course provides a review of analytical methodologies and examines the importance of understanding problems, setting

objectives, critical thinking and interpreting results. Problems will be addressed in a variety of disciplines. Prerequisite: and BUS 247 and CS-220.

BUS-396 Data Governance and Stewardship (3 credits)

This course provides an overview of the disciplines of governing data by examining the basic concepts, principles and practices of a data governance program and techniques used to measure success. The essential components of an enterprise-wide program are covered and a roadmap to execute a successful data governance program is outlined. The course makes data governance real by illustrating the concepts, principles, and practices using case studies. Prerequisite: BUS-367.

MANAGEMENT COURSES - 3 CREDITS

BUS-301 Project Management (3 credits)

This course is a full range introduction to project management. It covers the origins, philosophy, methodology, and involves actual applications and use of tools such as MS Project. The System Development Cycle is used as a framework to discuss project management in a variety of situations. Illustrative cases are used and project leadership and team building are covered as integral aspects of good project management. Prerequisite: EN-101

MATHEMATICS AND SCIENCE COURSES - 19 CREDITS

MA-112 Intermediate Algebra (3 Credits)

Designed for students needing mathematical skills and concepts for MA-114 and MA-261. Students are introduced to equations and inequalities, learn the language of algebra and related functions, including polynomial, rational, exponential and logarithmic functions. Other topics include solving equations, inequalities and systems of linear equations; performing operations with real numbers, complex numbers and functions; constructing and analyzing graphs of functions; and using mathematical modeling to solve application problems. Prerequisite: MA-005 or acceptance based on placement test scores.

MA-114 Algebra and Trigonometry (4 Credits)

Designed for students needing mathematical skills and concepts for MA-261. Topics covered in algebra include algebra: basic operations on real and complex numbers, fractions, exponents and radicals, determinates, solution of linear, fractional, quadratic and system equations. Topics covered in trigonometry include: definition and identities, angular measurements, solving triangles, vectors, graphs and logarithms. Prerequisite: MA-112 or acceptance based on placement test score.

MA-124 Discrete Mathematics (3 Credits)

This course focuses on logic sets and sequences; algorithms, divisibility and matrices; proof, induction and recursion; counting methods and probability; relations, closure and equivalence relations, graphs and trees; Boolean algebra. Prerequisites: MA-112, MA-114 or acceptance based on placement test score.

MA-128 Introduction to Statistics (3 Credits)

Topics covered in probability include: definitions, theorems, permutations and combinations. Binomial, hypergeometric, Poisson and normal distributions. Topics covered in sampling include: distribution and central limit theorem, estimation and hypothesis testing. Prerequisite: MA-114.

PH-201 General Physics I (3 Credits)

Non-calculus based physics. The course focuses on Mechanics: units, conversion factors: vector diagrams, translational equilibrium, friction, torque and rotational equilibrium: uniformly accelerated motion, projectiles: Newton's Law, work energy and power: kinetic and potential energy, conservation of energy: impulse and momentum. Heat: temperature scales, thermal properties of matter, heat and temperature change, heat and change of phase, physics of heat transfer; applications. Prerequisite: MA-114.

ENGLISH, HUMANITIES AND SOCIAL SCIENCE COURSES - 21 CREDITS**EN-101 English Communications I (3 Credits)**

This introductory college-level course focuses on effective oral and written communication skills and the development of analytical abilities through various reading and writing assignments. Students must demonstrate competence in writing mechanics, including grammar, sentence structure, logical content development, and research documentation through 2 essays and 2 research papers. Rhetorical modes may include description, comparison/contrast, narrative, and process analysis. Students are expected to develop effective oral communication skills through speeches. Group projects will develop effective team skills such as decision-making, time management, and cooperation. Prerequisites: acceptance based on placement test scores.

EN-102 English Communications II (3 Credits)

This sequel to EN-101 involves more sophisticated reading, writing, speaking, and research assignments. Students must demonstrate competence in writing mechanics, as well as advanced research skills, the ability to handle complex information, and effective team skills. Students write research papers: an information paper, a cause-and-effect paper, an argument paper, and a final research paper. Course includes group work. Presentations are required. Prerequisite: EN-101

EN-408 Writing Seminar in Technical Research (3 Credits)

This course covers the application of certain basic principles in developing documentation needed for technical communication. Each student must be able to identify a particular problem and devise a proposal for solving it. A series of written assignments should provide a thorough literature review and analysis of relevant issues, expert opinions, and the author's (student's) recommendations for solving the problem. Students are also expected to present their work via oral presentations. Prerequisite: EN 102 and senior status (earned 96 or greater credits).

HU-331 Arts and Ideas (3 Credits)

This course enables students to study and appreciate various forms of art, including painting, sculpture, architecture, music, drama, film, and literature through in-class and on-site experiences. The arts are also surveyed from an historical perspective, focusing primarily on eras in Western civilization. This enables students to sense the parallel development of the arts, of

philosophy, and of sociopolitical systems and to recognize various ways of viewing reality.
Prerequisite: EN-102.

SS-351 Ethics (3 Credits)

This course is designed to help students improve their ability to make ethical decisions. This is done by providing a framework that enables the student to identify, analyze, and resolve ethical issues that arise when making decisions. Case analysis is a primary tool of this course.
Prerequisite: EN-102.

One Humanities Electives (3 Credits)

One Social Science Elective (3 Credits)

2. Describe the educational objectives and intended student learning outcomes.

Educational Objectives:

- a. Students will be prepared to critically analyze problems and to identify relevant and useful information to support the attainment of desired outcomes.
- b. Students will be able to think critically by drawing appropriate conclusions from examining the output of methodological applications of applied analytics.
- c. Students will be able to conceptualize, apply and integrate effective strategies to acquire, store, analyze, deploy and secure information effectively.
- d. Students will be able to evaluate data management technologies in the context of data quality, and security and privacy regulations to determine their potential impact on information resources.

Learning Outcomes:

Upon graduation:

- a. Graduates will be prepared for employment in the field of cyber analytics in a business sector of choice with a strong understanding of cyber analytics concepts, project management process and team management skills
- b. Graduates will understand the laws, regulations, and customary expectations as they relate to information system and network security, individually identifiable information and related privacy concerns.
- c. Graduates will demonstrate familiarity with security operations and administration, demonstrate a working knowledge of infrastructure and operational security, know how to select and deploy access controls, conduct security analysis and monitoring, and apply principles of risk, response and recovery.
- d. Graduates will be able to conceptualize, apply and integrate effective strategies to acquire, store, analyze and deploy information effectively and securely using data management technologies appropriate to organizational context.

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

General education requirements will be met in an integrated manner along with the degree specific requirements. Beginning in the first semester of the first year, students take both general education requirements as well as degree specific courses. This methodology continues throughout the undergraduate curriculum until all general education requirements have been fulfilled. A student must satisfy all the requirements of the program, both general education and degree specific, to graduate. This process is consistent with other undergraduate degrees at the university.

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

The program will be accredited regionally by Middle States Commission on Higher Education (MSCHE) and under the NSA and Department of Homeland Security as a Center of Academic Excellence. Capitol Technology University is currently accredited by both. No special requirements exist.

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

The university will not be contracting with another institution or non-collegiate organization.

H. Adequacy of articulation:

1. If applicable, discuss how the program supports articulation with programs at partner institutions.

Currently this program does not have articulation partners. However, it is expected that articulation will work as it does for the university's current degrees. The university is very active with its transfer partners throughout the state and beyond. The goal of the university is to work with partners to make transfer as seamless as possible and to maximize transfer credits as allowable. There are dedicated transfer student personnel to guide this process.

I. Adequacy of faculty resources (as outlined in COMAR 13B.02.03.11):

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

All faculty listed below have been engaged with the university for at least several years. Barker, Pittman, Butler, Rankin, Bajwa, Opeka, Antunes, and Ashmall are full-time faculty members. Most faculty hold terminal degrees. Miller is a Professor of Practice under an annual teaching contract. Moss, Darraj, Andrews, Perry, McElyea, and Pomper work in cyber fields associated with analytics. The university leadership is confident in the quality of the faculty and their abilities to provide a learning environment supportive of the goals of the university for student success. Additional qualified faculty will be added as needed.

Instructors who will be engaged with the core courses and electives of this concentration are:

INSTRUCTOR	BACKGROUND	COURSES ALIGNED TO BE TAUGHT
Dr. Alex Antunes Full time	PhD Computational Astrophysics	BUS 240, BUS 396, BUS 247, IAE 458 All CS courses
Lt. Col Soren Ashmall, USMC (Ret.) Full time	M.A. Broadcast Journalism B.A. Theatre MOS 3450 (Planning, Programming, & Budget Systems Officer MOS 8055 Information Management Officer MOS 0202 Intelligence Officer MOS 2602 Signals Intelligence Officer/Ground Electronic Warfare Officer Licensed Real Estate Agent/REALTOR Facilities Security Officer, National Industrial Security Program (NISP)	All Liberal Arts IAE 458 All BUS courses
Dr. Garima Bajwa Full time	Ph.D., Computer Science and Engineering M.S., Electrical and Computer Engineering B.S., Electronics and Communication Engineering	CT 150, CT 206
Dr. Hasna Banu Adjunct	Ph.D. Theoretical Physics M.S. Mathematics B.S. Mathematics	All Math courses
Dr. Helen Barker Full-time	D.M. Organizational Leadership Ph.D. Public Administration and Policy (ABD) M.S. Information Systems Management M.S. Business Administration	BUS 114, BUS 240, BUS 396, BUS-247, IAE 458
Dr. Malcolm Beckett Adjunct	DBA. Quality Systems Management in Homeland Security and Defense M.S. Information Systems Management	All IAE courses BUS 396
Dr. William Butler Full time	D.Sc. Cyber Security M.S. Strategic Studies B.S. Computer Science NSTISSI No. 4011 CNSSI No. 4012 NSTISSI No. 4015 CNSSI No. 4016	All IAE Courses
Dr. Jami Carroll Adjunct	D.Sc. Cyber Security M.S. Cyber Security MBA	All IAE courses All BUS courses
Dr. Emily Darraj Adjunct	D.Sc. Cybersecurity M.S. Information Assurance	All IAE courses All BUS courses

Dr. George Hoffman Adjunct	DBA M.S. System Management B.S. Engineering Technology	BUS 310, BUS 367, BUS 443
Dr. Raymond Letteer Adjunct	D.Sc. Cyber Security M.S. Information Assurance	All IAE courses
Dr. Priscilla Lewis Adjunct	D.M. Leadership MBA and MPS Managerial Policy B.S. Economics/Mathematics	BUS 240, BUS 396
Dr. Brian McElyea Adjunct	Ph.D. Leadership and Organizational Change; Specialization: Knowledge Management	All BUS courses
Mr. Anthony Miller Professor of Practice	MBA B.S. Marketing	BUS 396
Dr. Mark Moss Adjunct	PhD Computer Science M.S. Computer Science B.S. Mathematics	All BUS courses All CS courses
Mrs. Pamela Opeka Full time	M.Ed. Math B.S. Biology & Chemistry	MA 112, MA 114, MA 128, MA 261
Dr. Alexander Perry Adjunct	D.Sc. Cyber Security M.S. Computational Mathematics	All IAE courses All BUS courses
Dr. Jason Pittman Full time	Ph.D. Information Assurance M.S. Network Security B.S. English Literature and Micro-Biology	All IAE courses All BUS courses
Dr. Gale Pomper Adjunct	D.Sc. Cyber Security M.S. Network Security	All IAE courses All BUS courses
Mr. Jeffrey Pullen Adjunct	MBA M.S. Public Administration M.S. Accounting M.S. Information Systems B.S. Business Management PMP FAC-P/PM, Senior Level FAC-COR, Level 111, Contract Officer Rep	BUS 114, BUS 240, BUS 396
Claude Rankin Full time	M.A. Communication Arts B.A. Political Science & Speech (Professionally qualified)	All BUS courses. All Liberal Arts and Humanities MA 112
Dr. Eric Sabbah Full time	Ph.D. Computer Science M.S. Computer Science B.S. Mathematics and Computer Science	ALL CS and CT Courses

Mr. Nathan Weideman Adjunct	M.S. Astronautical Engineering B.S. Professional Aeronautics	PH 201
Ms. Doris Wooding Adjunct	M.ET. Educational Technology M.S. Software Engineering B.A. Anthropology	CT 150

Additional doctorally-qualified faculty will be added in the near future.

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. If the program is to be implemented within institutional resources, include a supportive statement by the President for library resources to meet the program’s needs.**

Library Services: The Puente Library offers extensive services and a wide collection for Capitol students to be academically successful. Library resources are available digitally. The library also provides a mailing service for materials borrowed through the Maryland system. The library is currently supporting the following degrees at the graduate level: B.S. in Computer Science, B.S. in Cyber and Information Security, B.S. in Electrical Engineering, B.S. in Information Systems Management, B.S. in Internet Engineering, M.B.A., D.Sc. in Cybersecurity, and Ph.D. in Business Analytics and Decision Sciences. Therefore, the library is fully prepared to support a B.S. in Cyber Analytics.

Services provided to on line students include:

- “Ask the Librarian”
- Research Guides
- Tutorials
- Videos
- Online borrowing

Capitol Technology University’s online library as well as the on-campus library provides faculty and students with reference documents as well as texts appropriate to their learning experiences. Information about those services may be found at: <https://www.captechu.edu/current-students/undergraduate/library>.

The John G. and Beverley A. Puente Library provides access to management, decision science, and research methods materials through its 10,000-title book collection, e-books, and its 90 journal subscriptions. The library will continue to purchase new and additional materials in the management, decision science, and research methods area to maintain a strong and current collection in this subject area. Students can also access materials through the library’s participation in the Maryland Digital Library Program (MDL). This online electronic service provides access to numerous databases (Access Science, NetLibrary) that will provide access to the materials needed. Available databases include ProQuest, EBSCO, ACM, Lexis Nexis, Taylor Francis, and Sage Publications.

The Puente Library can provide access to historical management and decision science materials through its membership in the Maryland Independent College and University Association (MICUA) and the American Society of Engineering Education (ASEE). Reciprocal loan agreements with fellow members of these organizations provide the library access to numerous research facilities that house and maintain archives of management and data science documents. The proximity of the University of Maryland, College Park and other local area research and academic libraries provides the Puente Library with quick access to these materials as well.

The university is in the process of negotiating with local libraries to provide additional convenient access for students to learning materials.

The library currently supports the needs students at the undergraduate, masters and doctoral level.

K. Adequacy of physical facilities, infrastructure and instructional equipment (as outlined in COMAR 13B.02.03.13):

- 1. Provide an assurance that the 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. If the program is to be implemented within existing institutional resources, include a supportive statement by the President regarding adequate equipment and facilities to meet the program's needs.**

The university has sufficient classrooms to accommodate all hybrid or traditional classroom courses. The online class platform is web based and requires no additional equipment for the institution. The current Learning Management System meets the needs of the degree program. The Computer Science and Robotics Lab, Business and Technology Lab and the Cyber Lab together also meet the potential research needs of the students providing local and virtual support.

L. Adequacy of financial resources with documentation (as outlined in COMAR 13B.02.03.14):

- 1. Complete Table 1: Resources. Finance data for the first five years of the program implementation are to be entered. Figures should be presented for five years and then totaled by category for each year.**

TABLE 1: RESOURCES

Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	\$0	\$0	\$0	\$0	\$0
2. Tuition/Fee Revenue (c + g below)	\$786,570	\$2,411,224	\$4,728,575	\$5,386,445	\$5,605,003
a. Number of F/T Students	25	76	140	141	132
b. Annual Tuition/Fee Rate	\$25,619	\$26,003	\$26,393	\$26,789	\$27,191
c. Total F/T Revenue (a x b)	\$640,475	\$1,976,250	\$3,695,067	\$3,777,282	\$3,589,222
d. Number of P/T Students	15	44	103	158	195
e. Credit Hour Rate	\$812	\$824	\$836	\$849	\$861
f. Annual Credit Hour Rate	12	12	12	12	12
g. Total P/T Revenue (d x e x f)	\$146,095	\$434,974	\$1,033,508	\$1,609,162	\$2,015,782
3. Grants, Contracts & Other External Sources	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
4. Other Sources	-\$216,178	-\$667,402	-\$1,248,536	-\$1,276,992	-\$1,214,047
TOTAL (Add 1 – 4)	\$570,393	\$1,743,822	\$3,480,039	\$4,109,452	\$4,390,956

This proposal builds upon an existing degree programs. All courses exist within the other degree programs currently offered by the university.

- 2. Provide a narrative rationale for each of the resource categories. If resources have been or will be reallocated to support the proposed program, briefly discuss those funds.**

a. Reallocated Funds

Capitol Technology University has reallocated funds during Year 1 for support of program and course development, online support, office materials, travel, professional development, and initial marketing. There is no substantial impact on the institution because of the reallocation of these funds. The reallocated funds will be recovered after the first year. The program is expected to be

self-sustaining post Year 1.

b. Tuition and Fee Revenue

Tuition is calculated to include an annual 2.5% tuition increase. A 20% attrition rate has been calculated.

c. Grants

There are currently no grants etc. at this time.

d. Other Sources of Funds

The Funds listed are anticipated scholarships for students from outside sources.

3. **Table 2: Expenditure.** Finance data for the first five years of the program implementation are to be entered. Figures should be presented for five years and then totaled by category for each year.

TABLE 2: EXPENDITURES
Courses are taught by full-time and adjunct professors.

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	\$225,867	\$677,600	\$823,284	\$1,013,012	\$1,107,876
a. # FTE	2.7	8.0	9.7	12.0	13.1
b. Total Salary	\$186,667	\$560,000	\$680,400	\$837,200	\$915,600
c. Total Benefits	\$39,200	\$117,600	\$142,884	\$175,812	\$192,276
2. Admin. Staff (b + c below)	\$4,659	\$4,798	\$4,942	\$5,090	\$5,243
a. # FTE	0.07	0.07	0.07	0.07	0.07
b. Total Salary	\$3,850	\$3,966	\$4,084	\$4,207	\$4,333
c. Total Benefits	\$809	\$833	\$858	\$883	\$910
3. Support Staff (b + c below)	\$57,475	\$114,950	\$172,425	\$229,900	\$287,375
a. # FTE	1.00	2.00	3.00	4.00	5.00
b. Total Salary	\$47,500	\$95,000	\$142,500	\$190,000	\$237,500
c. Total Benefits	\$9,975	\$19,950	\$29,925	\$39,900	\$49,875
4. Equipment	\$3,840	\$11,520	\$22,745	\$27,986	\$30,607
5. Library	\$0	\$0	\$0	\$0	\$0
6. New or Renovated Space	\$0	\$0	\$0	\$0	\$0
7. Other Expenses	\$100,000	\$75,000	\$50,000	\$50,000	\$50,000
TOTAL (Add 1 – 7)	\$391,840	\$883,868	\$1,073,396	\$1,325,989	\$1,481,101

4. **Provide a narrative rationale for each of the resource categories. If resources have been or will be reallocated to support the proposed program, briefly discuss those funds.**

a. Faculty

Table 2 reflects the faculty hours in total, but this does not imply that these are new hire requirements.

b. Administrative Staff

Capitol Technology University will continue with current the administrative staff through the proposed time.

c. Support Staff

Capitol Technology University with continue with current administrative staff through year two. Additional support staff will be added in Year 3.

d. Equipment

Software for courses is available free to students or is freeware. Additional licenses for the LMS will be purchased by the university at the rate of \$40 per student. No additional equipment is needed.

e. Library

Money has been allocated for additional materials to be added to the on campus and virtual libraries to ensure currency of literature. It has, however, been determined that the current material serves the needs of this degree due to the extensive online database.

5. New or Renovated Space

No new or renovated space is required for this degree.

6. Other Expenses

Funds have been allocated for office materials, travel, professional development, course development, initial marketing, additional scholarships.

M. Adequacy of provisions for evaluation of program (as outlined in COMAR 13B.02.03.15):

The assessment process at the university consists of a series of events throughout the Academic Year. The results of each event are gathered by the University Assessment Team and stored in Canvas for analysis and use in annual reports, assessments, etc. The University Assessment Team analyzes the results, develops any necessary action plans, and monitors implementation of the action plans.

Academic Year Assessment Events:

Fall Semester:

- Faculty submit performance plans consistent with the mission and goals of the university and department. The document is reviewed and approved with the academic dean.
- Department Chairs and University Academic Dean review the Graduating Student Survey data.
- Department Chairs and University Academic Dean review student internship evaluations.
- Department Chairs and University Academic Dean review grade distribution reports from the spring and summer semesters.
- Department Chairs and University Academic Dean review student course evaluations from the

summer semester.

- Departments conduct Industrial Advisory Board meetings to review academic curriculum recommendations. The Advisory Board meets to begin curriculum review or address special issues that may arise related to curriculum. Based on an analysis and evaluation of the results, the University Academic Dean, faculty and the advisory boards will develop the most effective strategy to move the changes forward.

NOTE: A complete curriculum review for degrees in the Department of business and information sciences occurs every 2 years. In most cases, the changes only require that the University Academic Dean inform the Chief Academic Officer (CAO) and provide a report that includes a justification and the impact of the changes as well as a strategic plan. Significant changes normally require the approval of the CAO and the Executive Council. Changes may require notification/approval of accreditors.

- University Academic Dean and Vice President for Academic Affairs attend the Student Town Hall and review student feedback with department chairs.
- University Academic Dean meets with the faculty to review the student learning progress and discuss needed changes.
- At the August Faculty Retreat, the faculty reviews any outstanding student learning challenges that have not been addressed. The issues are brought to the University Academic Dean for review and development of implementation plans.

Spring Semester:

- Faculty Performance Plans are reviewed with faculty to identify issues of divergence and to adjust the plan as needed.
- Department Chairs and University Academic Dean review grade distribution reports from the fall semester.
- Department Chairs and University Academic Dean review the Graduating Student Survey data.
- Department Chairs and University Academic Dean review student course evaluations from the fall semester and the spring semester (in May before the summer semester begins).
- Department Chairs and University Academic Dean meet to review the content of the graduating student, alumni, and course surveys to ensure the surveys continue to meet the university's assessment needs.
- At Annual Faculty Summit in May, the faculty review and discuss student learning challenges from the past academic year and provide recommendations to the Academic Dean for review and development of implementation plans.
 - Department Chairs conduct interviews with potential employers at our Career Fair (this will move to fall and spring in 2016-2017).
 - Departments conduct Industrial Advisory Board meetings to review academic curriculum recommendations.

Based on the foregoing inputs from faculty, students, industry representatives and Department Chairs, the University Academic Dean prepares the proposed academic budget for the upcoming year. Budget increases are tied to intended student learning improvements and key strategic initiatives.

In addition to these summative assessments, the University Academic Dean meets with the Department Chairs weekly to review current student progress. This formative assessment allows for immediate minor changes, which increase faculty effectiveness and, ultimately, student outcomes.

The Faculty Senate meets monthly during August through April. The Faculty Senate addresses issues that impact student outcomes as those issues emerge. The leadership of the Faculty Senate then provides a report on the matter to the University Academic Dean. The report may include a recommendation or a request to move forward with a committee to further examine the issue. In most cases, the changes only require the University Academic Dean to inform the CAO and provide a report that includes a justification and the impact of changes as well as a strategic plan. Significant changes normally require the approval of the CAO and the Executive Council.

Student Learning Outcomes:

Student learning outcomes are measured using the instruments identified above as well as assigned rubrics/measures (e.g., capstone courses, competency exams/projects) dictated by the accreditation requirements of regional accreditor, Middle States Commission on Higher Education (MSCHE). This program is designed to meet the requirements of a Center of Academic Excellence (CAE) under the NSA/DHS.

N. Consistency with the State Minority Student Achievement goals (as outlined in COMAR 13B.02.03.05 and in the State Plan for Post-Secondary Education):

Capitol Technology University is a majority/minority school. Our programs attract a diverse set of students. Special attention is provided to recruit females into the STEM and multidisciplinary programs such as the B.S. Business Analytics, B.S. MCIT, B.S. CIT, B.S. ISM, D.Sc., and Ph.D. in Business Analytics and Decision Sciences. The same attention will be given to the B.S. in Cyber Analytics.

O. Relationship to low productivity programs identified by the Commission:

This program is not associated with a low productivity program identified by the commission.

P. If proposing a distance education program, please provide evidence of the Principles of Good Practice (as outlined in COMAR 13B.02.03.22C):

a. Curriculum and Instruction

Some courses in this concentration will be offered in an online classroom environment as well as in hybrid (synchronous and traditional classroom).

i. A distance education program shall be established and overseen by qualified faculty.

The Department of Business and Information Sciences, where this degree will be sponsored, is staffed by qualified teaching chair and other appropriately credentialed faculty.

Evaluation of courses/programs are done using the same process as all other programs. (Please see Section M of this document.) All Capitol faculty teach in the traditional classroom environment and online. (Please see qualifications in Section I of this document.)

- ii. **A program’s curriculum shall be coherent, cohesive, and comparable in academic rigor to programs offered in traditional instructional formats.**

Online programs/courses meet the same accreditation standards, goals, objectives, and outcomes as traditional instruction at the university. The online course development process incorporated the Quality Matters research-based set of standards for quality online course design to ensure academic rigor of the online course is comparable to the traditionally offered course. The dean, chairs, and faculty review curriculum annually. Courses are reviewed at the end of each term of course delivery. This process applies to online and traditional courses. In addition, advisory boards are engaged in the monitoring of course quality to ensure quality standards are met regardless of the delivery platform.

- iii. **A program shall result in learning outcomes appropriate to the rigor and breadth of the program.**

Online programs/courses meet the same accreditation standards, goal, objectives, and outcomes as traditional classroom delivery. Learning platforms are chosen to ensure high standards of the technical elements of the course. The dean monitors any course conversion from in-class to online to ensure the online course is academically equivalent to traditionally offered course and that the technology is appropriate to support the expected rigor and breadth of the programs courses.

- iv. **A program shall provide for appropriate real-time or delayed interaction between faculty and students.**

The program courses will be delivered in a format using Adobe Connect and the LMS Canvas. This system supports both synchronous and asynchronous interaction between faculty and students. Some of these class may also be in hybrid (online real-time and traditional classroom) format.

- v. **Faculty members in appropriate disciplines in collaboration with other institutional personnel shall participate in the design of courses offered through a distance education program.**

Currently employed faculty acts as an internal advisory board for program changes including course and program development. All faculty are selected on domain experience and program-related teaching experience.

When new faculty or outside consults are necessary for the design of courses offered our Human Resources Department initiates a rigorous search and screening process to identify appropriate faculty to design and teach online courses. Again, all faculty are selected on domain experience and program-related teaching experience.

b. Role and Mission

- i. **A distance education program shall be consistent with the institution’s mission.**

Distance education is consistent with the institution’s mission. Please refer to Section A (please see page 2) of this proposal.

- ii. Review and approval processes shall ensure the appropriateness of the technology being used to meet the program's objectives**

The dean and department chairs are an integral part of the curriculum approval process. The dean, chairs and faculty are participants in any new institutional technology changes. The dean approves technologies brought into the classroom by faculty to ensure compatibility with existing technology as well as with course and institutional objectives.

c. Faculty Support

- i. An institution shall provide for training for faculty who teach with the use of technology in a distance education format, including training and learning management system and pedagogy of distance education.**

The Department of Distance Learning and the instructional technology division support the online program needs of faculty and students. These departments and the help desk provide constant and on-going support to the faculty. The Canvas portion of the program is the online learning management system. When a new faculty member is assigned to teach an on-line course, the distance learning department provides formal training for that instructor. New faculty are assigned an experienced faculty mentor to ensure a smooth transition to the online environment as well as to ensure compliance with the institution's online teaching pedagogy. The university believes this provides the highest-level learning experience for students and faculty.

- i. Principles of best practice for teaching in a distance education format shall be developed and maintained by the faculty.**

The Distance Learning Department, in conjunction with the dean and an assigned mentor, provide on-going support and instruction on best online practices. Best practices are shared among faculty by the dean and chair as well as through formal events. There are also several texts in the library available to the faculty, which cover distance learning techniques and technology.

- ii. An institution shall provide faculty support services specifically related to teaching through a distance education format.**

As mentioned previously, the university online platforms offer several avenues to support instructors engaged in online learning. The Director of our Distance Learning Division is highly skilled and trained in faculty development. Several seminars and online tutorials are available to the faculty every year. Mentors are assigned to new faculty. Best practice sharing is facilitated through the dean and chair and through formal meetings.

- d. An Institution shall ensure that appropriate learning resources are available to students including appropriate and adequate library services and resources.**

Students can receive assistance in using online learning technology via several avenues. Student aides are available to meet with students and provide tutoring support in both subject matter and use of the technology. Tutors are available in live real-time sessions using Adobe Connect or other agreed upon tools. Pre-recorded online tutorials are also available.

In addition to faculty support, on ground and online tutoring services are available to students in a one-on-one environment.

Laboratories (on ground and virtual) are available for use by all students and are staffed by faculty and tutoring staff who provide academic support.

Library services and resources are appropriate and adequate. Please refer to Section J of this document and the attached letter from the university president, the library adequately supports the students learning needs.

e. Students and Student Services

1. A distance education program shall 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.

Students are provided a copy of a degree-tracking sheet at time of inquiry, at registration, and at advising sessions. Students also have access to a portal that contains this information digitally regarding courses in their degree. The system also provides information that identifies what courses been completed and what courses need to be completed. Course requirements are listed in the catalog, on the university website, and in the course syllabus (with more detailed information provided).

The university provides students with an overview of online learning techniques as well as detailed training for those who need it. In addition to online tutorials, a member of the Distance Learning staff is available to respond to questions. The Department of Distance Learning also provides technical support Monday thru Saturday for both Adobe Connect and the LMS (i.e., Canvas). Information regarding student expectations in an online class are outlined in each syllabus and covered by the faculty member in the introductory class for each course. This information is also covered during orientation and freshman seminar.

Information on system requirements is available from the Department of Distance Learning, Department of Information Technology, department chairs, and University Academic Dean. Information on support and system requirements is also found on page 10 of the university catalog.

Faculty members who are new to the online environment are provided experienced mentors as part of their support system. The mentors guide the faculty to ensure a quality learning experience for faculty and students. This ensures consistency in expectations of faculty and the course goals and objectives by the institution as well as students and our accreditors.

The university's Business and Financial Services Department provides cost and payment information and support for both on ground and online students. The information is also available on the university's website and catalog. The university's Financial Aid Department deals financial needs of both on ground and online students. In addition, there is a staff member dedicated to financial aid as it relates to military and veteran's benefits.

In addition to faculty support to the student who is in the on-line learning environment, support services are offered through Advising and Student Services. The types of support include tutoring, mentoring, advising, and career services.

2. Enrolled students shall have reasonable and adequate access to the range of student services to support their distance education activities.

Students have access to the same services as traditional on ground students. Some of these services are facilitated via such tools as Skype. For instance, distance students attend job fairs via Skype facilitated by an assigned campus representative. In addition, training videos are available in Capitol Technology University's student web portal.

3. Accepted students shall have the background, knowledge and technical skills needed to undertake a distance education program.

Students are required to have the same skills as traditional on ground students. Training is available for students to familiarize them with the tools of the distance learning system.

4. Advertising, recruiting and admissions materials shall clearly and accurately represent the program and services available.

Advertising, recruiting, and admissions materials do clearly and accurately represent the program and the services available.

f. Commitment and Support

1. Policies for faculty evaluation shall include appropriate considerations of teaching and scholarly activities related to distance education programs.

All faculty, including online faculty, are strongly encouraged to participate in at least one or two professional development opportunities to improve online teaching skills. Faculty are highly encouraged to share their experiences with fellow faculty as well as through publications and presentations. These factors are considered in the annual goals and objectives of faculty and, therefore, are considered in evaluation of performance for promotions, etc. Scholarly activities are recognized in formal university publications. Funding in the annual budget is provided for conferences in support of scholarly activities. Faculty meetings and colloquiums provide opportunities to share best practices among faculty. This includes online faculty. In addition, all faculty are offered the opportunity to attend the annual graduation ceremony and attend the annual faculty residency training event at the expense of the university.

2. An institution shall demonstrate a commitment to ongoing support, both financial and technical, and to continuation of a program for a period sufficient to enable students to complete a degree or certificate.

The university has made the financial commitment to the program (please refer to Section L). The university has a proven track record of supporting degree completion.

g. Evaluation and Assessment

- 1. An institution shall evaluate a distance education program's educational effectiveness, including assessment of student learning outcomes, student retention, student and faculty satisfaction and cost-effectiveness.**

The university applies the same evaluation standards and processes to all degree programs at the institution. (Please see Section M for an in-depth process description.)

In the Department of Cyber and Information Sciences, where this program will be sponsored, evaluations are done at the course level, student level, curriculum level, and faculty level as well as other stakeholder groups.

Assessment is based on the integration of all the above items as appropriate. Changes are developed and implemented by the faculty responsible for the courses upon approval of the dean. At the end of this cycle, an evaluation is repeated and results analyzed with the appropriate stakeholders regarding the effectiveness of the changes. This is an ongoing process. The university has a vice president and team in charge of outcomes and assessment supporting formal assessment measures.

- 2. An institution shall demonstrate an evidence-based approach to best online teaching practices.**

Capitol Technology University has established a course/program matrix, which requires faculty to report student outcomes and suggestions for improving student performance. The university complies with the requirements of its accrediting bodies regarding outcomes/evidenced based accreditation (Middle States Commission on Higher Education, ABET, IACBE, and NSA/DHS). The university is in good standing with all its accrediting bodies.

- 3. An institution shall provide for assessment and documentation of student achievement of learning outcomes in a distance education program.**

The assessment for distance learning classes/students is the same as for all programs at the university. Faculty provide required data on student achievement. The Learning Management System provides data on student achievement. Proof of these assessments is available during the class and post class to the VP of Academic Affairs, dean, and department chairs. On an annual basis, the information is reported to accreditation authorities such as Middle States Commission on Higher Education (MSCHE), IACBE, ABET, and NSA/DHS.