



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

Institution Submitting Proposal	
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Each action below requires a separate proposal and cover sheet.

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

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

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

President/Chief Executive	Type Name:
	Signature: Date: 5/15/2024

	Date of Approval/Endorsement by Governing Board:
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ANNE ARUNDEL COMMUNITY COLLEGE

101 College Parkway | Arnold, Maryland 21012-1895 | 410-777-AACC (2222) | www.aacc.edu



Dr. Dawn Lindsay

President

410-777-1177

dslindsay@aacc.edu

May 15, 2024

Dr. Sanjay Rai
Acting Secretary of Higher Education
Maryland Higher Education Commission
6 N. Liberty Street
Baltimore, MD 21201

Dear Dr. Rai:

Anne Arundel Community College is requesting approval of a new Cloud Computing Transfer, Associate of Science degree. Please see the attached proposal that supports this request.

If you have any questions, please contact Dr. Tina Smith, Associate Vice President for Learning at ksmith56@aacc.edu or (410) 777-2776.

We appreciate the Maryland Higher Education Commission's consideration of this request.

Sincerely,

A handwritten signature in black ink, appearing to read 'D. Lindsay', written in a cursive style.

Dr. Dawn Lindsay
President

cc: Tanya Millner, Ed.D., Provost/Vice President for Learning
Tina Smith, Ph.D., Associate Vice President for Learning
Lance Bowen, Ph.D., Dean, Science, Technology, and Education
Nanci Beier, M.A., Registrar
Tara Carew, M.B.A., M.Ed., Director, Financial Aid

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Cloud Computing Transfer, Associate of Science

A. Centrality to Institutional Mission and Planning Priorities:

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

Consistent with the mission of Anne Arundel Community College (AACC) to respond to the needs of our diverse community by offering high quality, affordable, accessible, and innovative lifelong learning opportunities, this proposal demonstrates the need for the establishment of the Cloud Computing Transfer, Associate of Science (A.S.) program. The program is committed to quality through curriculum and workforce alignment, program assessment, faculty evaluations and student feedback through evaluations. It has the power to be transformative by leading to lucrative jobs for our graduates; and by creating a highly skilled, credentialed workforce for the community.

The Cloud Computing Transfer, A.S. program provides a solid information technology foundation for those students transferring to four-year colleges and universities to pursue a bachelor's and/or master's degree in cloud engineering. Cloud computing is a type of computing technology that relies on sharing computing resources owned by third-party companies. These resources are made available to individual subscribers, usually at a lower cost than purchasing the resources. Cloud computing allows subscribers to utilize resources to build infrastructure, platforms, and software applications in a secure environment. It also allows companies to establish private cloud environments to support employees' access to company resources from anywhere at any time. This program builds on the collaboration with industry leaders such as the Amazon Web Services Academy (AWS) curriculum and Microsoft Azure.

There is a growing interest and demand for skilled professionals in the cloud computing job market. The worldwide cloud computing industry was estimated at nearly \$370 billion in 2022, and it is anticipated to grow at an annual rate of 15.7% from 2022 to 2030, exacerbating workforce shortages. As such, students and incumbent workers are seeking formal training in supporting cloud-based implementations and transitions of existing information systems.

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

AACC is committed to helping students achieve their educational goals, which is the theme of AACC's strategic plan. Every decision is grounded in how students can be helped to achieve academic excellence and remain engaged with their own goals.

The college's strategic plan, *Engagement Matters II: Excellence through Innovation*, focuses on creating the ideal conditions to ensure that more students complete their educational goals and earn family-sustaining wages. The college is pursuing this plan while adhering to the mission's central tenet of committing to academic excellence, which is the fundamental foundation upon which the work and continued reputation as a college of distinction is built.

The proposed degree will enhance collaboration with industry leaders such as AWS and Azure and expand the pathway for students to a wide range of transfer degree opportunities. In particular, this new program strongly supports the college's strategic goals of progress and completion.

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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.)

The funding required to support expenses for this program already exist in the college's operating budget and will continue to be adequately funded for the first five years of program implementation. No additional funding is required except for the cost associated with providing additional faculty coverage should enrollment grow.

4. Provide a description of the institution's a commitment to:
 - a) Ongoing administrative, financial, and technical support of the proposed program.

Anne Arundel Community College is committed to the ongoing administrative, financial, and technical support for this program. This program will be implemented by AACC's Department of Cybersecurity, Networking and Digital Forensics. Existing resources within the department are adequate to support Cloud Computing. Technical support will be provided by the onsite technical call center through AACC's Information and Instructional Technology (IIT) division. The college's Idea Lab will provide support and maintenance of the college's learning management system (LMS).

This academic proposal is proceeding with the full support of the department chair, assistant dean, dean and provost/vice president under which the program was developed. The program also has the full support of the offices of the president and Board of Trustees.

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

Anne Arundel Community College is committed to providing all students with an opportunity to complete their program of study. Students may elect to graduate from a program by meeting the curriculum requirements as outlined in the catalog in effect during their initial enrollment. The academic department will provide all students affected by such decisions with assistance in choosing appropriate courses and programs for completion.

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

The field of cloud computing continues to have a demonstrated need for highly skilled workers. With the approval of this program, AACC (as an open access institution) will be particularly well- positioned to offer a certificate that seamlessly transfers into an associate degree, and ultimately into a bachelor's degree program. There is a growing interest and demand for skilled professionals in the cloud computing job market. The worldwide cloud computing industry was estimated at nearly \$370 billion in 2022, and it is anticipated to grow at an annual rate of 15.7% from 2022 to 2030, exacerbating workforce shortages. This certificate is designed for incumbent workers who are seeking formal training in supporting cloud-based

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implementations and transitions of existing information systems.

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

This program greatly expands the educational opportunities and choices for minority and educationally disadvantaged students in the county and beyond. As an open access institution, approval of this proposal will position AACC to draw on the county's increasingly diverse populations to recruit students with an aptitude to develop the requisite skills and cultural competencies for functioning effectively and appropriately in their field of choice. As of fall 2022, over 43% of credit students at the college identified as racial/ethnic minorities. While many in the county prosper, there is also an increasing income gap among residents, with 6.2% living below the poverty level (U.S. Census, Quick Facts Anne Arundel County, July 2022). The percentage of overall students receiving Pell grants in fall 2022 was 21.8%.

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

Not applicable

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

The 2022 Maryland State Plan for Higher Education outlines three primary goals for the higher education community in Maryland. One of the goals is to ensure equitable access to affordable and high-quality postsecondary education for all Maryland residents.

In addition, another goal is promoting and implementing practices and policies that will ensure student success. According to the Maryland Education Code Ann. § (10-204) public institutions of higher education are required to teach and train students for careers and provide public services for citizens of the State. This program will meet an existing need in for highly skilled employees in the information technology sector.

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.

The proposed degree is under the Department of Cybersecurity, Networking, and Digital Forensics and was developed for individuals that intend to specialize in supporting cloud-based implementations and transitions of existing information systems. As an in-demand major in the information technology field, the cloud computing program will provide a firm foundation for students who will continue their education to a bachelor's degree.

Prospective students may be already employed in the industry (career switchers or builders) but may not have the respective formal training or are using older methodologies, as well as for high school graduates (career starters).

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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 Career One Stop (sponsored by the U.S. Department of Labor) reports the computer network architecture profession¹ has a faster than average job outlook when compared to other occupations and will see a 6% increase from 2020-2030, with an average salary currently at \$116,780. Searches on websites such as Indeed.com, which includes jobs from the private and public sectors, consistently demonstrate hundreds of job postings within the region. This program will provide quality information technology professionals that help business and industry address shortages in the workforce.

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.

According to www.onetonline.net there were over 350,000 jobs related to cloud computing in Maryland with projected job openings from 2020-2030 to increase 5% each year². Currently, there are many job postings within a fifteen-mile radius of Arnold, MD based on the job search engine Indeed.com, which includes jobs from private and public sector. Many of those openings are expected to result from the need to replace workers who transfer to different occupations or exit the labor force, such as to retire.

¹ <https://www.careeronestop.org/Toolkit/Careers/Occupations/occupation-profile.aspx?keyword=Computer%20Network%20Architects&location=UNITED%20STATES&onetcode=15124100>

² <https://www.onetonline.org/link/summary/15-1244.00>

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The studies below further demonstrate the availability of high salaries for cloud engineers in Maryland.

Study	Salary	Source
Average salary for Cloud Engineer (Glassdoor)	\$111,165	https://www.glassdoor.com/Salaries/cloud-engineer-salary-SRCH_KO0,14.htm
Cloud Engineer Salary in Baltimore, MD (Zip Recruiter)	\$124,559	https://www.ziprecruiter.com/Salaries/Cloud-Engineer-Salary-in-Baltimore,MD
Entry Level Cloud Engineer Salary in Baltimore, MD (Zip Recruiter)	\$82,334	https://www.ziprecruiter.com/Salaries/Entry-Level-Cloud-Engineer-Salary-in-Baltimore,MD

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

Currently, although the need for cloud engineers is significant and is expected to grow even higher over the next decade, only Montgomery College and College of Southern Maryland offer similar programs at the associate degree level. Although the anticipated need for employees in the state is in the thousands, there are only a few hundred students in the respected programs.

The number of graduates for this cloud computing degree is projected to be ten by year two, with the expectation of doubling this number to 20 by year five.

According to the MHEC Institution Program Inventory³, there are two other community colleges in Maryland that offer a program of a similar title and CIP code. These programs graduated a total of 301 students between 2014 and 2021 according to trend data from MHEC (see below). This is well below the projected national and state of Maryland job annual openings.

Supply of Graduates from Comparable Maryland Programs

Institution	Program Name (CIP)	2014	2015	2016	2017	2018	2019	2020	2021
College Southern MD	Cloud and Information Tech A.A.S. (11.0103)	30	29	21	18	21	17	13	11
Montgomery College	Cloud Computing & Networking Tech A.A.S. (15.1202)	19	22	17	13	18	15	19	18

D. Reasonableness of Program Duplication:

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

There are only a couple of related programs in the state of Maryland. Given the high demand for skilled workers in this industry, there is not a concern about program duplication.

³ https://mhec.maryland.gov/institutions_training/Pages/HEPrograms.aspx

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- The College of Southern Maryland offers a 60-credit Cloud and Information Technology, A.A.S. degree program that is designed to provide students with the essential technical and communication skills required for entry-level employment in the vast field of cloud and information technology (IT). This program includes coursework that will help students to prepare for entry-level CompTIA certification exams in A+ and Network+. Students also prepare for the Amazon Web Services (AWS) exam in Cloud Practitioner. With further study, students may also be prepared for CompTIA Security+ and AWS Solutions Architect certifications.
- Montgomery College offers a 60-credit Cloud Computing and Networking Technology, A.A.S. degree program that provides students with a broad technical understanding of computer technology, networking, and security, as well as the communication skills and professionalism required of all entry-level IT professionals. In this program, students develop skills in software and hardware installation, network configuration and diagnostics, security and forensics fundamentals, and virtualization and cloud computing implementation, with more of a “hands-on” orientation focused on scenarios in which troubleshooting, and tools must be applied to resolve problems. Montgomery’s program requires program courses and electives in introduction to the Internet of Things, computer concepts, introduction to Cloud computing, microcomputer essentials, introduction to Scripting, introduction to programming, introduction to networking, network and Cloud infrastructure, UNIX/LINUX system administration, network security, Microsoft modern desktops, Cloud architecting, Cloud administration, network visualization and system administrator, and network and Cloud forensics.
- As of 2023, Prince George’s Community College added a Cloud Technologies AAS degree. The courses prepare students for the AWS Certified Solutions Architect - Associate, Microsoft Azure Administrator, and CompTIA Network+ and Cloud+ certification exams. PGCC’s program requires program courses in programming and logic design, introduction to networks – Network+ prep, Microsoft Azure fundamentals, fundamentals in database management, AWS Cloud practitioner, Cloud+ preparation, AWS Cloud computing architecture, Microsoft Azure administration, Linux administration, advanced Cloud security, and systems analysis and project management.

Although the degrees offered by AACC, PGCC, College of Southern Maryland and Montgomery College include Amazon Web Services (AWS) Cloud Practitioner certificate, AACC’s degree also incorporates coursework towards AWS Cloud Solutions Architect, AWS Cloud SysOps Administrator, and AWS Cloud Developer which sets it apart from what other community colleges are offering.

2. Provide justification for the proposed program.

Development of programming in cloud computing was recommended as the result of both the internal department’s academic program review process and by the college’s industry advisory board. This degree will provide a clear pathway for students to enter the field of cloud computing. This degree will adequately prepare students to not only transfer to a four-year institution in a wide range of majors (cloud computer science, information systems, etc.) but also allow access and entry into the workforce in a variety of settings. Many of the students in our student population would not have the ability or resources to travel that distance to access courses in those programs.

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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.

At this time, this program currently does not impact Maryland's HBIs.

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

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

This program does not impact Maryland's HBIs.

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 describe the faculty who will oversee the program.

The proposed program grew out of the guidelines and directions of the industry advisory board as well as recent program review. Associate Professor Adrian Pringle will serve as program director of the cloud computing program at AACC. He holds a Master of Science in Information Technology as well as several industry certifications. He joined the faculty of AACC in 2014. Please see section I for more information on departmental faculty.

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

Anne Arundel Community College provides programs that meet the ever-changing information technology needs of business and industry and qualify graduates to obtain employment opportunities that provide family-sustaining wages and contribute to quality of life. The cloud computing program teaches a type of computing technology that relies on sharing computing resources owned by third-party companies. Students will learn how to manage the security of cloud deployed applications, utilize resources to build infrastructure, platforms, and software applications in a secure environment. Following are the program outcomes:

- Understand AWS services, functions, and cost.
- Summarize the process of designing cloud-based solutions.
- Design and configure cloud-based services and solutions.
- Secure and manage access to cloud-based networks and services.
- Implement cloud backup, disaster recovery, and business continuity.
- Implement identity and access management schemes.

3. Explain how the institution will:

- a) Provide for assessment of student achievement of learning outcomes in the program

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Anne Arundel Community College is committed to ensuring that its students and graduates are among the best-prepared citizens and workers of the world by offering high quality, affordable, and accessible learning opportunities while also continuing the institution’s excellence, accountability, and continuous learning. To this end, practices and procedures are established to ensure faculty, staff, and administrators systematically assess student learning outcomes at the course, program, and institution levels. All academic departments maintain assessment plans for their programs and courses that outline learning outcomes, curriculum mapping, assessments, and data collection cycles.

Assessments to measure student learning take many forms including exams, research papers and other written assignments, class discussions, performances, and lab exercises. These assessment items are mapped to course-level and program-level learning outcomes. Measures of student learning are aggregated to the appropriate level (course, program, institution) to provide the basis for faculty discussions on curriculum, pedagogy, and assessment. In addition to periodic program-level learning outcomes assessment, all credit degree and certificate programs are reviewed on a 4-year cycle for evidence of: program retention and completion, success in program foundational courses, enrollment, value-added, and assessment practices. Program review also includes a review of program outcomes.

- b) Document student achievement of learning outcomes in the program

Program learning outcomes will be assessed through final projects and exams in the program’s required courses. The department documents evidence of student achievement of learning outcomes on a cyclical basis in the college’s assessment management system. Documentation includes learning outcomes, curriculum maps, assessment plans, findings (data and analysis), and action plans.

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

General Education Requirements: 31 credits	
Course	Number of Credit Hours
English Composition: 6 credits	
ENG 101 Academic Writing and Research 1	3
ENG 102 Academic Writing and Research 2	3
<i>ENG 101 and ENG 101A are equivalent courses. Students may take ENG 101-ENG 102 or ENG101A-ENG 102 to meet their English Composition General Education requirement.</i>	

Arts and Humanities: 6 credits	
CTP 194 Ethics and the Information Age	3
<i>Students must take CTP 194 and one additional Arts and Humanities course. The second course must be from a discipline other than CTP. See General Education Arts and Humanities Requirements for a list of approved courses.</i>	

Biological and Physical Sciences: 7 credits	
BIO 135 Principles of Nutrition	3

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Students must take BIO 135 and one additional 4-credit lab science. See General Education Biological and Physical Sciences Requirements for a list of approved courses. Students should check their transfer institution for specific course requirements.

Mathematics: 3 credits	
MAT 135 or a higher-level math course	3

Social and Behavioral Sciences: 6 credits	
<i>Students must take two Social and Behavioral Sciences courses from two different disciplines. One course should be used to satisfy the Diversity course requirement (SOC 111 is recommended).</i>	
<i>See General Education Requirements for a list of approved courses.</i>	

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Additional General Education requirements: 3 Credits	
Technology Requirement	
CTS 107 Cyber Essentials	3

Program Requirements: 29 credits	
<i>A grade of C or better is required in each (Cloud Computing Transfer, AS) course requirement.</i>	
Course	Number of Credit Hours
CTS 110 Network Essentials	4
CTS 234 Windows Server	4
CTP 114 Python for Everyone	2
CTS 236 Virtualization & Cloud	4
CTS 237 Cloud Foundation	3
CTS 238 Cloud Developing	3
CTS 239 Cloud Solutions Architect	3
CTS 243 Cloud Operations	3
Electives:	3
<i>Complete 3 credits of electives from any CTA, CTP, CTS, CYB or STM course.</i>	

Diversity Requirement	
Students may satisfy the diversity requirement simultaneously as they satisfy the Social and Behavioral Sciences or Arts and Humanities general education requirement. See Diversity Requirement for a list of approved courses.	

Wellness Requirement	
BIO 135 meets the Wellness requirement for this degree.	

General Education Courses: 31 credits

English Composition: 6 credits

ENG 101 Academic Writing and Research 1: 3 credits

Learn critical writing, reading, and thinking strategies. Write multiple essays, culminating in an instructor-guided research paper. Analyze a variety of texts and identify their cultural, historical, and social contexts. Develop foundational information literacy, academic research, and documentation skills. Prerequisite: Appropriate placement into ENG 101. Note: A grade of C or better is required to satisfy the general education requirement.

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ENG 102 Academic Writing and Research 2: 3 credits

Develop advanced critical writing, reading, and thinking skills. Compose analytical and argumentative essays, culminating in the production of an independent, extensive, multiple-source, fully documented research paper. Analyze a variety of texts through close reading and explore their cultural, historical, and social contexts. Learn advanced research techniques, including formulation of research questions, identification of multiple audiences, analysis of rhetorical situations, and ethical research tactics. Prerequisite: Successful completion of ENG 101/ENG 101A or ENG 101H with a grade of C or better.

Note: A grade of C or better is required to satisfy the general education requirement.

Art and Humanities: 6 credits

CTP 194 Ethics and the Information Age: 3 credits

Analyze ethics and moral philosophy as a means for providing a framework for ethically grounded decision making in the information age.

(Arts and Humanities - Select from approved General Education courses in the college catalog) 3 credits

Biological and Physical Sciences: 7 credits

Students must take BIO 135 and one additional 4-credit lab science. Refer to General Education Biological and Physical Sciences Requirements for a list of approved courses. Students should check their transfer institution for specific course requirements.

BIO 135 Principles of Nutrition: 3 credits

Learn the digestion, absorption, and physiological function of nutrients in the body. Emphasis is placed on normal nutrition and the relationship between nutrients and chronic disease. Nutrition needs of the healthy person through stages of the life span are included. This course does not satisfy a lab science requirement.

Mathematics: 3 credits

MAT 135 or a higher-level math course.

MAT 135 Statistics: 3 credits

Use meaningful data to explore concepts in probability and statistics including measures of central tendency and dispersion. Develop statistical literacy by studying graphical representations of data, discrete and continuous probability distributions, and sampling techniques and theory. Construct and interpret confidence intervals, find lines of best-fit, and perform hypothesis tests for means, proportions, and independence. Technology use is required throughout the course for statistical analyses.

Social and Behavioral Sciences & Diversity: 6 credits

(Select from approved General Education courses in the college catalog): 3 credits

To fulfill this requirement students must take two (2) Social and Behavioral Science general education courses from two different disciplines (6 credits), one of which must be:

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SOC 111 Introduction to Sociology: 3 credits

Learn sociological principles and perspectives as a way of understanding everyday social life. Study meanings and functions of various roles in historical and contemporary societies. Evaluate causes, consequences and comparisons of social hierarchies.

Additional General Education requirements: 3 Credits

CTS 107 Cyber Essentials: 3 credits

Develop an understanding of computer technology within the context of the cyber domain in our connected world. Learn about the basic structure of hardware, software, and network systems, the threats these systems face, and how to defend them. Use hands-on lab experiences to develop the foundational skills needed to maintain and protect computer systems.

Program Requirements: 29 credits

CTS 110 Network Essentials: 4 credits

Learn the fundamental building blocks that form a modern network including protocols, topologies, hardware and network operating systems. Develop the networking knowledge and skills related to TCP/IP, Ethernet, and wireless transmission and security. Learn to maintain and troubleshoot existing local area networks.

CTS 234 Windows Server: 4 credits

Learn the skills needed to install and configure Windows Server. Develop an in-depth knowledge of Windows Server features and services, including Active Directory, Identity Services, User and Computer accounts, Group Policy, and Certificate Services. Manage security, system backup, and network services such as DNS and DHCP.

CTP 114 Python for Everyone: 2 credits

Learn Python variables and expressions and built-in Python functions. Design and implement functions. Learn decision and repetition control structures in Python. Work with Python data structures such as strings, lists, tuples and sets. Learn to read and write to external files.

CTS 236 Virtualization & Cloud: 4 credits

Learn the fundamental principles of virtualization technologies and cloud computing. Build, configure, and implement virtual desktop infrastructures and virtual networks. Identify the technology, architecture, and uses of cloud computing platforms including the application of virtualization in cloud environments.

CTS 237 Cloud Foundation: 3 credits

Develop technical expertise in cloud development using industry standard technologies. Explore cloud computing concepts independent of specific technical roles. Learn cloud concepts, AWS core services, security, architecture, pricing, and support. This course addresses the core material of the AWS Practitioner Examination.

CTS 238 Cloud Developing: 3 credits

Students will gain technical expertise in software development and deploy secure applications in the cloud. Configure programmatic access and identity management. Explain and configure caching and containers. Configure storage programmatically. Design and code event-driven solutions, and Application Programming Interface (API) Gateway.

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CTS 239 Cloud Solutions Architect: 3 credits

Learn the fundamental principles of building a cloud-based infrastructure. Learn cloud technologies by understanding cloud services and how these services fit into cloud-based solutions. Emphasis is placed on best practices for the Cloud, and it recommends various design patterns to help you think through the process of architecting optimal IT solutions.

CTS 243 Cloud Operations: 3 credits

This course prepares students for entry-level DevOps, support, and cloud operations roles. Emphasizing best practices in Cloud operations and recommended design patterns. Students will also learn how to solve problems and troubleshoot various scenarios, how to automate and create repeatable deployments of networks and systems, and covers specific features and tools related to configuration and deployment.

Electives: Complete 3 credits of electives from any CTA, CTP, CTS, CYB or STM course.

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

Please see question four above.

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

Not applicable.

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

Not Applicable

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.

Anne Arundel Community College provides all students with clear, complete, and timely information on the curriculum, course, and degree requirements, nature of faculty/student interactions, 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.

Anne Arundel Community College ensures accuracy of program presentation in advertising, recruiting and admissions materials by using procedural processes through a connected curriculum/catalog software system where content managers and the college catalog editor review and update in a collegial partnership with our Strategic Communications department. If this program is approved, the catalog will present clear and accurate curricular information to include course and degree requirements, available course formats and information about technology

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assumptions about competency, equipment requirements, and the learning management system.

Each student also receives a course syllabus from their instructor that outlines the course content to be covered and the nature of faculty/student interactions as appropriate for that course and course format. For online courses or courses with an online component, students are made aware about assumptions of technology competence and skills, technical equipment requirements, and the College is learning management system (Canvas). This information for each course may be provided via the course syllabus or directly by the instructor during the first few class sessions.

In addition, each new student is encouraged to attend an orientation session, either online or in person. Orientation offers an introduction to all the various aspects of academic and campus life at AACC. Students learn tips for academic success, hear a variety of AACC student success stories, learn more about MyAACC, the student portal, meet faculty members, join a student organization, meet fellow students, and take a campus tour.

Students have access to the complete range of services available at AACC in support of achieving their educational goals. The college website, catalog, and a myriad of other materials outline the comprehensive services available to students: Academic Services, Student Records, Campus Amenities, Careers & Employment, Disability Support Services, Health & Personal Counseling Services, Student Achievement & Success, and Technology.

The majority of AACC credit students receive some form of financial aid, scholarships, or financial support. AACC's Financial Aid & Veterans Benefits office provides financial assistance to students and families, allowing them to participate fully in the total educational experience. More information on how to apply for scholarships and grants is found on the college website, as is information on tuition, fees, and methods of payment.

All admissions and outreach materials are the same for all students, and accurately represent programs and services available. Notice of nondiscrimination and information on Title IX, ADA, and Title 504 contacts are provided.

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.

Anne Arundel Community College ensures accuracy of program presentation in advertising, recruiting, and admissions materials by using procedural processes through a connected curriculum/catalog software system where content managers and the college catalog editor review and update in a collegial partnership with Strategic Communications. Anne Arundel Community College's homepage has links to six major headings, two of which directly apply to college majors and credit courses (earn a degree, certificate, or college credits, and earn college credits while in high school). The main page for each heading has relevant advertising, recruiting and admissions information. In addition, across the top of every page are direct links to Programs & Courses, Apply & Register, Costs & Paying for College, and Resources for

Students, Campus Life & Activities, and About Us.

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H. Adequacy of Articulation

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

AACC coursework transfers to Maryland public institutions based on the rules outlined in the Code of Maryland Regulations (COMAR 13B.06 General Education and Transfer). This program will establish a clear transfer pathway for students. The department will engage and partner with 4-year public and private Maryland institutions to discuss Memoranda of Understanding to ensure seamless transfer. Courses in this program have outcomes that align with similar courses at other Maryland institutions.

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

1. Provide a brief narrative demonstrating the quality of program faculty. Include a summary list of faculty with appointment type, 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 Department of Cybersecurity, Networking, and Digital Forensics at AACC currently employs six full-time faculty. The majority of the courses are taught by the full-time faculty members. The table below provides more information on faculty.

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Name	Terminal Degree, Title and Field	Academic Title	Status	Courses
Adrian Pringle	Master of Science, Information Technology: concentration of Information Security & Assurance	Associate Professor	FT	CTS130 CTS230 CTS231 CTS234 CTS236
Bryan Deehring	MBA, IT Management	Associate Professor	FT	CTS140 CTS240
Mary Wallingsford	Master's Telecommunications Management	Associate Professor	FT	CTS130 CTS131 CTS232 CTS270
Kasia Taylor	MBA, Information Systems	Professor	FT	CTS107
Dawn Ryan	MS, Digital Forensics & Cybercrime Investigations	Professor	FT	CTS140 CTS240
William Seabrook	M.S., Computer Science	Assistant Professor	FT	CTS110 CTS120
Carrie Leary	MBA, Information Technology & International Business	Professor	FT	CTS107 CTS140 CTS242

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

Anne Arundel Community College provides professional development for faculty in pedagogy that includes student-centered, content focused, evidenced-based effective teaching practices that improve student learning. Competency-based faculty professional development learning opportunities occur in a variety of formats including face-to-face workshops, online and hybrid courses, focused signature series programs, and department specific mini workshops. These opportunities are facilitated by internal teaching faculty and expert consultants. A menu of focused faculty development programs aligned to the priorities for the Division of Learning to include a focus on teaching effectiveness and pedagogy is provided yearly. Faculty may select from these signature programs for their required professional development plans.

Anne Arundel Community College faculty development is designed to deepen the faculty member's understanding of concepts, skills, and teaching strategies that lead to substantial learning experiences for students. Faculty content experts engage in professional development opportunities focused on understanding and applying a learner-centered approach to college teaching linking

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theory to practice. Structures and strategies necessary for student learning of challenging content, critical thinking, and collaboration are taught to faculty utilizing adult learning theory and incorporating active learning. Faculty are provided with formal and informal opportunities to collaborate with colleagues and learn in job-embedded contexts for discipline/course-specific content instruction. Faculty are supported in expanding their instructional practices through these formal professional development opportunities and through colleague-to-colleague professional development including learning structures such as mentoring, coaching, teaching squares, book studies, and colleague to colleague observation and feedback. In addition, supervisors routinely provide opportunities for feedback and reflection.

b) The learning management system

All full and part-time faculty teaching online, or hybrid courses must complete Focus on Facilitation, which provides online faculty an introduction to Canvas, an understanding of teaching online and best practices in course design, facilitation, and technology integration. Online Focus- Applied provides faculty an opportunity to build or substantially improve an online or hybrid course utilizing best practices in course design and quality standards. Separate training is also available for faculty only using the learning management system for teaching in a face-to-face mode. In all of these trainings, instruction regarding online pedagogy is both provided and modeled. An emphasis is placed on strategies that facilitate communication, develop higher order thinking and problem-solving skills, and engage learners in the online environment. Clear navigation, explicit instructions, accessibility, and format of appropriate assessments are presented and discussed. Lectures for all didactic courses are placed online through the Canvas system.

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

Faculty content developers work in collaboration with instructional designers to develop online courses that adhere to institutional course design best practices as informed by the essential standards for course design. Additionally, trainings, presentations, demonstrations, and model courses are available to faculty regarding evidenced-based best practices for distance education. In addition, all faculty members, both full and part-time, who will be teaching hybrid or online sections, enroll in and must pass Focus on Facilitation. Online Focus is a semester-length online course building process emphasizing educational practices and best practices in course design offered by the college's Virtual Campus.

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

1. Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program. If the program is to be implemented within existing institutional resources, include a supportive statement by the President for library resources to meet the program's needs.

The college's Andrew G. Truxal Library has a collection of over 148,000 books, 150 print periodicals, and 65 online databases offering access to more than 15,000 electronic journals and magazines, 35,000 electronic books, hundreds of thousands of digital images and hours of streaming video and audio. The library provides access to the Internet for educational research purposes. All textbooks used in the proposed curriculum are available in the library for students to use. The textbooks will be available both to be checked out and in the reference section. Resources are periodically reviewed for current content and availability. Library staff were consulted during the program development phase and determined that adequate resources are available for the students in the proposed program.

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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. If the program is to be implemented within existing institutional resources, include a supportive statement by the President for adequate equipment and facilities to meet the program's needs.

The proposed degree program will be implemented using existing institutional resources (including an academic Data Center) which are adequate to meet the program's needs. The program has the full support of the president and Board of Trustees. No new facilities or resources will be required.

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

AACC provides all students with a student college email address. In addition, there is an electronic mailing system within the Canvas learning management system. Canvas is a robust and comprehensive learning management system that features tools for group discussions as well as private email communication with the instructor and among students. Additionally, they may use any of the other Canvas features such as posting announcements and discussion boards.

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

AACC has an easy-to-use learning management system, Canvas, which students can either learn on their own, virtually attend Canvas online training, or receive help from the helpdesk or instructors. The helpdesk (410-777-HELP) is available during the week and on weekends.

There are also computers in the Truxal Library for student use. Canvas provides the necessary technological support that this certificate needs. All courses have a Canvas course shell in which faculty are required to post their syllabus and to use the Canvas gradebook. Additionally, they may use any of the other Canvas features such as posting announcements and discussion boards. It also features an accessible online gradebook that all instructors are required to use and update regularly. Assignments can be assessed directly in Canvas using easily accessible tools for providing and viewing instructor feedback.

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

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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.

Cloud Computing Transfer					
Resource Categories	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1. Reallocated Funds	\$ 1,306	\$ -	\$ -	\$ -	\$ -
2. Tuition and Fee Revenue	\$ 36,250	\$ 74,820	\$ 96,425	\$ 158,920	\$ 184,005
a. Number FT Students	5	10	10	20	20
b. Annual Tuition and Fee Rate	\$ 3,625	\$ 3,741	\$ 3,857	\$ 3,973	\$ 4,089
c. Total FT Revenue	\$ 18,125	\$ 37,410	\$ 38,570	\$ 79,460	\$ 81,780
d. Number PT Students	5	10	15	20	25
e. Credit Hour Rate	\$ 125	\$ 129	\$ 133	\$ 137	\$ 141
f. Annual Credit Hour Rate	\$ 29	\$ 29	\$ 29	\$ 29	\$ 29
g. Total PT Revenue	\$ 18,125	\$ 37,410	\$ 57,855	\$ 79,460	\$ 102,225
3. Grants contracts other external sources	-	-	-	-	-
4. Other Sources	-	-	-	-	-
Total Revenue	\$ 37,556	\$ 74,820	\$ 96,425	\$ 158,920	\$ 184,005

Financial Data - Resources

Reallocated Funds: Existing resources are available to reallocate to support instruction costs. After the initial year it is anticipated program enrollments will generate sufficient revenue to cover program costs.

Tuition and Fee Revenue: Enrollment for the degree program is expected to start at 10 (5 FT and 5 PT) and grow to 45 (20 FT and 25 PT) by year 5. The Fa2025 in-county tuition rate of \$125/credit is used for the tuition calculation. Tuition rates are projected to increase by 3% per year..

Grants and Contracts: None

Other Sources: None

Total Year: None

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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.

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
Faculty	\$ 37,556	\$ 38,680	\$ 39,835	\$ 82,042	\$ 84,477
# FTE	1	1	1	2	2
Salary	\$ 34,887	\$ 35,931	\$ 37,004	\$ 76,212	\$ 78,474
Benefit	\$ 2,669	\$ 2,749	\$ 2,831	\$ 5,830	\$ 6,003
Admin Staff	-	-	-	-	-
# FTE	-	-	-	-	-
Salary	-	-	-	-	-
Benefit	-	-	-	-	-
Support Staff	-	-	-	-	-
# FTE	-	-	-	-	-
Salary	-	-	-	-	-
Benefit	-	-	-	-	-
Equipment	-	-	-	-	-
Library	-	-	-	-	-
New and/or Renovated Space	-	-	-	-	-
Other Expense (Supplies)	-	-	-	-	-
Total Expense	\$ 37,556	\$ 38,680	\$ 39,835	\$ 82,042	\$ 84,477

Financial Data - Expenditures

Faculty Funds - This degree program consists of coursework that has faculty and other instructional resources in place. As a result, there are no additional resources required to offer this program, except for the cost associated with providing additional faculty coverage in support of enrollment growth. Increased enrollment would potentially increase the number of section offerings and require additional adjunct contracts at the estimated Fa2025 rate of \$1,203 per FLH. Salaries are estimated to increase 3% per year.

Administrative Staff Funds: None

Supportive Staff Funds: None

Equipment: None

Library - Library materials are purchased through the library's operating budget.

New or Renovated Space - Existing space is available for classroom instruction and faculty offices.

Other Expenses: Any other expense purchases would be made through the college's existing operating budget.

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.

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All courses and faculty at AACC are evaluated by students using the online Student Opinion Forms (SOFs) at the conclusion of each semester. These forms have standard Likert questions with opportunities for anecdotal feedback. Students are also given the opportunity to leave comments in some of the criteria and to render a summary judgment of the course and teaching faculty. All faculty are evaluated each academic year based on the college's evaluation form which includes a review of student opinion form data. Student opinion form data is also reviewed and evaluated during the faculty promotion and tenure processes. In addition to soliciting student input for faculty and course evaluation, faculty colleagues conduct classroom visitations and peer evaluations in the second and fifth year of employment and at any time of consideration for promotion or tenure for full-time faculty. Adjunct faculty are evaluated by a peer or supervisor in the first year of employment and every three years thereafter and/or at the time of consideration of promotion.

Student learning outcomes will be assessed by evaluating data collected via the Canvas Learning Platform data collection tool. Data will be collected from a number of assessment sources, including essays, exams, and quizzes. Faculty will compare global achievement levels with the current set of student learning outcomes to determine the utility and effectiveness of the learning outcomes. This procedure leaves open the possibility of future adjustment to ensure that these outcomes drive optimal classroom instruction and yield useful data.

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

The College has an established Office of Assessment and Instructional Innovation. The Director of Assessment and Instructional Innovation meets regularly with a faculty-run subcommittee on Learning Outcomes Assessment, a sub-committee of the Teaching and Learning Committee. The mission of the subcommittee on Learning Outcomes Assessment is to guide and oversee program-level outcomes assessment throughout the college. The Office of Assessment and Instructional Innovation provides tools to the college's various programs to assist in regular program assessment, including an Annual Program/Department Assessment Report and a Curriculum Mapping Template to ensure alignment of course objectives and outcomes with department and/or program outcomes as well as college-level core competencies.

Anne Arundel Community College's Educational Policies Committee (EPC) is designed to evaluate the addition or modification of new programs, and deletion of existing programs. EPC makes recommendations to the Academic Forum/Council of the college since it is charged with evaluating existing and proposed curricula and courses so that they support educational objectives and policies and comply with established requirements from accrediting and other approving agencies. The proposed program was reviewed and approved by EPC, the Academic Forum/Council as well as the College's Board of Trustees.

The college conducts regular evaluations of degree programs with respect to enrollment, retention, curriculum relevancy, and outcomes assessment. All programs undergo a comprehensive review on a staggered 4-year cycle, using a Comprehensive Program Review Template that contains program data scored on a rubric. The template includes metrics in the areas of program continuation and completion, course success, headcount and program outcomes assessment. Also required is completion of a Program Review Narrative, which includes action items. The entire package is then reviewed in meetings that include the program chair/director, Assistant Dean, Director of Assessment and Instructional Innovation, Dean, Associate Vice President for Learning & Academic Affairs (AVPL), and the Provost/Vice President for Learning. The purpose of the program review meeting is to share program successes and address program

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needs. To ensure progress is being made on action items, the Office of the AVPL requires the Deans to complete two-year interim reports. Program review meetings and discussions also include consideration of programs costs and return on investment to address cost effectiveness and the impact on student and community needs. Each year the program's progress is evaluated in the Assessment of Outcomes and Educational Effectiveness Plan. In addition, National exam pass rates are also evaluated during this process.

Student satisfaction with courses and instruction is assessed for each course and instructor each semester through the collection of feedback through student opinion forms. Through student opinion forms, students can assess and comment on the course content, delivery, and instruction. This information is used for faculty evaluation and considerations for promotion and tenure.

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.

A key feature of AACC's mission and strategic planning involves respecting, valuing and achieving diversity. AACC's Diversity Statement asserts that AACC is committed to supporting and sustaining a diverse and inclusive educational environment. Diversity is not merely a goal, but a value that is embedded throughout the institution in multiple areas including, but not limited to, learning, teaching, student development, institutional functioning, and engagement in partnerships with the local and global community. In addition, the elements of the proposed program strongly align with the college's strategic plan in support of academic excellence in using "... high-quality educational practices and learning to eradicate systemic inequalities."

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.

Not applicable.

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.

Anne Arundel Community College has been approved to offer one or more degree or certificate/diploma programs for which students could meet 50% or more of their requirements by taking distance education courses by Middle States Commission on Higher Education. AACC utilizes the Canvas platform to provide online lectures to students. In addition, the college has distance education classrooms equipped with cameras and audio to share lectures with students in

offsite facilities.

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

The Middle States Commission on Higher Education is the accrediting body for AACC. The College follows the appropriate guidelines and adheres to the national standards and integrity for its distance education programs.