OFFICE OF THE PRESIDENT

November 15, 2022

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

Dr. Fielder:

I am requesting your approval of Coppin State University's proposal to offer a B.S. in Cybersecurity Engineering with program codes REGIS 0925.00 and CIP 11.1003. The program aligns with the university's STEM goals, meets a compelling workforce demand, and contributes to the innovation and economic growth goals of Maryland as identified in the University System of Maryland's Strategic Plan.

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

Sincerely,

Anthony L. Jenkins, Ph.D.
President

cc: Dr. Pamela R. Wilks, Provost & Vice President for Academic Affairs
Dr. Darlene Brannigan Smith, Interim Associate Vice Chancellor for Academic Affairs
Dr. Emily A. A. Dow, Assistant Secretary
Dr. Leontye Lewis, College of Arts, Sciences, and Education
Mr. Michael W. Bowden, Assistant Vice President for Planning & Assessment

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Office Use Only: PP#

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

Institution Submitting Proposal	Coppin State University

Each action below requires a separate proposal and cover sheet.

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

Payment Submitted: (●) Yes ( ) No Payment Type: ( ) R*STARS # ( ) Check # Payment Amount: 850.00 Date Submitted: 12/8/2022

Department Proposing Program	Mathematics and Computer Science	
Degree Level and Degree Type	Undergraduate; Bachelor of Science	
Title of Proposed Program	Bachelor of Science in Cybersecurity Engineering	
Total Number of Credits	122	
Suggested Codes	HEGIS: 925.00	CIP: 11.1003
Program Modality	(●) On-campus ( ) Distance Education (fully online) ( ) Both	
Program Resources	(●) Using Existing Resources ( ) Requiring New Resources	
Projected Implementation Date (must be 60 days from proposal submisison as per COMAR 13B.02.03.03)	(●) Fall ( ) Spring ( ) Summer	Year: 2023
Provide Link to Most Recent Academic Catalog	URL: https://catalog.coppin.edu/index.php	
Preferred Contact for this Proposal	Name: Mr. Michael W. Bowden	
	Title: Assistant Vice President for Planning and Assessment	
	Phone: (410) 951-6280	
	Email: mbowden@coppin.edu	
President/Chief Executive	Type Name: Dr. Pamela R. Wilks, Provost & VPAA	
	 Date: 12/08/2022	
	Date of Approval/Endorsement by Governing Board:	

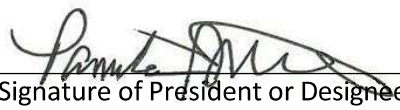
Revised 1/2021

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

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

Coppin State University
Institution Submitting Proposal

Bachelor of Science in Cybersecurity Engineering
Title of Proposed Program

Bachelor of Science	**Fall 2023**
Award to be Offered	Projected Implementation Date
0925.00	**11.1003**
Proposed HEGIS Code	Proposed CIP Code
Mathematics and Computer Science	**Dr. Atma Sahu**
Department in which program will be located	Department Contact
(410) 951-3464	**asahu@coppin.edu**
Contact Phone Number	Contact E-Mail Address
	**12/8/2022**
Signature of President or Designee	

Coppin State University
Proposal for Bachelor of Science in Cybersecurity Engineering (CYSE)

A. Centrality to Institutional Mission and Planning Priorities:

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

The Bachelor of Science in Cybersecurity Engineering (CYSE) will provide the knowledge and skills for the development of cyber-resilient systems that include the protection of intended human users, hardware and accompanying computing devices, and the networks that connect them (i.e., the internet). The program requires a proactive approach in engineering the design of systems, with cybersecurity incorporated from the beginning of system development. The purpose of the proposed program is to provide students with the currently rare combination of highly technical knowledge and skills, cybersecurity expertise, with a system engineering approach. Systems engineering is an interdisciplinary field of engineering and engineering management that focuses on how to design and manage complex systems over their life cycles. The CYSE program has a specific emphasis on securing Medical Cyber-Physical Systems (MCPS). Degree recipients will be postured to fill most cybersecurity titles, which are in desperate demand today and for the foreseeable future. Graduates will be trained to work on emerging trends, designing, and developing comprehensive trustworthy architectures to accommodate MCPS telecommunication and telemedicine devices. Coppin State University (CSU) is the first in the State of Maryland to undertake engineering cybersecurity systems.

Coppin is an urban, comprehensive Historically Black College/University (HBCU) committed to serving Baltimore City and educating a multi-generational student population. Therefore, consistent with its mission, and strategic goals, Coppin seeks to expand its capacity to offer unique and critical Medical Cyber-Physical Systems (MCPS)-focused CYSE degree program. In the fall of 2013, Coppin established a STEM Center designed to provide coordination of academic programming and initiatives to strengthen the pipeline of STEM graduates to the Maryland workforce and form partnership agreements with federal agencies. The implementation of the BS in CYSE would be a magnificent achievement, allowing Coppin's diverse community the opportunity to place greater emphasis on culturally responsive STEM education, creative problem-solving, and career development. The BS in CYSE enhances Coppin's culturally relevant story in a way that increases the public perception of the university. The program will help increase interest and enrollment and increase fundraising results while highlighting and promoting research and engagement to garner national attention and leadership. With an infrastructure comprised of demanding STEM programs, housed in a cutting-edge facility, coupled with access to state-of-the-art equipment, this program will help Coppin enhance and maintain its place within the competitive global marketplace.

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

The proposed program supports Coppin's strategic goals and strategic institutional priorities. According to Coppin's Strategic Plan (https://www.coppin.edu/csu-strategic-planning), the proposed CYSE program will support the following goals (recently approved Fall 2021 and is currently aligned with the University's recent launch of the strategic planning process):

Goal 1. *Become a University of Choice* - by increasing innovation in academic programs and curricula activities with the workforce development needs of Baltimore City and the state of Maryland;

Goal 2. - *Improve the holistic development and completion rates of our students* by aligning Coppin's programs with the national needs of Baltimore city and the state of Maryland;

Goal 3. - *Strengthen our brand and reputation as a leader in urban higher education* by offering a critical need based unique CYSE program and also support aligning Coppin's Strategic Plan and Coppin's branding together with the University System of Maryland (USM) Strategic Plan, Vision 2030: From Excellence to Preeminence (https://www.usmd.edu/vision2030/); and

Goal 4. *Enhance our teaching and research excellence* - by competing for state and national recognition of academic programs in the CYSE-STEM space area.

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

Coppin State University will support the proposed CYSE BS degree program through the same process and level of support as the University's existing programs. The University has also budgeted funds to support program and course development, online support, office materials, travel, professional development, and initial marketing. There is no substantial impact on the institution due to the advanced budgeting of these funds. If approved, the program will be self-sustaining going forward.

The CYSE program has administrative leadership commitment and additional funds and faculty lines have been committed for this program to be adequately funded for five or more years, especially as the program continues to grow. The program is housed within the Department of Mathematics and Computer Science showing further leveraging of related curricula and mathematics and computer science faculty which is interconnected intrinsically when the CYSE program becomes operational.

The *growth* of this new CYSE program will further be accomplished via the promotion of education and research collaborations amongst students, faculty, other academic institutions, and industry partners across different disciplines including Computer Science, Engineering, Mathematics, Health Information Systems, and others. Internships (paid and unpaid) along with student scholarships will also be sought in order to attract an increasing number of students each year. This new program will significantly aid the University in increasing enrollment as it develops a cybersecurity niche in the crowded academic market. With Coppin situated close to Washington, D.C., this Cybersecurity Engineering program will bring in government agencies and private sector employers to provide internship training opportunities.

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

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

The proposed program is an integral part of the University's Strategic Plan. The institutional and departmental budgets for FY 2022-2023, as well as the forecasted budgets going forward, include funding for the administrative, financial, and technical support of the new degree.

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

Coppin is fully committed to continuing the proposed BS degree. in the Cybersecurity Engineering program for a sufficient period to allow enrolled students to complete the program.

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

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

a) The need for the advancement and evolution of knowledge

Cybersecurity Engineering is the subject of maximizing university resources by way of expanding and deploying advanced science and technology. There are a few more critical concerns facing the world and there is no pathway to achieve them currently this proposal is to offer a solution based on the STEM knowledge needed for Cybersecurity experts to acquire exploration skills in addition to their digital forensic systems knowledge.

Furthermore, Cybersecurity talent gaps exist across the country. Closing these gaps requires detailed knowledge of the cybersecurity workforce in Maryland region with the Maryland cybersecurity job opening quotient of 2.5 being more than double when compared to the national average of 1.0.

Source: https://www.cyberseek.org/heatmap.html

However, the nation's rapidly growing cybersecurity jobs market has many more openings available than trained workers to fill them. For example, there are 128,000 positions for

"Information Security Analysts," but only 88,000 workers are currently employed in those positions—a talent shortfall of 40,000 workers for cybersecurity's largest job, according to analytics firm Burning Glass Technologies. Jobs requesting cloud security skills remain open 96 days on average—longer than any other IT skill.

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

An HBCU (Historically Black College and University), Coppin has a culturally-rich history as an institution providing quality educational programs and community outreach services. In 2020, 415 degrees were awarded across all undergraduate and graduate programs at Coppin State University. 81.9% of these degrees were awarded to women, and 18.1% were awarded to men. The most common race/ethnicity group of degree recipients was black or African American (332 degrees), 23.7 times more than then the next closest race/ethnicity group, white (14 degrees). https://datausa.io/profile/university/coppin-state-university

The employment need for cybersecurity talent is acute and the Coppin Cyber Security Engineering Bachelor of Science program is being proposed to fill this void.

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

The proposed CYSE degree program will significantly strengthen and expand the capacity of Coppin State HBCU, one of the four historically black institutions in state, to provide high-quality, high-demand, and unique systems-engineering-based Cybersecurity educational experiences to students.

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

The proposed CYSE BS degree program at Coppin is well aligned with the 2022 Maryland State Plan for Higher Education, 2022 State Plan for Higher Education. The proposal supports the primary goals of providing Access, Success, and Innovation, but especially, Innovation, which states, "Foster innovation in all aspects of Maryland higher education to improve access and student success."

The CYSE skill set drives innovation and the demand for information security analysts, employment of which is projected to grow by 31.6 percent and translates to over 3.5 million unfilled cybersecurity jobs globally by 2021. As indicated earlier, Cybersecurity talent gaps exist across the country. Closing these gaps requires detailed knowledge of the cybersecurity workforce in Maryland region.

As more connected devices enter homes and workplaces, the present and future need for robust online security positions increases, creating a cybersecurity workforce gap in the U.S. is about 500,000 people which estimates that the cybersecurity industry needs a 62% talent increase to meet business demands.

The CYSE program framework (adapted from the National Institute of Standards and Technology (NIST) ensures state-of-the-art curricula bridging the present and future capabilities needs at Coppin. This program is designed to provide students with new knowledge and problem-solving skills sets in emerging Cyber-war-fare situations, so they maintain the skills they need to succeed in the workforce. Therefore, the proposed Cybersecurity Engineering program is to ensure that Coppin a HBCU/MI is competitive, both in terms of program and infrastructure, with Maryland's other institutions.

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

1. Describe potential industry or industries, employment opportunities, and expected level of entry (ex: mid-level management) for graduates of the proposed program.

   Graduates from the proposed CYSE program will possess advanced cyber engineering systems knowledge in areas such as Cyber-Physical Medical Systems, Secure Medical Systems I, II, Secure RF Communication, Security Artificial Intelligence, MIS Digital Forensics, Cybersecurity Engineering, and Digital Electronics courses with the ability to serve as top leaders in their field. They will also be able to serve as consultants and work in private companies or government agencies. In addition, supporting those related to the nation's cyber defense will be served by this degree.

   The graduates of the CYSE BS Degree program are expected to enter the following employment opportunities:

Cybersecurity Systems Engineer	Systems Administrator
Cybersecurity Manager	Cybersecurity Consultant
Cybersecurity Analyst	Penetration & Vulnerability Tester
Network Engineer	Cybersecurity Specialist

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

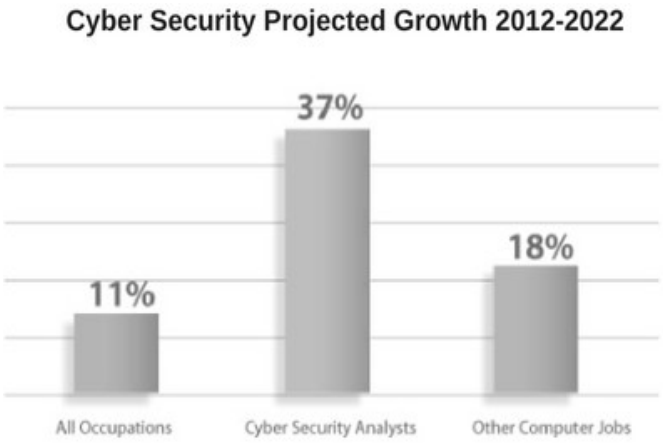
   The CYSE skill set drives the demand for information *security analysts*, employment of which is projected to grow by 31.6 percent and translates to over 3.5 million unfilled cybersecurity jobs by globally by 2021.

   As more connected devices enter homes and workplaces, the need for robust online security positions increases, creating a cybersecurity workforce gap in the U.S. is about 500,000 people which estimates that the cybersecurity industry needs a 62% talent-increase to meet business demands.

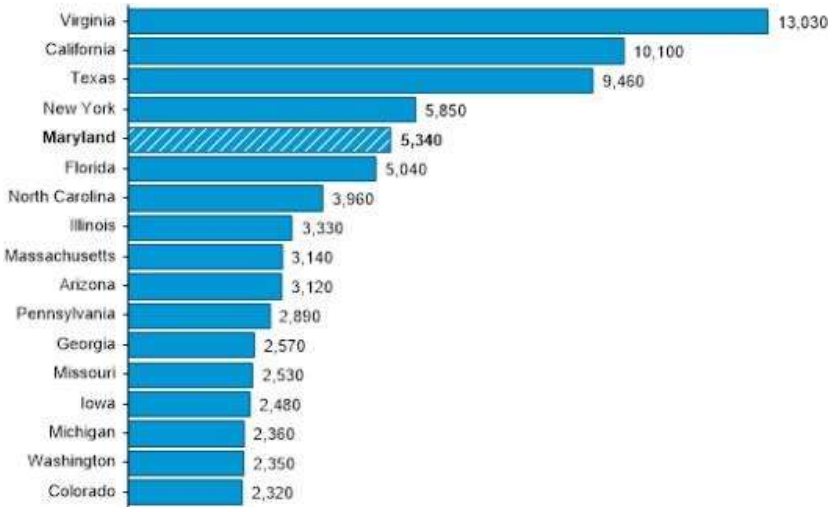
   Currently, the Cybersecurity unemployment rate is at 0%. Underrepresented minority groups comprised 28.5 percent of our national population in 2006, yet just 9.1 percent of college-educated Americans in S&E to triple to match their share of the overall U.S. population. The employment need for cybersecurity talent is acute and the Coppin Cyber Security Engineering Bachelor of Science degree is being offered to fill this void.

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

Government researchers, cyber engineers, and other agencies anticipate that there will predominantly Cyberwars (after 9/11) Cross Agency (47 Intelligence Agencies) , John (Chris) Inglis et al (https://www.youtube.com/watch?v=dBZEvIdPH2o). The State and nation will need professionals in the discipline to protect the country and advance knowledge of cybersecurity engineering systems.



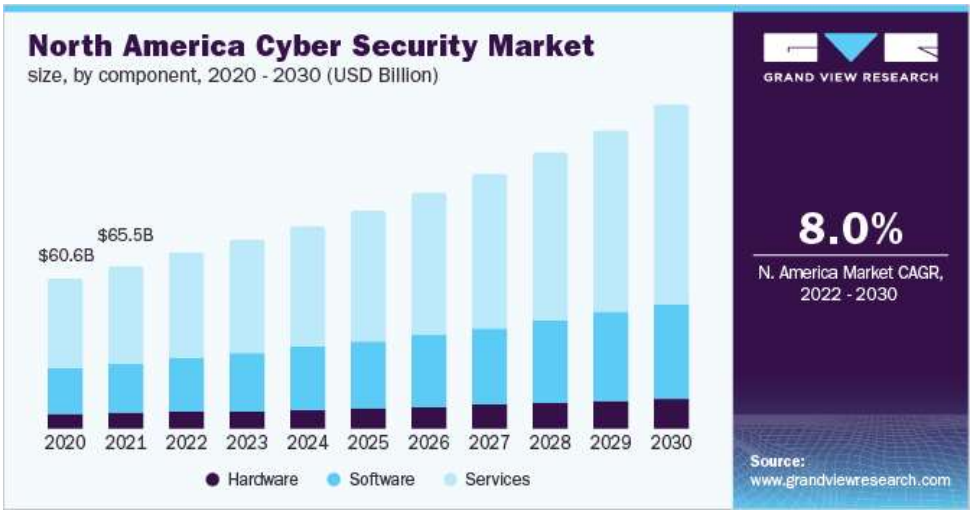
Within Maryland, there are many industries needing cybersecurity systems engineers. Remarkably, the data below show the need to support cybersecurity engineers' positions and widen its pool of people is increasing.



(https://gritinaction.umbc.edu/wp-content/uploads/Cybersecurity2.png)

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

   The global cybersecurity market size was valued at USD 184.93 billion in 2021 and is expected to expand at a compound annual growth rate (CAGR) of 12.0% from *2022 to 2030.* Consequently, organizations are expected to adopt and deploy advanced cyber security solutions to detect, mitigate, and minimize the risk of cyber-attacks, thereby driving current and projected market growth with a proportionally need to prospective graduates in all areas of Cyber engineering ranging from hardware, software, and systems management services. (www.grandviewresearch.com/industry-analysis/cyber-security-market)



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.

Maryland institutions offering cybersecurity BS degrees are:

Institution	Program	Degree
Bowie State University	Cyber Operations Engineering	Bachelor
Capitol Technology University	Construction Info Tech & Cybersecurity	Bachelor
Capitol Technology University	Cyber Analytics	Bachelor
Capitol Technology University	Cybersecurity	Bachelor
Capitol Technology University	Management Of Cyber & Info Technology	Bachelor
Morgan State University	Cybersecurity Intelligence Management	Bachelor

Mount St. Mary's University	Cybersecurity	Bachelor
SANS Technology Institute	Applied Cybersecurity	Bachelor
SANS Technology Institute	Applied Cybersecurity	Bachelor
Stevenson University	Cybersecurity & Digital Forensics	Bachelor
Univ. of Maryland University College	Cybersecurity Management and Policy	Bachelor
Univ. of Maryland University College	Cybersecurity Technology	Bachelor
University of Baltimore	Cyber Forensics	Bachelor

Source: https://mhec.maryland.gov/institutions_training/Pages/searchmajor.aspx

All cybersecurity BS degree programs compared above prepare graduates in cybersecurity operation, management, policy, technology, and related specializations. Bowie State University may be considered the most like what Coppin is proposing. However, the institution offers a Bachelor of Science degree in Cyber "*Operation"* Engineering (not Systems Engineering). Whereas Coppin State University (CSU) is the first in Maryland state to undertake a Cybersecurity *Engineering* (CYSE) BS degree program. CSU's proposals are distinct from all other offerings in that it focuses on the rare combination of providing highly-technical knowledge and skills, cybersecurity expertise, with a systems engineering approach. Systems engineering is an interdisciplinary field of engineering and engineering management that focuses on how to design and manage complex systems over their life cycles. CSU's CYSE program also has a specific emphasis on securing Medical Cyber-Physical Systems (MCPS). Degree recipients will be postured to fill most cybersecurity titles, which are in desperate demand today and for the foreseeable future. Graduates will be trained to work on emerging trends, designing, and developing comprehensive trustworthy architectures to accommodate MCPS telecommunication and telemedicine devices. Coppin State University (CSU) will be the first in the State of Maryland to undertake engineering cybersecurity systems.

2. Provide justification for the proposed program.

Systems engineering is an interdisciplinary field of engineering and engineering management that concentrates on how to design and manage complex systems over their life cycles. None of the institutions compared earlier deliver "systems Engineering" content that has a specific emphasis on securing Medical Cyber-Physical Systems (MCPS), in which there is a great demand throughout Maryland and the nation. Coppin's proposed program will prepare graduates to fill most cybersecurity titles listed few paragraphs above and these CYSE job opportunities are in desperate demand today and will remain for a greater length of time.

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

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

Coppin will not have any undesirable impact due to the implementation or maintenance of high-demand programs at HBIs. There are no BS degree programs in Cybersecurity Engineering at any of Maryland's HBCUs or the rest of the United States. The proposed BS degree in Cybersecurity Engineering would be the first.

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.

Coppin will not have any undesirable impact on the uniqueness and institutional identities and mission. There are no BS degree programs in Cybersecurity Engineering in Maryland or the rest of the United States. The proposed BS degree in Cybersecurity Engineering would be the first.

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

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

Coppin's faculty team within the Department of Mathematics and Computer Science established the proposed program through a rigorous review of unmet academic program needs. The CYSE BS degree program proposal was prepared with assistance from a cybersecurity qualified consultant. The program proposal along with the nineteen (19) CYSE new course syllabi were presented to Coppin's Curriculum Standards and Policy Committee, and all were approved by the Provost and Vice President of Academic Affairs. Dr. Atma Sahu, Professor, and Chair of the Mathematics and Computer Science department will oversee the program.

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

BS CYSE Program Objectives

Graduates earning the Bachelor of Science degree in Cyber Security Engineering at Coppin State University are expected within **three to five years after graduation** to be professionals who:

- Establish themselves in a successful cyber security engineering career in industry or government
- Communicate and perform ethically and effectively as members or leaders of multi-disciplinary teams

- Stay current through continuing education opportunities, professional conferences, graduate school, and other self-learning experiences; have the ability to obtain and maintain professional licensing

BS CYSE Program Education Learning Objectives

Graduates earning the Bachelor of Science degree in CYSE Engineering at Coppin State University at the time of graduation have (adapted from Accreditation Board for Engineering and Technology (ABET) criterion number (3): At the end of the program graduation the graduates will be able to:

(a) Apply knowledge of mathematics, science, and engineering
(b) Design and conduct experiments, as well as to analyze and interpret data
(c) Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) Function and contribute to multidisciplinary teams
(e) Identify, formulate, and solve engineering problems
(f) Deliver professional and ethical responsibility
(g) Communicate effectively
(h) Demonstrate the broad education necessary to understand the impact of engineering solutions in as global, economic, environmental, and societal context
(i) Recognition of the need for, and an ability to engage in life-long learning
(j) Exhibit knowledge of contemporary issues
(k) Employ the techniques, skills, and modern engineering necessary for engineering practice.

Source: https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2021-2022/

Learning Outcomes:

As indicated above in assessment and evaluations paragraphs the Institutional (Middle States), ACM (Association for Computing Machinery) and ABET student's learning outcomes that are aligned with CYSE course concepts will be monitored.

Upon graduation:

CYSE COURSE CONNECTIONS WITH LOs	
Primary CYSE Courses for the Purpose of Learning Outcome Assessment	**Learning Outcomes (Los)**
CYSE 101 Intro.to Engineering	c, e, j
CYSE 107 Intro.to Cyber Security Engr.	d, e
CYSE 391 Defensive Programming	b, k
CYSE 386 Info. Assurance	c, e
CYSE 393 Introduction to Network Security	b
CYSE 394 Network and Protocols	a, k
CYSE 301 Digital Electronics	c, e
CYSE 411 Secure Systems Design	d, g

CYSE 425 Secure RF Communication	a, e
CYSE 450 Cyber Vulnerability Lab	b, e
CYSE 459 Senior Advance Design Project	b, c, d, f, i
CYSE 424 CPS Cybersecurity AI	b, d
CYSE 426 Principles of CPS	a, g
CYSE 428 Secure Medical Info. Systems II	a, e
CYSE 484 Spec Topics in CYSE	a, b
CYSE 485 Security Tools for Info.	e, k,b
CYSE 491 Hacking of Unix Binaries	b, k
CYSE 495 MIS Digital Forensics	c, g, i
CYSE 497 MCPS Security & Privacy	b, c, d, f, i
CYSE 496 Engineering Senior (seminar)	d, f, g, h, i

Overview of Technical Learning Outcomes:

Learning outcomes and appropriate measures in four key areas:

(1) Technical Foundations
(2) Problem and Requirements Identification
(3) Solution Evaluation
(4) Solution Development and Implementation.

In relation to each of these four key areas, students will be able to:

Technical Foundations

- Demonstrate and apply knowledge in core technical areas.
- Demonstrate knowledge of software and operating systems, hardware, telecommunications networks, and cryptography theory and operation.
- Apply knowledge to the design, testing, exploitation, and security of devices, systems, and connecting networks.

Problem and Requirements Identification

- Identify contemporary cybersecurity threats to cyber resilient systems.
- Examine vulnerabilities in information technology, hardware systems, and software systems to gain experience in engineering cyber resilient systems to mitigate cybersecurity threats. Integrate relevant research findings to improve cybersecurity engineering practices.

Solution Evaluation

- Apply risk frameworks in the analysis of cybersecurity threats to system and mission design objectives.
- Conduct qualitative and quantitative vulnerability, threat, and cybersecurity risk assessments to Information Technology (IT) and Operational Technology (OT) systems, components, and processes.

- Analyze cyber-physical systems and identify their interdependencies on each other. Conduct economic analyses in the development of cybersecurity engineering recommendations.
- Demonstrate knowledge of the regulatory and standards landscape required to design, protect, and evaluate cyber resilient systems.
- Apply engineering economic analysis in the assessment of costs/benefits of alternative cybersecurity engineering solutions.
-

Solution Development and Implementation

- Apply Cybersecurity Engineering principles in each phase of the systems development life cycle.
- Demonstrate critical thinking in the application of cybersecurity engineering principles to identify, formulate, and engineer cybersecurity solutions.
- Apply commonly used cybersecurity software and tools to identify and mitigate security risks in the systems development life cycle. Design, synthesize, and apply Cybersecurity Engineering solutions within an Enterprise Security Architecture.
- Demonstrate knowledge of the Enterprise Security Architecture process.
- Identify and evaluate cybersecurity engineering alternatives within the Enterprise Security Architecture.

3a) **Overview of CYSE Student Assessment at Coppin State University**

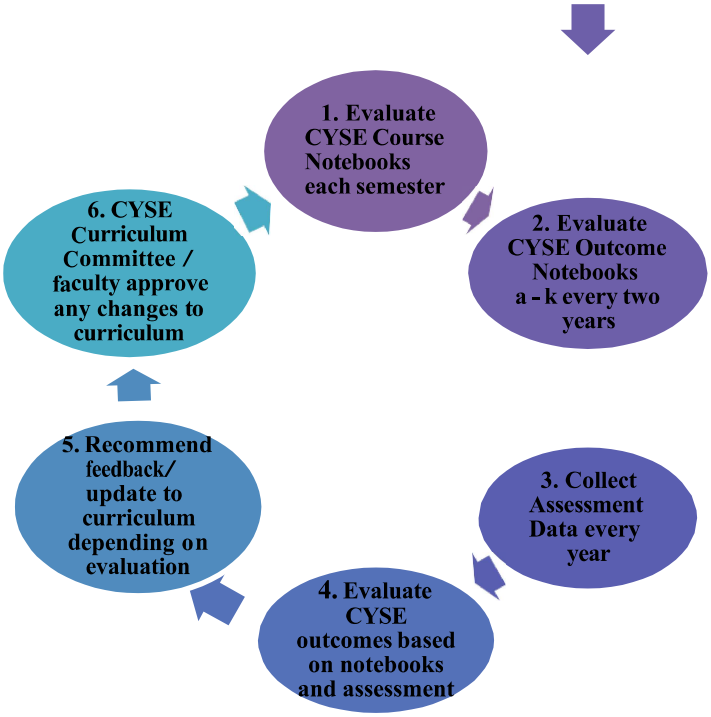
Students learning outcomes will be assessed in each core course through various mechanisms that include:

(1) CYSE Course-Lab projects
(2) Case studies and problem-solving exercises
(3) Homework assignments
(4) Term papers
(5) Presentations (Individual and Groups) in class or students-conferences
(6) Formative and Summative: tests and exams, homework, quizzes and discussions
(7) Capstone Project - The Cyber Security Engineering Capstone Project is the culminating application of the students' Comprehensive knowledge and skills acquired from the proposed program. The learning outcomes for the program are specific to undergraduate-level knowledge, skills, and abilities that students should acquire in the degree program. Student learning outcomes will be assessed across the curriculum on the scale illustrated below. This scale will convert to the A-F grading system currently used at Coppin.

3b) document student achievement of learning outcomes in the program

Through the Academic Affairs Assessment Committee, utilizing Blackboard Outcomes and the software platform, assessment of student learning will be regularly monitored, reviewed by the committee and departmental faculty, and if necessary, enhancements to the curriculum will be provided to ensure student success. The Assessment schedule of the university will drive routine and systematic assessment of learning required for the overall assessment of educational effectiveness. Results of Assessment are shared with the respective assessment committee, the Assessment Office, chief academic officer and preserved as evidence for future academic enhancements and as accreditation artifacts.

The Program Coordinator with Mathematics and computer science chairman, and CYSE Faculty will set key performance indicators and will evaluate and assess the program on a yearly basis continuously as shown in the diagram below:



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

The Department of Mathematics and Computer Science along with the support and commitments from Provost and President CSU will have faculty, lab structure, state-of-the-art classrooms equipped with advanced technology and all needed capacity to be able to gain ABET accreditation.

The current and proposed departmental courses to be used in this new academic program are illustrated below:

List of Proposed Course Descriptions for B. S. in Cybersecurity Engineering Program includes the following courses 3 credit hours, unless otherwise different credit hrs. mentioned.

CYSE 101: Introduction to Engineering. Components, Quantities, and Units; Series Circuits; Digital Concepts; Number Systems and Programming Concepts. **Co-requisite(s): Math Placement Test score qualifying student for MATH 131.**	**CYSE 426: Secure Medical Info. Systems I.** Medical Community of Interest (MedCOI) network technology, Health IT Training, Acquisition Management Support Program Affordability and Cybersecurity and Risk Management Framework (RMF) all within the area of Health Care IT services. Electronic Health Records (EHR). Innovative Health IT
	Solutions. Health IT Research. Health Care IT Engineering and Technical Services. **Required Prerequisites: CYSE 411**
CYSE 107: Introduction to Cyber Security Engineering. Principles, Applications, and Practice of cyber security engineering (e.g., concepts, terminology, systems engineering, design processes, and Secure Software Development Life Cycle). **Prerequisite or corequisite: CYSE 101**	**CYSE 428: Secure Medical Info. Systems II** Maintaining and modifying moderately complex Health IT Cyber Security technologies. Project planning, guidance, and technical expertise in the following areas pertinent to Health IT: Cyber Security engineering program, policy, process, and planning; risk management, auditing, and assessments; Assessment and Authorization (A&A), QA, and QC planning. **Prerequisites: CYSE 301 and CYSE 426**
CYSE 221 Introduction to C and C++ Programming Computer components, algorithm design with flowcharts, pseudo-code, and algorithm implementation. Apply programming, documentation, debugging/testing techniques to problem solving and data analysis. Basic data types, the C++ string class, variables and constants, and their declaration, basic input/output operators, assignment operators, arithmetic operators, and object-oriented elements. This course qualifies to be equivalent COSC 221 **Prerequisites: MATH 131 or higher**	**CYSE 450: Cyber Vulnerability Lab, 1 Credit** Hands-on experience in security issues of network systems. Issues in ethical hacking, penetration testing, forensics and incident handling and response using virtual machines. A hands-on lab course, with short lecture introductions **Prerequisites: CYSE 393 and CYSE 391**

CYSE 301: Digital Electronics Digital systems, circuits, and computers (e.g., binary systems and codes, digital logic gates, microelectronics, and integrated circuits, computer architecture). **Required Prerequisites: MATH 405 or PHYS 304**	**CYSE 459: Senior Advanced Design Project, 2 Credits** First semester of a two-semester capstone course in Cyber Security Engineering Program. Development of a design project by a team of students. Conception of the project and determination of its feasibility. Work includes developing preliminary design and implementation plan. Projects will aim at the integration of the technical material learned in several courses and incorporation of industry input. **Required Prerequisites: CYSE 428**
CYSE 386: Information Assurance. Authentication, access control, security models, Cryptography, cybersecurity using Unix and Win NT, enumerated and classified assets, identify threats, risk management planning and development.	**CYSE 484 Special Topics in Cyber Security Engr** Special Topics in the Cyber Security Engineering area, with different content in different terms. Offered by CSU. May be
Prerequisite: CYSE 107	repeated within the term for a maximum of 6 credits. **Required Prerequisites: CYSE 426**
CYSE 391: Defensive Programming in C Defense by design, removing explicit vulnerable code, building validation, designing a public interface, and unifying error flows, and develop defensive design practices. **Required Prerequisites: CYSE 221**	**CYSE 485: Security Tools for Information Security** Perform host- and network-based security tasks relating to security, investigation, compliance verification and auditing using a wide selection of commonly used tools on both Windows and Linux platforms, with emphasis on open-source tools. **Required Prerequisites: CYSE 393**
CYSE 393: Introduction to Network Security Cryptography applications in networks. Firewalls architectures, VPNs, network and routing protocols, DNS, e-mail, and wireless network security. **Required Prerequisites: CYSE 107**	**CYSE 491: Hacking of Unix Binaries** In-depth discussion on various security vulnerabilities (e.g., buffer overflows) in C applications. Analyzing at the assembly level. Discusses best practices and design principles for secure programming. **Required Prerequisites: CYSE 391**

CYSE 394: Network and Protocols Overview of Network Protocols: TCP/IP, NAT, DHCP, IPsec, ICMP, SMTP, DNS, IPv6, Bellman-Ford and Dijkstra algorithms, RIP, OSPF, IGRP, EIGRP, and BGP. **Required Prerequisites: CYSE 107**	**CYSE 495: MIS Digital Forensics Investigation** Principles of collection, preservation, examination, and analysis of computer evidence. Evolving law of acquiring and analyzing digital evidence from computers and devices, and the presentation of legal evidence in a court of law, and history of gray hat hacking. **Required Prerequisites: CYSE 385**
CYSE 411: Secure Software Engineering Software engineering concepts, methods, and practices important to both the theorist and the practitioner. The entire range of responsibilities expected of a software engineer. Requirement's development, software design, programming languages, supporting systems engineering **Required Prerequisites: CYSE 391**.	**CYSE 496: Engineering Senior Seminar 3 Credits** This course covers a variety of responsibilities of cyber security engineers including engineering ethics, government policies, laws and regulations affecting cyber security engineering, industry practices, and entrepreneurship. **Required Prerequisites: CYSE 460**
CYSE 424: Security Artificial Intelligence Curating threat intelligence from millions of research papers, blogs, and news stories. Using AI to fight through the noise of daily alerts, drastically reducing response times and using deep learning to reduce the endless cycle of manually updating signatures in response to the latest permutation, combining data points, crunching volumes of data. **Required Prerequisites: CYSE 411**	**CYSE 497: CPS Medical Systems** Overarching hospital CPS and technology functions: patient and provider engagement technologies, core technologies, HER, Supply chain management, data aggregation and management, reporting and analytics technologies, IT interoperability and integration.
	Required Prerequisites: CYSE 301 and CYSE 393
CYSE 425: Secure RF Communications Security issues in wireless networks, such as cellular networks, wireless LANs, Bluetooth, NFC, RFID, mobile security, anti-jamming communication, and physical layer security. Focus on wireless network attacks and proposed solutions and their limitations. **Required Prerequisites: CYSE 301**	

Now, total support courses (MATH and Computer Science) and the core CYSE degree program courses are tabulated below:

Total Credits of Current Courses for CYSE Plan of Study: 26 hrs.

	HEGIS	Course #	Course Name	Credit Hours
1	COSC	220	Computer Science I	4
2	COSC	221	Computer Science II or CYSE 221 C++ Prog	4

3	COSC	310	System Programming	3
4	MATH	132	Pre-Calculus	4
5	MATH	201	Calculus I	4
6	MATH	202	Calculus II	4
7	MATH	301	Linear Algebra	3

Total Credits of New Courses for CYSE Plan of Study: 58 hrs.

	HEGIS	Course #	Course Name	Credit Hours
1	CYSE	101	Intro. to Engineering	3
2	CYSE	107	Intro. to Cyber Security Engr.	3
3	CYSE	221	C and C++ Prog or COSC 221 Computer Sc. II	4
4	CYSE	391	Defensive Programming	3
5	CYSE	301	Digital Electronics	3
6	CYSE	386	Info. Assurance	3
7	CYSE	394	Network and Protocols	3
8	CYSE	393	Introduction to Network Security	3
9	CYSE	491	Hacking of Unix Binaries	3
10	CYSE	411	Secure Systems Design	3
11	CYSE	425	Secure RF Communication	3
12	CYSE	424	Security Artificial Intelligence	3
13	CYSE	450	Cyber Vulnerability Lab	1
14	CYSE	459	Senior Advance Design Project	2
15	CYSE	424	Security Artificial Intelligence	3
16	CYSE	426	Secure Medical Info. Systems I	3
17	CYSE	428	Secure Medical Info. Systems II	3
18	CYSE	495	MIS Digital Forensics	3
19	CYSE	497	CPS Medical Systems	3
20	CYSE	496	Engineering Senior Seminar	3

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

The CYSE BS degree program is an addition to the two current degree programs offered in the Mathematics and Computer Science Department (BS in Mathematics & BS in Computer Science) and is expected to be implemented in the Fall 2023 semester. Courses will be taught during the spring and fall semesters. Modes of instruction will be face-to-face and practicum. The total number of credit hours required for completion is 122.

The CYSE program status sheet (***Total 122 credit hours***) is prepared for CYSE BS Degree program students and includes all COMAR GER requirements, Computer Science, Mathematics, and 19-CYSE Core courses. A brief account follows:

> *GERs* :42 hrs. (English, Math. Hum and Fine Arts, Natural Sc and Physics, Social and Behavioral and Interdisciplinary)

Computer Science: 11 hrs. Java/C++ programing language and Systems programming. (Some Computer Science Courses have been re-designed to fit CYSE programming requirements and are counted twice to reflect CYSE's re-designed course code.)

Mathematics: 15 hrs. Pre-calc, Calc I, II, and Linear Algebra

Cybersecurity Engineering Core: 54 hrs. (19 courses) include among other areas—Cyber-Physical Medical Systems, Secure Medical Systems I, II, Secure RF Communication, Security Artificial Intelligence, MIS Digital Forensics, Cybersecurity Engineering, and Digital Electronics courses.

Nineteen (19) CYSE course syllabi based on the "Engineering-CYHIS" (Cyber Security in Health Information Systems) brand thrust were prepared and have been approved by the CSU Curriculum Standards and Policy Committee on April 20, 2022. These courses will soon be available on the CSU catalog. Thus, all courses (122 hrs.) in the CYSE program are university-approved.

The four-years semester-by-semester course schedule plan is tabulated below:

Cybersecurity Engineering B. S. Degree Course-Checklist: 122 Credits	
YEAR 1 = 32 Cumulative = 32	
FALL	**SPRING**
MATH 131(3) College Algebra	MATH 132 (4) Pre-Calculus
ENGL 101(3) English Composition I	ENGL 102 (3) English II
CYSE 101(3) Introduction to Engineering	CYSE 107(3) Intro. to Cyber Security Engineering
PHIL 102 (3) Introduction to Logic	COSC 220 (4) Computer Science I
HIST 205(3) African Am. History I or HIST 201or HIST 203	HIST 202 (3) World History II or HIST204 or HIST206

15 credit hours	**17 credit hours**
YEAR 2 = 33 Cumulative = 65	
FALL	**SPRING**
MATH 201(4) Calculus I	PHYS 304 (3) Heat, Electricity & Magnetism
MATH 301(3) Linear Algebra	ECON 103 (3) Intro Bus & Ent
COSC 221(4) or CYSE 221 (4) C and C++ Prog.	CYSE 391(3) Defensive Programming
PHYS 303(3) Mech and Particle Dynamics	SPCH 105 (3) Speech Communication
WLIT 207 (3) World Lit or any 200 level English	MATH 202 (4) Calculus II
17 credit hours	**16 credit hours**
YEAR 3 =30 Cumulative = 95	
FALL	**SPRING**
CYSE 301 (3) Digital Electronics	CYSE 411 (3) Secure Software Engineering
CYSE 386 (3) Information Assurance	CYSE 424 (3): Security Artificial Intelligence
CYSE 393 (3) Introduction to Network Security	CYSE 425 (3) Secure RF Communication
CYSE 394 (3) Network and Protocols	CYSE 426 (3) Secure Medical Info. Systems I
CYSE 491 (3) Hacking of Unix Binaries	CYSE 495 (3): MIS Digital Forensics
15 credit hours	**15 credit hours**

YEAR 4 = 27 Cumulative = 122	
FALL	**SPRING**
CYSE 428 (3) Secure Medical Info. Systems II	CYSE 496 (3) Engineering Senior Seminar.
COSC 310 (3) Systems Programming	CYSE 497(3) CPS Medical Systems
CYSE 459 (2) Senior Advanced Design Project	CYSE 485 (3) Security Tools for Information
PSYC 201 (3) General Psychology	HEED 101(3) Health/Wellness or HEED 102,105, 110
SOCI 201 (3) Intro to Sociology	CYSE 450(1) Cyber Vulnerability Lab
14 Credit Hours	**13 credit hours**

TOTAL: 122 Credits Hours

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

After USM and MHEC approval, the program will be accredited nationally by Middle States Commission on Higher Education (MSCHE). However, as designed, it will follow the blueprint for specialized accreditation with ABET.

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

N/A. Coppin will not be contracting with another institution or non-collegiate organization.

8. Provide assurance and any appropriate evidence that the proposed program will provide students with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/student interaction, assumptions

about technology competence and skills, technical equipment requirements, learning management system, availability of academic support services and financial aid resources, and costs and payment policies.

The CYSE BS degree program will provide students with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/student interaction, assumptions about technology competence and skills, technical lab equipment requirements, Blackboard Ultra Learning Management System, availability of Eagle Academic Center (EAC) support services and financial aid resources, and costs and payment policies.

Curriculum, course, and degree information will be available on the university website and via email as well as regular mail if requested. The expectations for faculty/student interaction are available to students during virtual and face-to-face open house events, literature, website, etc. This information is also part of the material distributed for each course. Technology competence and skills and technical equipment requirements sharing are part of the material distributed for each course.

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

The CYSE BS degree program's advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and the services available. The content for every new program is derived from the new program request that is sent to the Maryland Higher Education Commission and is the source of the content for every new program at Coppin. Upon full program approval, the program is advertised in the University's catalog and homepage. Additionally, other marketing will include outreach on appropriate social media platforms.

H. Adequacy of Articulation

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

   Currently, there is no articulation agreement available. However, there are meetings in progress to discuss articulation with one community college in the region. Talks are currently in progress. CSU's transfer admissions personnel will guide the academic staff at both institutions through the 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 faculty members 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 in the proposed program.

The proposed instructors for CYSE program are the full-time and current tenure/tenure track professors listed below.

Faculty Member	Degree and Field	Status	Courses Faculty will teach	Rank
Atma Sahu	Ph.D. Mathematics, MIT Cybersecurity Cert, HARVARD AI Health Care Cert.	Full-Time	All MATH, COSC, and CYSE 101, 301, 424	Professor & Chair
Stephen Providence	Ph.D. Computer Science	Full-Time	All COSC and CYSE 424, CYSE 221	Assistant Professor
Sean Brooks	Ph.D. Mathematics	Full-Time	All MATH, CYSE Labs	Assistant Professor
Nicholas Eugene	Ph.D. Mathematics, MPS Cybersecurity	Full-Time	All MATH, CYSE (select) courses	Associate Professor
Clarence Williams	Ph.D., MS (Cybersecurity), Cyber Engineering Cert	Full-Time	All CYSE Courses	Sr. Lecturer
Two (2) New hires (Positions announced)	Ph.D. Cybersecurity	Full-Time	All CYSE Courses	Assistant Professors

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

a) Pedagogy that meets the needs of the students

The primary pedagogy for faculty at Coppin is the project-based active learning model. The Coppin faculty believes strongly in a highly interactive, thinking, and hands-on problem-solving experience. Each CYSE course has a course-capstone project. Instructors design and demonstrate course projects in classrooms and labs for students in each class to the maximum extent possible. Faculty members are provided support for conferences and related research presentation.

b) The Learning Management System (LMS)

Coppin has full-time instructional technology IT employees who provide Blackboard Ultra training and Quality Matters rubric-based content development assistance. New faculty are assigned an experienced faculty mentor to ensure a smooth transition to the Bb Ultra LMS environment as well as to ensure compliance with the institution's Quality Matters teaching pedagogy.

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

The CYSE program will be offered on-campus face-to-face.

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.

Parlett L. Moore Library at Coppin is a member of the Library Information Management System (LIMS) of the University System of Maryland and Affiliated Institutions (USMAI), a collaborative effort that permits state higher education institutions to share resources. LIMS provides a USMAI union online public access catalog that contains more than 1,400,000 titles. The library has five floors, two computer labs for student use/work, two smart classrooms, four study rooms, the Parren Mitchell smart conference room, and the Cab Calloway room/art gallery.

The library currently supports 750+ courses. The library currently supports the needs of students at the undergraduate, graduate, and doctoral levels. The library is fully-prepared to support the CYSE BS Degree program at Coppin.

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

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

   No new facilities are required for the program. The Mathematics and Computer Science department has an AI lab equipped with Mathematica software, VMWare, Python, SPSS, and many other Integrated Software Development Systems. Coppin has multimedia state-of-the-art classrooms all over the campus. The Nano-Technology and Computer Science Lab meet the potential lab-projects needs of the students. The Office of Institutional Technology provides both local and virtual support. Coppin has a new Science and Technology Building with adequate spaces for classrooms, staff and faculty offices, and laboratories for CYSE program research and teaching.

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

   a) *An institutional electronic mailing system*
   Coppin provides an institutional electronic mailing system to all students, faculty, and staff. Coppin requires the use of the email system by all students and faculty in all the institution's modalities of course delivery. Coppin's students and faculty are required to use the institution's email addresses (e.g., JDoe@coppin.edu) in all University matters and communications. Coppin State University uses email capabilities in Microsoft Office 365 and Microsoft Outlook.

   b) *A learning management system that provides the necessary technological support for distance education*

The proposed CYSE BS degree program is face-to-face. However, if needed Coppin provides a robust Learning Management Systems (LMS) known as Blackboard Ultra and is required for administration of every class. All syllabi, grades, and assignments must be entered into the LMS on a timely basis throughout the semester. All instructors are required to use Bb Ultra LMS which is supported by Coppin's Office of instructional Technology.

L. Adequacy of Financial Resources with Documentation (as outlined in COMAR 13B.02.03.14)

1. Complete Table 1: Resources and Narrative Rationale. Provide finance data for the first five years of program implementation. Enter figures into each cell and provide a total for each year. Also provide a narrative rationale for each resource category. If resources have been or will be reallocated to support the proposed program, briefly discuss the sources of those funds.

RESOURCES & EXPENDITURES: Five years projected budget

TABLE SEVEN: RESOURCES					
Resources Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1.Reallocated Funds	0	0	0	0	0
2. Tuition/Fee Revenue2 (c+g below)	$322,365	$741,976	$3,127,468	$6,791,669	$14,580,244
a. #F.T Students	15	26	38	49	59
b. Annual Tuition/Fee Rate	6716	6716	6716	6716	6716
c. Annual Full Time Revenue (a x b)	$100,740	$174,616	$255,208	$329,084	$396,244
d. # Part Time Students	5	8	18	27	40
e. Credit Hour Rate	2955	2955	2955	2955	2955
f. Annual Credit Hours	15	24	54	81	120
g. Total Part Time Revenue (d x e x f)	$221,625	$567,360	$2,872,260	$6,462,585	$14,184,000
3. Grants, Contracts, & Other Sources	50,000	50000	100000	0	0
4. Other Sources	0	0	0	0	0
TOTAL (Add 1 - 4)	$372,365	$791,976	$3,227,468	$6,791,669	$14,580,244

Rationale:

i) Reallocated Funds: None

ii) Tuition/Fee Revenue Computed for 15 students' tuition at CSU rate

iii) Grants, Contracts & other Sources: HBCU Lawsuit and other CSU academic program budget funds

iv) Other sources: The department will continue pursuing grants from NIST and NSF to support further development of the program.

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

TABLE EIGHT: EXPENDITURES					
Expenditure Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1. Total Faculty Expenses (b+c below)	117000	234000	234000	351000	455000
a. # FTE	1	2	2	3	4
b. Total Salary	$90,000	$180,000	$180,000	$270,000	$350,000
c. Total Benefits	$27,000	$54,000	$54,000	$81,000	$105,000
2. Total Administrative Staff Expenses (b + c below)					
a. # FTE	0.5	0.5	0.5	1	1
b. Total Salary	$28,000	$28,000	$28,000	$56,000	$56,000
c. Total Benefits	$8,400	$8,400	$8,400	$16,800	$16,800
3. Total Support Staff Expenses (b + c below)	$36,400	$36,400	$36,400	$72,800	$72,800
a. # FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
4. Equipment	0	0	0	0	0
5. Library	$125	$125	$0	$0	$0
6. New or Renovated Space	0	0	0	0	0
7. Other Expenses	0	0	0	0	0
TOTAL (Add 1 - 7)	$153,525	$270,525	$270,400	$423,800	$527,800

Rationale

Total Faculty Expenses: As faculty expenses are tabulated, the plan is to hire one CYSE faculty in the first year, one more in the second year, and a third in fourth year. These funds are allocated from HBCU lawsuit state funds to Coppin.

Equipment: Software for courses is available free to students or is freeware.

Library: Money has been allocated for additional materials to be added to the on-campus library.

M. Adequacy of Provisions for Evaluation of Program (as outlined in COMAR 13B.02.03.15)

1. Discuss procedures for evaluating courses, faculty and student learning outcomes.

The assessment process at Coppin consists of a series of events throughout the Academic Year. Some Academic Year Assessment Events are:

- At the August/Jan Faculty Meeting Chair and Deans address faculty and discuss courses and programs assessment and student learning issues.
- Faculty submit performance plans consistent with the mission and goals of the University and department. The documents are reviewed and approved by the Academic Dean.
- Department Chairs and Academic Dean review the faculty/Environment Survey data.
- Department Chairs and Academic Dean meet monthly and address program, instructional, and other academic issues.
- A complete curriculum review for degrees occurs every two years.
- Department chair and Academic Dean meet with the faculty to review the student learning progress and discuss needed changes.
- Faculty Performance Plans are reviewed with faculty to identify issues of divergence and to adjust the plan as needed.
- Department Chairs and Academic Dean review student course evaluations from the Fall and Spring semesters.
- Department Chairs and Academic Dean meet to review the course evaluations by students to ensure the evaluations continue to meet the university's assessment needs.

In addition to these summative assessments, the Academic Dean meets with the Department Chairs other every week 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. The Faculty Senate addresses issues that impact student outcomes as those issues emerge. Additionally, the Academic Affairs Assessment Committee reviews the assessment data and provides feedback to the departments.

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

At Coppin, the Office of Assessment, along with the Office of Institutional Research, is housed within the Office of Planning and Assessment. The unit resides within the Division of Academic Affairs and serves the entire university in building a culture of assessment that involves all stakeholders – students, faculty, staff, and administrators. By doing so, it serves students' learning and success while preparing the institution for effectively meeting the standards for accreditation set by Middle States Commission on Higher Education.

The Office of Assessment seeks to build assessment (student learning outcomes, student retention, student and faculty satisfaction) capacity at Coppin State University in order to help students succeed. The Office of assessment does this by:

- Facilitating sustainable, utilization-focused unit-level assessment and related data-based decision-making and resource allocation;
- Designing, implementing, and monitoring a unit-level assessment process that is aligned to the institutional strategic plan; and,
- Supporting the acquisition and implementation of assessment technologies.

Student Learning Outcomes

This CYSE BS degree program is designed to meet the Student's Learning Outcomes requirements of MSCHE. The University is in good standing with all its accrediting bodies.

Students will be expected to meet with a faculty advisor during their initial semester to create their academic plans of study, and then as necessary to discuss academic progress and update plans of study. Core courses will be taught by full-time, tenure-track faculty members. The program will require 122 credit hours, including 42 General Education Requirements (with 9 credits in Category 5 instead of 7 credits). All Nineteen (19) CYSE course syllabi based on "Engineering-CYHIS" (Cybersecurity Health Information systems) brand thrust are aligned with Institutional (Middle State), ACM and ABET student's learning outcomes and require a mandatory course-lab projects

Student Retention

Coppin Assessment Office maintains a comprehensive student retention program under the Vice President/Director of Assessment. The Academic Advisors in each department work with each student to create a plan to remove any barriers to success. The Academic Advisors also work with the course instructors as needed to gain additional insight that may help correct the situation. Each student also meets with their Academic Advisor each semester to evaluate their progress toward degree completion. An updated plan of action is developed for each student for their next semester's registration and each following semester through degree completion.

The Eagle Academic Center provides additional advising and instructional support services. As a new center, they will employ methods of assessing student and faculty satisfaction. Evaluations and assessments of Student and Faculty satisfaction occur every semester. Faculty members are evaluated every semester by students enrolled in their courses. Students are required to complete a course evaluation online within a specified time frame at the end of the semester for every enrolled course via Blackboard Ultra LMS. The Department Chairs and Academic Dean review the student evaluations for every course offered at Coppin. The Department Chairs and Academic Dean also review faculty satisfaction every semester. Changes are made by faculty members accordingly. This cycle is an ongoing process.

Cost-Effectiveness

The Division of Administration and Finance provides excellent technologically advanced and customer-centered services to Coppin State University students, faculty, staff, alumni, and visitors. The Vice President of Finance and Administration monitors each academic program with the input from Vice President of Academic Affairs throughout every semester and term for its cost-effectiveness. The Department Chairs and College Dean prepare the proposed academic budget for each program for the upcoming year. Budget increases are tied to increasing enrollment, student learning and success.

N. Consistency with the State's Minority Student Achievement Goals (as outlined in COMAR 13B.02.03.05).

1. Discuss how the proposed program addresses minority student access & success, and the institution's cultural diversity goals and initiatives.

   Coppin is a majority-minority-serving HBCU/Minority Serving Institution. Our programs attract a diverse set of students who are multiethnic and multicultural. The University actively recruits minority populations for all undergraduate and graduate-level degrees. Special attention is also provided to recruit females into the STEM and multidisciplinary programs at all degree levels –undergraduate, master's, and doctoral.

   Coppin will use the same methodology for the CYSE BS degree program student recruitment.

O. Relationship to Low Productivity Programs Identified by the Commission:

1. If the proposed program is directly related to an identified low productivity program, discuss how the fiscal resources (including faculty, administration, library resources and general operating expenses) may be redistributed to this program.

This is not applicable as this program is not associated with a low-productivity program.

P. Adequacy of Distance Education Programs (as outlined in COMAR 13B.02.03.22)

1. Provide affirmation and any appropriate evidence that the institution is eligible to provide Distance Education.

Not applicable as the CYSE BS degree program is not a distance education program.

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

Not Applicable.

Memorandum of Understanding
between the
Community College of Baltimore County
And
Coppin State University

Pathways to Success

This Memorandum (Agreement) is made between the Community College of Baltimore County (CCBC or College), located in Baltimore County Maryland, a public community college established under the laws of the State of Maryland and Coppin State University (CSU or University), a public institution of higher education located in Baltimore City, Maryland established under the laws of the State of Maryland to create an education partnership to increase collegiate engagement, academic progress and success, degree completion, and transition to careers.

WHEREAS CCBC is a community college with post-secondary education opportunities that result in the awarding of associate degrees and CSU provides students the opportunities to earn undergraduate and graduate degrees;

WHEREAS CCBC and CSU recognize the need for and importance of facilitating education opportunities at the associates and bachelors' level as a pathway to career success at the initiation of a student's admission to CCBC;

WHEREAS CCBC and CSU recognize that cooperative education programs benefit the community, employers, and students in the State and regions;

WHEREAS CCBC and CSU Pathways to Success Program provides for the joint admission to both institutions to support the completion of degree requirements for an associated degree from CCBC and bachelor's degree from CSU;

WHEREAS, the mutual benefit of students engaging in and having access to campus resources, including library, dining, residence life, academic advising, is recognized to support successfully attaining educational goals; and

WHEREAS, the purpose of the Pathways to Success Program is to facilitate the transition from CCBC to CSU for jointly admitted students, effectively efficiently, and more seamlessly into Upper Division programs as CSU.

NOW THEREFORE, in consideration of the mutual promises and conditions herein, the adequacy of which is hereby acknowledged, the Community College of Baltimore County and Coppin State University hereby agree as follows:

I. Definitions

Dual Admissions:

- Dual Admission is a **special transfer program** between selected two- and four-year colleges and universities that allows students to take advantage of unique benefits that are intended to provide a seamless and successful transition to participating four-year schools.

II. Responsibilities of the Parties

In support of this partnership and administration of the program, CCBC and CSU will:

- Coordinate trainings to educate faculty and staff about the Pathways to Success Program.

III. Responsibilities of CCBC

In support of this partnership and administration of the program, CCBC will:

- Establish a Pathways to Success web page for program information.
- Promote the Pathways to Success to general audiences to be acquainted with the program and to prospective students at the time of admission who will be dually admitted.
- Facilitate admissions to CSU upon initial admission and throughout their CCBC student experience under the Pathways to Success program.
- Facilitate classroom presentations/visits by CSU representatives to CCBC students for the purpose of presenting the program and CSU academic opportunities.
- Provide space for CSU staff and faculty to meet with prospective students, conduct pre-transfer advising, and host information sessions.
- Provide an opportunity for CSU representatives to present at CCBC New Student Orientation or provide a table to be occupied by CSU staff
- Facilitate the exchange of transcripts between CCBC and CSU for purposes of advising, evaluation, and admission.
- Provide CSU with the number of, and contact information for, CCBC students enrolled in Pathways to Success program at the end of each academic semester.
- Confirm enrollment of all Pathways to Success students on a semester basis.

IV. Responsibilities of CSU

In support of this partnership and administration of the program, CSU will:

- Establish a Pathways to Success web page for program information.
- Provide a Pathways to Success Application for use by CCBC students, to be made available at all transfer events and online.
- Provide a dedicated bridge advisor to work with CCBC students on a semester basis, to support progression and retention efforts, including to confirm enrollment in the Pathways to Success program.
- Provide embedded student advising at CCBC (in-person or virtually) to assist students in applying to the Program, meeting eligibility requirements, following curriculum maps, and utilizing resources available through the Pathways to Success Program.
- Identify faculty across transfer majors who will work, at regular and advertised times throughout the program, with students in the program from admissions at CCBC through their transfer to CSU.
- Verify that Program participants declare a major upon transfer to the University.

- Share information with CCBC student enrollment patterns, retention, and degree attainment.
- Invite CCBC partners to CSU Commencement to honor Pathways to Success Program students.

In support of this partnership and acceptance of college credit in transfer, CSU will:

- Require completion of the Associate of Arts and the Associate of Science degrees at CCBC for Pathways to Success students prior to enrolling in CSU courses in the program in which the student earned the degree at CCBC.
- Accept all general education coursework and require no further general education courses for students attaining the Associate of Arts or Associate of Science degrees as required by *COMAR Sec. 13b.06.01.04. Transfer of Education Program Credit, B. Credit Earned in or Transferred From a Community College.*
- Accept the sixty (60) semester hours that comprise an Associate of Arts or Associate of Science degree to transfer to any CSU bachelor's degree program with Junior standing (60-70 credits). CSU will guarantee the acceptance of all credits earned from the transfer Associate of Science or Associate of Arts degree program not to exceed 70 credits. Transfer of other degree types will be determined through seamless articulation agreements.
- Provide Pathways to Success graduates junior class status (60-70 credits) with respect to registration and housing, if applicable.
- Accept up to forty-five (45) credits in transfer through CCBC's documented prior learning and high school articulation agreements, as applied to the Associate of Arts or Associate of Science degree.
- A full-time student admitted with third year (junior) status to CSU will be able to complete a bachelor's degree at CSU within two academic years provided the student completes the appropriate associate degree at CCBC and completes and appropriately sequences his/her remaining course work at CSU, which will be determined by number of credits earned each semester.

In support of this partnership, including financial and student support incentives, CSU will:

- Provide CCBC students admitted to CSU with CSU ID card. Provide financial incentives for students through dedicated CCBC transfer scholarships. Students transferring from CCBC through the Pathways to Success Program to CSU will automatically receive a one-time $1,000.00 scholarship tuition credit and may be eligible for additional Transfer Scholarships offered by CSU. The Office of Admissions identifies qualified transfer students for the Transfer Scholarship. Entering students must complete the Federal Financial Aid Form (FAFSA) and the CSU scholarship application. This merit-based scholarship provides an award of $2000.00 for the academic year ($1000.00) per semester. Students must complete the AA or AS degree to qualify. Note that all financial aid awards must comply with federal and state eligibility requirements. Students receiving the Community College Transfer Scholarship must maintain full-time enrollment and a grade point average (GPA) of at least 2.50 (4.00 scale).
- Provide access to institutional, academic, and student support services at the receiving institution to which all other CSU students have access.

V. Term

The initial term of the Agreement shall be for a period of five (5) years, commencing on the Effective Date, which is the date on which the agreement is fully executed by the parties. At the end of which the Agreement shall automatically renew for successive one (1) year periods unless otherwise terminated by either party as set forth herein. It is understood and agreed that this Agreement will be reviewed every five (5) years, at least ninety (90) days prior to the auto renewal period to ensure terms and conditions are consistent with the program structure and operations. Any adjustments will require a written update, modification, or addendum to the Agreement.

Either party may terminate this Agreement by providing ninety (90) days written notice to the other party. During the notice period the parties may discuss continuation of a formal relationship. If the Agreement is terminated, CSU will honor students who are in the Pathways to Success Program and have been admitted to CSU at the time of termination. The parties shall meet, at least annually, to review changes in curriculum, programs, and credential requirements for the purpose of determining whether or if the Agreement should be amended.

VI. Program Administrators

The parties designate the following individuals to serve as administrators under this Agreement:

CCBC Program Administrator	CSU Program Administrator
Ann Gamble Director of Transfer and Degree Acceleration agamble@ccbcmd.edu 443-840-1735	Nicole Lee Transfer Coordinator nilee@coppin.edu 410-951-3707

VII. FERPA

The parties will comply with all provisions of the federal Family Educational Rights and Privacy Act ("FERPA") in all disclosures of FERPA protected information between CCBC and CSU. For example, the parties may be able to share personally identifiable information from a student record for purposes related to enrollment or transfer, per 34 C.F.R §§ 99.31 (a)(2) and 99.34. Also consistent with FERPA, the parties shall use reasonable methods to ensure that only those education records necessary to the purpose for the disclosure are provided as permitted under FERPA. Nothing in this Agreement may be construed to allow the parties to maintain, use, disclose, or share student record information in a manner not allowed under applicable laws or regulations.

VIII. Publicity

Neither party shall use directly or by implication the names, trademarks, logos, or trade dress of the other party, nor any of the other party's affiliates or contractors, nor any abbreviations thereof, or of any staff member, faculty member, student, or employee of the other party in connection with any products, publicity, promotion, financing, advertising, or other public disclosure without the express prior written permission of an authorized official of the other party.

IX. Force Majeure

Neither party shall be responsible for delays or failures in performance resulting from occurrences beyond the control of such party. Such occurrences shall include but not be limited to acts of God, strikes, lockouts, riots, acts of war, epidemics, pandemics, governmental regulations imposed after the date of this Agreement, fire, communication line failures, power failures, earthquakes, or other disasters. In the event of any such occurrences, the time for performance of the party affected thereby will be extended by the same number of days as the time of delay resulting from such occurrences.

X. Independent Contractors

Nothing contained in this Agreement shall be construed to imply a joint venture, partnership, or principal-agent relationship between the parties hereto, and neither party shall, by virtue of this Agreement, have any right, power, or authority to act or create any obligation, expressed or implied, on behalf of the other party. Neither shall this Agreement be construed to create rights or obligations, expressed or implied, on behalf of or for the use of any parties other than CCBC and CSU; and CCBC and CSU shall not be obligated, separately or jointly, to any third parties by virtue of this Agreement.

XI. Non-Discrimination

There shall be no discrimination on the basis of age, race, color, religion, sex, disability, gender identity, veteran status, sexual orientation, marital status, genetic information, national origin, or any other legally protected status in either the selection of students for participation in the Pathways to Success or as to any actions taken pursuant to this Agreement.

XII. Amendments

This Agreement represents the entire and integrated agreement between the parties and supersedes all prior negotiations, representations, or agreements, either written or oral. This Agreement may be amended only by written instrument signed by both parties.

XIII. Non-Waiver

The failure of either party to insist, in any one or more instances, on the performance of any of the terms, covenants, or conditions of this Agreement, or to exercise any of its rights, shall not be construed as a waiver or relinquishment of such term, covenant, condition or right with respect to further performance.

XIV. Severability

Each provision of this Agreement shall be deemed to be a separate, severable, and independently enforceable provision. The invalidity of any provisions shall not cause the invalidity of the remaining provisions hereof.

XV. Enforcement

The failure of either party to insist upon strict performance of any of the terms or conditions of this Agreement, or to exercise any rights or remedies, shall not be construed as a waiver of its right to assert any of the same or to rely on any such terms or conditions at any time thereafter.

XVI. Counterparts

This Agreement may be executed in counterparts and each counterpart shall be deemed an original.

XVII. Assignment

Neither party shall assign or delegate this Agreement without the prior written consent of the other.

XVIII. Applicable Law

This Agreement, and all claims arising out of or relating to this Agreement, whether sounding in contract, tort, or otherwise, shall be governed in all respects by the laws of the State of Maryland, without reference to its conflicts of laws rules. CCBC and CSU expressly consent and submit to the exclusive jurisdiction of any court of competent jurisdiction in the State of Maryland.

IN WITNESS WHEREOF, in consideration of the mutual promises and covenants contained herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereby evidence their agreement to the above terms and conditions by having caused this Agreement to be executed and delivered on the day and year indicated above.

Sandra L. Kurtinitis, Ph.D.
President
Community College of Baltimore County

April 8, 2022
Date

Anthony L. Jenkins, Ph.D.
President
Coppin State University

March 28, 2022
Date

Joaquin G. Martinez, Ph.D.
Provost and Vice President for Instruction
Community College of Baltimore County

April 8, 2022
Date

Leontye L. Lewis, Ed.D.
Provost and Vice President for
Academic Affairs
Coppin State University

3/28/2022
Date

ACADEMIC PROGRAM ARTICULATION AGREEMENT

BETWEEN

COMMUNITY COLLEGE OF BALTIMORE COUNTY
AND
COPPIN STATE UNIVERSITY

REGARDING TRANSFER FROM

I CCBC Computer Engineering, Associate of Science in Engineering
II CCBC Cybersecurity, Associate of Applied Science
III CCBC Computer Science, Associate of Science
IV CCBC Mathematics, Science Area of Concentration, Associate of Science

TO

CSU Cybersecurity Engineering BS Degree Program

This Academic Program Articulation Agreement ("Agreement") is entered into by and between **Community College of Baltimore County, CCBC Catonsville** (the "Sending Institution") and Coppin State University (the "Receiving Institution") (collectively, the "Institutions") to facilitate the transfer of academic credits from AS in

I CCBC Computer Engineering, Associate of Science in Engineering
II CCBC Cybersecurity, Associate of Applied Science
III CCBC Computer Science, Associate of Science
IV CCBC Mathematics, Science Area of Concentration, Associate of Science

CCBC Catonsville, MD 21228 for the completion of a BS in **CSU Cybersecurity Engineering BS Degree Program** at Coppin State University.

A. Qualifying Students

This Agreement pertains to the transfer of "Qualifying Students", *i.e.*, those students who:
1. Have successfully completed the program at the Sending Institution;
2. Are enrolled in the Sending Institution, in good standing; and
3. Are accepted for admission into the Receiving Institution
4. Earn a grade of "C" or higher in all transferrable courses

B. Responsibilities of the Institutions

The Institutions agree to implement the transfer of Qualifying Students in accordance with applicable law and the following requirements and protocols:

1. A Qualifying Student may transfer from the Transferring Institution into the Receiving Institution for the completion of the Program.

2. Courses that the Receiving School will accept credits towards completion of the Program include those as provided on Attachment A to this agreement.

3. The Receiving Institution shall designate, and shall provide to the Sending Institution, the contact information for a staff person at the Receiving Institution who is responsible for the oversight of the transfer of Qualifying Students. The Sending Institution shall designate, and shall provide to the Receiving Institution, the contact information for a staff person at the Sending Institution who is responsible for the oversight of the transfer of Qualifying Students.

4. The Receiving Institution shall provide access to Occupation Insights (OI) to all admitted transfer students from the Sending Institution. The OI platform provides students with labor market information related to the various disciplines. This information assists students with mapping out their career pathways.

5. The Receiving Institution shall provide Guaranteed Admission to students from the Sending Institution who meet all admission requirements.

COMMUNITY COLLEGE OF BALTIMORE: COUNTY, CATONSVILLE

Dr. Joaquin G. Martinez
Provost and Vice President of Instruction
jmartinez@ccbcmd.edu
443.840.1020

COPPIN STATE UNIVERSITY:

Dr. Pamela Richardson Wilks
Provost & VP, Academic Affairs
pawilks@coppin.edu
(410) 951-3010

Both Institutions agree that should the staff person or position change at an institution the institution will promptly provide new contact information to the partner institution and inform the Maryland Higher Education Commission of the change.

Secondary contact information:

COMMUNITY COLLEGE OF BALTIMORE COUNTY, CATONSVILLE

Jane Mattes MBA, MPS
Dean of Instruction, School of Business, Technology & Law
Accreditation Liaison Officer
jmattes@ccbcmd.edu
443-840-3051

COPPIN STATE UNIVERSITY

Dr. Leontye L. Lewis
Dean, College of Arts & Sciences and Education
llewis@coppin.edu
(410) 951-1297

6. If the Qualifying Student is using federal Title 38 VA Education Benefits (GI Bill® Education Benefits), the Institutions agree to adhere to applicable U.S. Department of Veterans Affairs' regulations, including the regulations governing the awarding prior credit, as regulated under Title 38, Code of Federal Regulations, Sections 21.4253(d)(3) and 21.4254(c)(4).

7. Each Institution agrees to adhere to applicable transfer requirements set forth in the Annotated Code of Maryland and the Code of Maryland Regulations.

8. Each Institution agrees to advise students of transfer opportunities under this Agreement, and to advise students of financial aid opportunities and implications associated with the transfer of credits from the sending to the receiving institution.

   Community College Transfer Scholarship
   Students transferring from College of Baltimore County, CCBC Catonsville to Coppin may be eligible for the Transfer Scholarships offered by Coppin. The Office of Admissions identifies qualified transfer students for the Transfer Scholarship. Entering students must complete the Federal Financial Aid Form (FAFSA) and the Coppin State scholarship application. This merit-based scholarship provides an award of $2000.00 for the academic year ($1000.00) per semester. Students must complete the AA or AS degree to qualify. Ten (10) _CC students transferring to CSU will be guaranteed this scholarship which may be renewed for an additional year. However, all financial aid awards must comply with federal and state eligibility requirements. Students receiving the Community College Transfer Scholarship must maintain full-time enrollment and a grade point average (GPA) of at least 2.50 (4.00 scale).

   Transfer students who have not yet earned the AA or AS degree may be awarded $750.00 per semester. The students must have earned at least 25 credit hours and a 2.70 or better cumulative grade point average from their previous institution(s). Entering students must complete the Federal Financial Aid Form (FAFSA) and the Coppin State scholarship application. A total of fifty students are awarded this renewable scholarship (2 years total) each year.

9. Should either Institution make changes to program requirements, the institution will inform the partner institution as soon as practicable of the modifications, and if practicable of plans to make modifications to program requirements and advise the partner institution of the impact of any changes or proposed changes in a program. (Note: The articulation agreement should be updated to reflect the program changes and forwarded to the Maryland Higher Education Commission.)

C. Term and Termination

1. This agreement shall be effective on the day of December 15, 2023.

2. Either Institution may, at its sole discretion, terminate this Agreement upon delivering thirty (30) days written notice to the other Institution and the Maryland Higher Education Commission. Those students who have transferred into the receiving institution shall not be affected by the termination of this agreement.

3. Both Institutions agree to meet once every three (3) year(s) to review the terms of this agreement.

D. Amendment

1. This Agreement constitutes the entire understanding and agreement of the Institutions with respect to their rights and obligations in carrying out the terms of the Agreement and supersedes any prior or contemporaneous agreements or understandings.

2. This Agreement may be modified only by written amendment executed by both Institutions.

E. Governing Law

This Agreement shall be governed by, and construed in accordance with, the laws of the State of Maryland.

F. Counterparts

This Agreement may be executed in counterparts, each of which shall be deemed to be an original, but all of which, taken together, shall constitute one and the same agreement.

G. Notice of Agreement

1. The Institutions agree to provide a copy of this Agreement, with any amendments, to the Maryland Higher Education Commission.

2. The Institutions agree to provide copies of this Agreement to all relevant individuals and departments of the Institutions, including but not limited to students, academic department chairs participating in the transfer, office of the president, registrar's office, and financial aid office.

H. No Third-Party Beneficiaries

There are no third-party beneficiaries to this Agreement.

I. Representations and Warranties of the Parties

Both Institutions represent and warrant that the following shall be true and correct as of the Effective Date of this Agreement, and shall continue to be true and correct during the term of this Agreement:

1. The Institutions are and shall remain in compliance with all applicable federal, state, and local statutes, laws, ordinances, and regulations relating to this Agreement, as amended from time to time.

2. Each Institution has taken all action necessary for the approval and execution of this Agreement.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their duly authorized representatives.

Community College of Baltimore County, CCBC Catonsville:

By: _____
Dr. Joaquin G. Martinez
Provost and Vice President of Instruction
(President or Chief Academic Officer)

_____
Date

COPPIN STATE UNIVERSITY:

By: _____
Dr. Anthony L. Jenkins
President

_____
Date

TABLE OF COURSE OUTLINE: CCBC vs CSU Cybersecurity Engineering BS Degree Program

Course Outline Reference Links:

1. CCBC Course Out Lines: https://www.ccbcmd.edu/Programs-and-Courses-Finder/Program/cybersecurity (retrieved: 12/04/2022)
2. CSU Course Outlines:
https://catalog.coppin.edu/content.php?catoid=7&catoid=7&navoid=283&filter%5Bitem_type%5D=3&filter%5Bonly_active%5D=1&filter%5B3%5D=1&filter%5Bcpage%5D=1#acalog_template_course_filter (retrieved: 12/04/2022)

I CCBC Computer Engineering, Associate of Science in Engineering to CSU Cybersecurity Engineering BS Degree Program Course Outline: Transfer Courses

CCBC Associate of Applied Science Program (GERs and Core Courses) https://www.ccbcmd.edu/Programs-and-Courses-Finder/Program/computer-engineering	**CSU CYSE BS Degree Program** (GERS and Core Courses)
ENGL 101 College Composition I, 3 Credits College Composition I, is a course on critical thinking, reading, and composing practices with an emphasis on integrating appropriate research and academic documentation. Students develop rhetorical strategies, employing writing processes to compose for a variety of purposes and audiences. **CMNS 101- Fundamentals of Communication 3 Credits** Introduces the study of human communication. Students develop an understanding of the theoretical principles of verbal and non-verbal interaction by analyzing and applying these principles in a variety of communication contexts. Areas of study include intrapersonal, interpersonal, cross-cultural, small group, and public speaking. **CHEM 131 -General Chemistry I 4 Credits** Includes the study of atomic structure, nomenclature, chemical reactions and equations, stoichiometry, thermochemistry, chemical bonds, and chemical structures; this course is typically taken by science, health professionals, and engineering majors. The laboratory experience in this course develops knowledge of chemical concepts, experimentation, and of laboratory instruments and techniques. **MATH 251 - Calculus I 4 Credits** Covers functions, limits, continuity, derivatives, derivative algorithms, linear approximations, optimization, and other applications, area under a	**ENGL 101 English Composition I, 3 Credits** The study of usage, mechanics, rhetoric, the elements of composition, and appropriate readings for the purpose of developing the ability to write clear expository prose. Topics for essays derived from critical reading and class discussions of selections from the reader. **SPCH 105 Speech Communications 3 Credits** Focuses on both the theory and the practice of rhetoric. Students critique historically significant speech texts and other forms of public rhetoric. They also present speeches adapted to particular genres, audiences, purposes, and occasions. **CHEM 101 - General Chemistry I 4 Credits** A systematic study of the principles, laws, and theories of modern chemistry, treating such topics as properties of elements and compounds, bonding, stoichiometry, gas laws, and electronic structure. In the laboratory, emphasis is placed on accurately collecting, recording, and reporting data as well as developing other laboratory techniques. **MATH 201 - Calculus I 4 Credits** Review of function concepts, limit. and continuity of a function; derivative of a function; differentiability and continuity;

curve, definite integrals, the Fundamental Theorem of Calculus, Mean Value Theorem, Rolle's Theorem, Intermediate Value Theorem.	derivatives of algebraic, composite, power, sine and cosine functions; implicit differentiation; maxima and minima; Rolle's Theorem and the Mean Value Theorem; differentials, anti-differentiation, integration, the definite integral, the Fundamental Theorem of Calculus; applications, approximate integration.
MATH 252 Calculus II 4 Credits Covers antiderivatives, approximation techniques for definite integrals, integration techniques, improper integrals, applications of definite integrals, infinite series, power series, Taylor series, and introduction to differential equations	**MATH 202 - Calculus II 4 Credits** Differentials and differential formulas, anti-differentiation, the definite integral, the Fundamental Theorem of Calculus, applications of the definite integral, differential equations with variables separable; differentiation and integration of logarithmic, exponential, and trigonometric functions; techniques of integration. Indeterminate forms, L'Hopital's Rule, infinite sequences and series
PHYS 151 - General Physics I 4 Credits Covers Newtonian mechanics, kinematics, and dynamics of translational, rotational, and simple harmonic motions; momentum, energy, and gravitation.	**PHYS 303 - Mechanics and Particle Dynamics– Calculus Based 4 Credits** A study of vectors, linear and circular motion, force and energy, principles of mechanics, collisions, harmonic motion, rotation, and gravitation.
SOCL 101 - Introduction to Sociology 3 Credits Examines how social conditions and cultural values affect peoples' life chances, problems and predicaments; covers basic concepts such as culture, socialization, social inequality, social power, deviance, social control, and institutions.	**SOCI 201 - Introduction to Sociology 3 Credits** An introduction to the systematic study of society, including a study of the major concepts in sociology and the scientific approach in dealing with social phenomena.
ENSC 101 Introduction to Engineering Design 3 Credits Introduces students to the engineering design process, engineering disciplines, analytical analysis utilizing trigonometry, and graphical representation. Through classroom and lab assignments, students develop basic engineering and communication skills; students work in teams to design and build a project by utilizing engineering principles and appropriate software.	**CYSE 101: Introduction to Engineering 3 Credits** Components, Quantities, and Units; Series Circuits; Digital Concepts; Number Systems and Programming Concepts.
PHYS 251 General Physics II 4 Credits Includes electricity and magnetism, kinetic theory, thermodynamics, thermal energy, and heat transfer.	**PHYS 304 - Heat, Electricity, and Magnetism–Calculus Based 4 Credits** A continuation of PHYS 303, covering such

	topics as thermodynamic kinetic theory, electricity, magnetism, electrodynamics, Maxwell's equation, and electrodynamics

II CCBC Cybersecurity, Associate of Applied Science to CSU Cybersecurity Engineering BS Degree Program
Course Outline: Transfer Courses

CCBC Associate of Applied Science Program (GERs and Core Courses) https://www.ccbcmd.edu/Programs-and-Courses-Finder/Program/cybersecurity	**CSU CYSE BS Degree Program** (GERS and Core Courses)
ENGL 101 College Composition I, 3 Credits (https://www.ccbcmd.edu/Programs-and-Courses-Finder/course/ENGL/101) College Composition I, is a course on critical thinking, reading, and composing practices with an emphasis on integrating appropriate research and academic documentation. Students develop rhetorical strategies, employing writing processes to compose for a variety of purposes and audiences. **CMNS 101- Fundamentals of Communication** **3 Credits** Introduces the study of human communication. Students develop an understanding of the theoretical principles of verbal and non-verbal interaction by analyzing and applying these principles in a variety of communication contexts. Areas of study include intrapersonal, interpersonal, cross-cultural, small group, and public speaking. **BIOL 108- Investigating the Living World** **3 Credits** Provides a general overview of the basic principles of biology, an introduction to scientific thought, and methodology, and necessary skills for science literacy. Topics include human biology, cell structure and function, evolution, genetics, and ecology.	**ENGL 101 - English Composition I** **3 Credits** The study of usage, mechanics, rhetoric, the elements of composition, and appropriate readings for the purpose of developing the ability to write clear expository prose. Topics for essays derived from critical reading and class discussions of selections from the reader. **SPCH 105 Speech Communications** **3 Credits** Focuses on both the theory and the practice of rhetoric. Students critique historically significant speech texts and other forms of public rhetoric. They also present speeches adapted to particular genres, audiences, purposes, and occasions. **BIOL 101 - Biological Science 4 Credits** The principles and concepts of biology with an explanation of how they may be applied to the interpretation of natural phenomena, concentrating on topics representing a cross-section of the biology disciplines. OR **BIOL 106 Fund. Cell Biology.**

MATH 163 - Pre-Calculus I 3 Credits Explores the nature and scope of college mathematics through the study of functions. Topics include the study of polynomial, rational, radical, piece-wise defined, and absolute value functions and their graphs and applications as well as modeling with these functions. Additional topics include complex numbers, the binomial theorem, inverse functions, operations with functions, and exponential and logarithmic functions and their graphs and applications. **SOCL 101 - Introduction to Sociology** **3 Credits** Examines how social conditions and cultural values affect peoples' life chances, problems and predicaments; covers basic concepts such as culture, socialization, social inequality, social power, deviance, social control, and institutions. **DCOM 211- Introduction to Firewalls** **3 Credits** Provides the information and skills necessary for students to design, implement, and maintain firewall systems. This course is designed for students who plan to evaluate, implement, and administer networked-based firewalls.	**MATH 131 - College Algebra for Mathematics and Science Majors, 3 Credits** Real numbers field; sets of real numbers; linear equations and inequalities, absolute value; exponents; radicals; polynomials and roots of polynomial equations; complex numbers; linear, quadratic, rational, and radical functions; systems of equations with two variables; methods of combining functions; inverse functions, the Cartesian plane, and graphs of equations and inequalities; exponential and logarithms functions and equations. **SOCI 201 - Introduction to Sociology** **3 Credits** An introduction to the systematic study of society, including a study of the major concepts in sociology and the scientific approach in dealing with social phenomena. **CYSE 393: Introduction to Network Security** **3 Credits** Cryptography applications in networks. Firewalls architectures, VPNs, network and routing protocols, DNS, e-mail, and wireless network security.

III CCBC Computer Science, Associate of Science to CSU Cybersecurity Engineering BS Degree Program Course Outline: Transfer Courses

CCBC Computer Science, Associate of Science (GERs and Core Courses) https://www.ccbcmd.edu/Programs-and-Courses-Finder/Program/computer-science	**CSU CYSE BS Degree Program** (GERS and Core Courses)
ENGL 101 College Composition I, 3 Credits College Composition I, is a course on critical thinking, reading, and composing practices with an emphasis on integrating appropriate research and academic documentation. Students develop rhetorical strategies, employing writing processes to compose for a variety of purposes and audiences. **MATH 251 - Calculus I 4 Credits** Covers functions, limits, continuity, derivatives, derivative algorithms, linear approximations, optimization, and other applications, area under a	**ENGL 101 English Composition I, 3 Credits** The study of usage, mechanics, rhetoric, the elements of composition, and appropriate readings for the purpose of developing the ability to write clear expository prose. Topics for essays derived from critical reading and class discussions of selections from the reader. **MATH 201 - Calculus I 4 Credits** Review of function concepts, limit. and continuity of a function; derivative of a

curve, definite integrals, the Fundamental Theorem of Calculus, Mean Value Theorem, Rolle's Theorem, Intermediate Value Theorem. **CCBC GERS** Arts and Humanities 6 Credit(s). Social and Behavioral Sciences 6 Credit(s). Biological and Physical Sciences (one course must include a lab) 7-8 Credit(s). **CCBC Program Requirements:** CSIT 214 - C++ Programming, 4 Credits MATH 252 - Calculus II, 4 Credits MATH 257 - Linear Algebra, 4 Credits **CCBC Program Electives** DCOM 150 - Digital Forensics I ENGL 102 - College Composition II MATH 165 - Pre-Calculus II	function; differentiability and continuity; derivatives of algebraic, composite, power, sine, and cosine functions; implicit differentiation; maxima and minima; Rolle's Theorem and the Mean Value Theorem; differentials, anti-differentiation, integration, the definite integral, the Fundamental Theorem of Calculus; applications, approximate integration. **CSU GERs** Arts and Humanities 6 Credit(s). Social and Behavioral Sciences 6 Credit(s). Biological and Physical Sciences (one course must include a lab) 7-8 Credit(s). **CSU Program Requirements:** CYSE 221 C++ Programming, 3 Credits MATH 202 - Calculus II, 4 Credits MATH 301 - Linear Algebra, 3 Credits **CSU CYSE GERs and Core Courses** CYSE 495 MIS Digital Forensics ENGL 102 Composition II MATH 132 Pre-Calculus

IV CCBC Mathematics, Science Area of Concentration, Associate of Science to CSU Cybersecurity Engineering BS Degree Program Course Outline: Transfer Courses

CCBC Mathematics, Science Area of Concentration, Associate of Science (GERs and Core Courses) https://www.ccbcmd.edu/Programs-and-Courses-Finder/Program/mathematics-science-area-of-concentration	**CSU CYSE BS Degree Program** (GERS and Core Courses)
ENGL 101 College Composition I, 3 Credits (https://www.ccbcmd.edu/Programs-and-Courses-Finder/course/ENGL/101) College Composition I, is a course on critical thinking, reading, and composing practices with an emphasis on integrating appropriate research and academic documentation. Students develop rhetorical strategies, employing writing processes to compose for a variety of purposes and audiences.	**ENGL 101 English Composition I, 3 Credits** The study of usage, mechanics, rhetoric, the elements of composition, and appropriate readings for the purpose of developing the ability to write clear expository prose. Topics for essays derived from critical reading and class discussions of selections from the reader.

CMNS 101- Fundamentals of Communication3 Credits Introduces the study of human communication. Students develop an understanding of the theoretical principles of verbal and non-verbal interaction by analyzing and applying these principles in a variety of communication contexts. Areas of study include intrapersonal, interpersonal, cross-cultural, small group, and public speaking. **MATH 251 - Calculus I 4 Credits** Covers functions, limits, continuity, derivatives, derivative algorithms, linear approximations, optimization, and other applications, area under a curve, definite integrals, the Fundamental Theorem of Calculus, Mean Value Theorem, Rolle's Theorem, Intermediate Value Theorem. **PHYS 151 - General Physics I 4 Credits** Covers Newtonian mechanics, kinematics, and dynamics of translational, rotational, and simple harmonic motions; momentum, energy, and gravitation. **PHYS 251 General Physics II 4 Credits** Includes electricity and magnetism, kinetic theory, thermodynamics, thermal energy, and heat transfer **CCBC GERS Electives** Arts and Humanities 3 Credits. Social and Behavioral Sciences 6 Credits. **CCBC Program Requirements:** MATH 252 - Calculus II, 4 Credits MATH 257 - Linear Algebra, 4 Credits	**SPCH 105 Speech Communications 3 Credits** Focuses on both the theory and the practice of rhetoric. Students critique historically significant speech texts and other forms of public rhetoric. They also present speeches adapted to particular genres, audiences, purposes, and occasions. **MATH 201 - Calculus I 4 Credits** Review of function concepts, limit. and continuity of a function; derivative of a function; differentiability and continuity; derivatives of algebraic, composite, power, sine and cosine functions; implicit differentiation; maxima and minima; Rolle's Theorem and the Mean Value Theorem; differentials, anti-differentiation, integration, the definite integral, the Fundamental Theorem of Calculus; applications, approximate integration. **PHYS 303 - Mechanics and Particle Dynamics– Calculus Based 4 Credits** A study of vectors, linear and circular motion, force and energy, principles of mechanics, collisions, harmonic motion, rotation, and gravitation. **PHYS 304 - Heat, Electricity, and Magnetism–Calculus Based, 4 Credit(s)** Covering such topics as thermodynamic kinetic theory, electricity, magnetism, electrodynamics, Maxwell's equation, and electrodynamics. **CSU GERs** Arts and Humanities 3 Credit(s). Social and Behavioral Sciences 6 Credit(s). **CSU Program Requirements:** MATH 202 - Calculus II, 4 Credits MATH 301 - Linear Algebra, 3 Credits

Coppin State University
College of Arts and Sciences
Department of Mathematics and Computer Science (MCS)
Cybersecurity Engineering Program Sheet

Directions: Use this form to plan your course schedule based on the program course offerings. Each semester, you should meet with an advisor and submit both this checklist advisement form and the computerized audit form printed from EagleLinks. Remember to apply for graduation when registering for your final semester. A student must graduate with no less than 120 credits, even if all requirements have been completed.

Name_____ **ID #**_____ **Semester Entered**_____

Gen Ed – Category 1: English (6 hrs.)

		Credit	Grade
ENGL 101 Composition I		3	
ENGL 102 Composition II		3	

Gen Ed – Category 2: Hum & Fine Arts (15 hrs.)

WLIT 207 World Lit or any 200 level English		3	
SPCH 105 Speech Comm or 202 or 204		3	
IDIS 102 or 103 Vis Arts& Theatre or Music 201 or Dance 226		3	
HIST 201 World Hist I or 203 US Hist I or 205 African Am Hist I		3	
HIST 202 World Hist II or 204 US Hist II or 206 African Am Hist II		3	

Gen Ed – Category 3: Social and Behavioral (6 hrs.)

SOCI 201 Intro to Sociology		3	
PSYC 201 General Psychology		3	
ECON 103 Intro Bus & Ent		3	
ECON 201 Intro into economics		3	

Gen Ed – Category 4: Mathematics (3 hrs.)

		Credit	Grade
MATH 131 College Algebra		3	

Gen Ed – Category 5: Natural Sciences, PSYC & PHYS (9 hrs.)

BIOL 101 Gen Biology		4	
CHEM 101 Gen Chem or 103 chemistry for health sciences		3	
PHYS 303 Mechanics & Dynamics		3	
PHYS 304 Heat, Electricity & Magnetism		3	
PHSC 103 Tech & Human affairs		3	

Gen Ed – Category 6: Interdisciplinary (3 hrs.)

Health/ Wellness HEED 101, 102, 105, 110		3	
ORIE 101 Freshman Seminar		1	

GERs (42hrs): https://catalog.coppin.edu/preview_program.php?catoid=3&poid=141&returnto=portfolio&in_portfolio=1

Cybersecurity Engineering Core (65 hrs.)

CYSE 101 Introduction to Engineering		3	
CYSE 107 Intro.to Cybersecurity Engineering		3	
CYSE 391 Defensive Programming		3	
CYSE 301 Digital Electronics		3	
CYSE 386 Information Assurance		3	
CYSE 393 Introduction to Network Security		3	
CYSE 394 Network and Protocols		3	
CYSE 491 Hacking of Unix Binaries		3	
CYSE 411 Secure Software Engineering		3	
CYSE 424 Security Artificial Intelligence		3	
CYSE 425 Secure RF Communication		3	
CYSE 426 Secure Medical Info. Systems I		3	
CYSE 495 MIS Digital Forensics		3	
CYSC 428 Secure Medical info Systems II		3	

Cybersecurity Engineering Core Contd…

CYSE 450 Cyber Vulnerability Lab		1	
CYSE 459 Senior Adv. Design Project		2	
CYSE 496 Engineering Senior Seminar.		3	
CYSE 497 CPS Medical Systems		3	
CYSE 485 Security Tools for Info		3	
COSC 220 Computer Science I		4	
COSC 310 Systems Programming		3	
COSC 221 or CYSE 221 C++ Progrmng		4	
Mathematics Core (15 hrs)			
MATH 132 Pre-calculus		4	
MATH 201 Calculus I		4	
MATH 202 Calculus II		4	
MATH 301 Linear Algebra		3	

General Electives Selection made by students

Grand Total **122 Credits hrs.**

COPPIN STATE UNIVERSITY
EST. 1900

OFFICE OF THE PROVOST & VICE PRESIDENT FOR ACADEMIC AFFAIRS
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MEMORANDUM

TO: Tegwa Fadl Alla
Education Analyst, Program Review
Maryland Higher Education Commission

FROM: Michael Bowden
Assistant Vice President for Planning & Assessment

SUBJECT: Explanation for Exceeding 120 Credits – B.S. Cybersecurity Engineering

DATE: January 3, 2023

CC: Dr. Pamela Wilks, Provost & Vice President for Academic Affairs
Dr. Leontye Lewis, Dean, College of Arts & Sciences and Education
Dr. Atma Sahu, Chair, Department of Mathematics and Computer Science

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The following memorandum is in response to your inquiry below:

i. *Coppin State University listed the total credit hours of the programs as 122. The standard credit hours of a Bachelor of Science is 120. Please indicate your justifications for exceeding the limit of the bachelor program total credits requirements.*

Response:

The B.S. in Cybersecurity Engineering proposal is designed to meet the accreditation standards of the Accreditation Board of Engineering Technology (ABET) and critical needs of the labor force. To have a successful future application to the Board, it is necessary to include the three rigidly-sequenced 4 credit undergraduate-level courses, which causes the increase of two (2) additional credits in question, over the 120 credits.

MATH 132 Pre-calculus	4
MATH 201 Calculus I	
MATH 202 Calculus II	4
	4

Additionally, these three Calc-mathematics courses are needed to ensure that students entering cybersecurity core courses possess prerequisites and prior mathematics-foundation knowledge in an orderly sequenced manner.

I hope this information is helpful. Please let me know if additional information is needed.