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

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

- | | |
|---|---|
| <input checked="" type="radio"/> New Academic Program | <input type="radio"/> Substantial Change to a Degree Program |
| <input type="radio"/> New Area of Concentration | <input type="radio"/> Substantial Change to an Area of Concentration |
| <input type="radio"/> New Degree Level Approval | <input type="radio"/> Substantial Change to a Certificate Program |
| <input type="radio"/> New Stand-Alone Certificate | <input type="radio"/> Cooperative Degree Program |
| <input type="radio"/> Off Campus Program | <input type="radio"/> Offer Program at Regional Higher Education Center |

Payment <input checked="" type="radio"/> Yes	Payment <input type="radio"/> R*STARS #99606	Payment	Date
Submitted: <input type="radio"/> No	Type: <input checked="" type="radio"/> Check # 99606	Amount:	Submitted: 1/15/26

Department Proposing Program	Engineering		
Degree Level and Degree Type	Bachelor of Science (B.S.)		
Title of Proposed Program	Bachelor of Science in Artificial Intelligence Engineering		
Total Number of Credits	120		
Suggested Codes	HEGIS: 909.00	CIP: 11.0102	
Program Modality	<input type="radio"/> On-campus <input type="radio"/> Distance Education (fully online) <input checked="" type="radio"/> Both		
Program Resources	<input checked="" type="radio"/> Using Existing Resources <input type="radio"/> Requiring New Resources		
Projected Implementation Date <small>(must be 60 days from proposal submission as per COMAR 13B.02.03.03)</small>	<input checked="" type="radio"/> Fall <input type="radio"/> Spring <input type="radio"/> Summer Year: 2026		
Provide Link to Most Recent Academic Catalog	URL: https://catalog.captechu.edu		

Preferred Contact for this Proposal	Name: Dr. Mohamed Ghazy
	Title: Dean of Academics
	Phone: (240) 965-2437
	Email: mshehata@captechu.edu

President/Chief Executive	Type Name: Bradford Sims
	Signature: Date: 1-15-26
	Date of Approval/Endorsement by Governing Board: JAN. 15, 2026

Revised 1/2021

January 15, 2026

Dr. Sanjay Rai
Secretary of Maryland Higher Education
Maryland Higher Education Commission
217 E. Redwood Street, Suite 2100
Baltimore, MD 21202

Dear Dr. Rai,

Capitol Technology University is requesting approval to offer a **Bachelor of Science (B.S.) in Artificial Intelligence Engineering**. The degree curriculum will be delivered using existing university faculty and supported through the development and integration of artificial intelligence, engineering, and autonomous systems coursework. Capitol Technology University's mission is to provide a practical education in engineering, computer science, information technology, and business—preparing individuals for professional careers and enabling them to thrive in a dynamic and evolving global environment. A central element of the university's mission is the advancement of hands-on, workforce-relevant knowledge that is valued by employers and aligned with the university's applied, career-focused academic programs. The university believes that the proposed degree aligns closely with this mission.

Demand for professionals with expertise in artificial intelligence, intelligent systems, and engineering-based AI applications continues to grow across multiple sectors, including autonomous systems, robotics, defense, transportation, manufacturing, healthcare, and data-driven infrastructure. Employers increasingly seek graduates who possess a strong engineering foundation, practical AI and machine learning skills, systems-level understanding, and the ability to apply advanced technologies in real-world environments. The proposed degree has been developed in direct response to these evolving workforce needs.

The degree is designed for individuals seeking to develop and advance technical competencies, analytical problem-solving abilities, and professional skills related to the design, implementation, and deployment of AI-driven and autonomous systems. The program emphasizes hands-on learning, engineering design, applied systems thinking, and the integration of artificial intelligence with hardware, software, and control systems to prepare graduates for immediate employment and long-term career advancement.

To address these workforce and educational needs, Capitol Technology University respectfully submits for approval the **Bachelor of Science in Artificial Intelligence Engineering**. Included with this submission is the required letter confirming the adequacy of the university's library resources to support the instructional and research needs of students enrolled in this program.

Respectfully,



Bradford L. Sims, PhD

President



January 15, 2026

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

Dear Dr. Rai,

This letter is provided in response to the request for confirmation regarding the adequacy of library resources at Capitol Technology University to support the proposed **Bachelor of Science in Artificial Intelligence Engineering**.

As President of Capitol Technology University, I affirm that the University's library resources—including professional library staff, physical collections, and comprehensive digital holdings—are fully adequate to support the instructional and research needs of students and faculty in the Bachelor of Science in Artificial Intelligence Engineering program.

Capitol Technology University remains firmly committed to the continuous enhancement of its library resources. The University allocates sufficient and ongoing budgetary support to ensure that library collections, electronic databases, instructional materials, and research services remain current and aligned with the evolving academic and professional requirements of artificial intelligence engineering and related engineering disciplines.

These resources will ensure that students enrolled in the Artificial Intelligence Engineering program have access to the scholarly, technical, and professional materials necessary to support academic success, hands-on learning, and workforce readiness.

Respectfully,

A handwritten signature in blue ink, appearing to read "BLS", is written over a light blue horizontal line.

Bradford L. Sims, PhD

President

PROPOSAL FOR:

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



Institution Submitting Proposal

Fall 2026

Projected Implementation Date

Bachelor of Science
Award to be Offered

**Bachelor of Science in Artificial
Intelligence Engineering**
Title of Proposed Program

0909

Suggested HEGIS Code

11.0102

Suggested CIP Code

Engineering
Department of Proposed Program

Dr. Mohamed Ghazy
Name of Department Head

Dr. Mohamed Ghazy
Dean of Academic

mshahata@captechu.edu
Contact E-Mail Address

(240) 965-2473
Contact Phone Number

 1-15-26
Signature and Date

President/Chief Executive Approval

JAN. 15, 2026
Date

Date Endorsed/Approved by Governing Board

Bachelor of Science in Artificial Intelligence Engineering, (AIE)

Capitol Technology University

Laurel, Maryland

A. Centrality to Mission and Planning Priorities

1. Program description and alignment with institutional mission

The **Bachelor of Science in Artificial Intelligence Engineering** is a 120-credit undergraduate program designed to prepare students for professional careers in the engineering design, implementation, and deployment of artificial intelligence-enabled systems. The program emphasizes the integration of **machine learning algorithms, data-driven modeling, software engineering, control systems, robotics, and embedded technologies** to create intelligent engineering solutions that operate reliably within real-world constraints. Students are prepared to design, analyze, and manage AI-driven systems that combine perception, computation, decision-making, and control across a wide range of applications, including intelligent automation, robotics, autonomous platforms, and smart infrastructure.

The curriculum provides a rigorous foundation in **engineering, computer science, mathematics, and physical sciences**, followed by advanced coursework in artificial intelligence, data analytics, machine learning, control systems, robotics, and systems engineering. Through project-based coursework and laboratory experiences, students develop practical skills in programming, modeling, simulation, experimentation, and system integration using industry-standard tools and platforms. The program culminates in a **two-course senior capstone design sequence**, during which students work in multidisciplinary teams to design, implement, test, evaluate, and document a complete AI-enabled engineering system addressing a real-world problem.

In addition to the technical core, the program includes coursework in **mathematics and science (30 credits), general education and humanities and social sciences (21 credits), and professional studies in communication, business, and ethics**. This balanced curriculum ensures that graduates possess strong analytical, communication, ethical reasoning, and teamwork skills, while fostering innovation, professionalism, and lifelong learning.

The program aligns directly with the mission of **Capitol Technology University** to educate individuals for professional opportunities in engineering, computer and information sciences, and business by providing hands-on, career-relevant learning experiences that prepare graduates for success in a rapidly evolving technological landscape. The B.S. in Artificial Intelligence Engineering advances this mission by preparing graduates to contribute to and lead in one of the most transformative engineering domains of the 21st century. The program further strengthens Capitol's leadership in STEM education by expanding its academic portfolio into high-demand areas at the intersection of artificial intelligence and engineering systems.

The program also supports the university's mission by advancing innovation, interdisciplinary education, and workforce development. It promotes ethical system design, applied problem solving, and industry engagement, aligning with regional and national priorities related to digital transformation, intelligent automation, and advanced engineering technologies.

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

The proposed **Bachelor of Science in Artificial Intelligence Engineering** directly supports Capitol Technology University's strategic goals of expanding academic offerings in emerging technologies, fostering interdisciplinary engineering education, and strengthening alignment with high-demand workforce sectors. The program addresses the growing need for engineers capable of designing, implementing, and sustaining AI-enabled systems across industries such as defense, aerospace, manufacturing, transportation, healthcare, and critical infrastructure.

The program contributes to **Goal I: Expand Educational Offerings and Increase Program Completion** by introducing a specialized engineering degree that builds upon Capitol's established strengths in electrical engineering, computer engineering, robotics, and systems engineering. The curriculum integrates artificial intelligence, software engineering, and hardware-based system design into a cohesive educational pathway that supports innovation and applied research.

It supports **Goal II: Increase Enrollment and Institutional Awareness** by attracting a diverse student population, including traditional undergraduate students, transfer students from community colleges, and working professionals seeking advanced skills in artificial intelligence engineering. The program's applied, project-based approach positions Capitol Technology University as a regional leader in engineering-focused AI education.

The program advances **Goal III: Improve Utilization of University Resources and Institutional Effectiveness** by leveraging existing instructional capacity, laboratories, and equipment within the Engineering and Computer Science departments. Shared foundational coursework in electronics, control systems, programming, and robotics ensures efficient resource utilization and cost-effective program delivery.

Finally, the program supports **Goal IV: Strengthen Industry and Community Partnerships** by fostering collaborations with industry and government organizations engaged in artificial intelligence, automation, and intelligent systems engineering. These partnerships will support student internships, capstone projects, and applied research initiatives, enhancing graduate employability and institutional visibility.

Evidence that this program is an institutional priority includes the following:

The program was developed under the direction of the **Office of Academic Affairs and the Chair of Engineering** as part of the university's long-term strategy to expand offerings in artificial intelligence and advanced engineering disciplines.

The program concept was reviewed and endorsed through academic planning processes, including faculty curriculum development activities and undergraduate academic governance structures, aligning with the university's strategic emphasis on intelligent technologies.

The curriculum was designed by faculty with expertise in artificial intelligence, data science, robotics, control systems, and engineering design, ensuring alignment with ABET expectations and evolving industry needs.

The program leverages shared laboratories and instructional resources supporting existing courses in electronics, microcontrollers, robotics, control systems, and digital systems, demonstrating efficient and sustainable resource utilization.

The development of this degree supports institutional enrollment growth by appealing to students interested in applied artificial intelligence, intelligent automation, and engineering innovation.

The program aligns with Capitol Technology University's ongoing partnerships with industry and government organizations engaged in artificial intelligence and advanced engineering applications.

3. Narrative of how the proposed program will be adequately funded for at least the first five years of implementation

The **Bachelor of Science in Artificial Intelligence Engineering** will be supported through existing institutional resources, tuition revenue, and strategic allocation of instructional capacity within the Engineering department. The university's multi-year financial planning model demonstrates the program's sustainability through conservative enrollment projections and planned growth supported by targeted recruitment, articulation agreements, and retention initiatives.

Many courses included in the program already exist within Capitol's engineering and computer science curricula, minimizing new course development costs. Existing laboratories supporting electronics, microcontrollers, control systems, robotics, and computing will be utilized, and are already equipped with relevant software and hardware platforms. Incremental investments in computing resources and instructional technology will be incorporated into the university's annual capital and technology enhancement plans.

Faculty instruction will primarily be delivered by existing full-time and adjunct faculty with expertise in artificial intelligence, software engineering, robotics, and systems engineering. As enrollment grows, additional adjunct faculty may be appointed to support advanced AI courses. These instructional costs have been anticipated and incorporated into academic budgeting projections.

The program is expected to generate sufficient tuition revenue to cover operating costs within the initial years of implementation. Long-term sustainability will be supported through shared resource utilization, efficient course scheduling, and exploration of external funding opportunities, including industry partnerships and workforce development grants related to artificial intelligence and engineering innovation.

4. Description of the institution's commitment to program support and continuity

Capitol Technology University is fully committed to the long-term success and sustainability of the **Bachelor of Science in Artificial Intelligence Engineering**. The program is integrated into the university's academic planning framework and will receive ongoing administrative, financial, and academic support.

a) Ongoing administrative, financial, and technical support

The program will be administered within the Engineering department under the oversight of the Chair of Engineering and the Office of Academic Affairs. Administrative, financial, and technical support are

incorporated into the university's operational planning and budgeting processes. The program will utilize existing computing, electronics, and robotics laboratories, which are maintained and upgraded through the university's scheduled lab modernization and equipment renewal plans. Faculty development resources will be allocated to support continued professional growth and currency in emerging artificial intelligence and engineering technologies.

b) Continuation of the program to allow students to complete their degrees

Capitol Technology University is committed to maintaining the program for a sufficient duration to enable all enrolled students to complete their degrees. The institution will ensure consistent course sequencing, faculty assignment, and academic advising for each cohort. In the event of future program modification or discontinuation, the university will implement a formal teach-out plan in accordance with MHEC requirements to ensure uninterrupted degree completion.

The proposed **Bachelor of Science in Artificial Intelligence Engineering** reflects Capitol Technology University's mission-driven commitment to delivering career-relevant, industry-aligned engineering education. The program leverages institutional strengths, addresses state and national workforce needs, and advances the university's strategic vision for innovation, excellence, and leadership in the rapidly evolving field of artificial intelligence engineering.

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

1. Demonstration of demand and need for the program in terms of meeting present and future needs of the region and the State

a) The need for the advancement and evolution of knowledge

The Bachelor of Science in Artificial Intelligence Engineering addresses a critical and rapidly expanding need for engineers who can design, implement, and deploy artificial intelligence within real-world engineering systems. As Maryland and the broader Mid-Atlantic region continue to invest in digital transformation, intelligent infrastructure, cybersecurity, defense technologies, healthcare systems, and advanced manufacturing, there is increasing demand for professionals who can integrate artificial intelligence with physical systems, software platforms, and operational constraints. This need aligns with the Maryland State Plan for Postsecondary Education priority of ensuring that academic programs remain responsive to emerging workforce and industry demands in high-growth technology sectors.

The program advances the evolution of knowledge by unifying foundational engineering disciplines with modern artificial intelligence methodologies, including machine learning, neural networks, data-driven modeling, embedded computing, control systems, and systems engineering. Students are trained to design intelligent systems that perceive data, make decisions, and act reliably within dynamic and uncertain environments. Graduates will be prepared to contribute to advancements in smart manufacturing, intelligent transportation systems, autonomous and semi-autonomous platforms, healthcare technologies, and cyber-physical infrastructure—sectors identified by the State of Maryland as essential to innovation, economic competitiveness, and long-term workforce sustainability.

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

The Artificial Intelligence Engineering program expands educational access to one of the most in-demand and transformative engineering fields for a diverse population of learners. Capitol Technology University has a demonstrated commitment to serving nontraditional students, transfer students, military-affiliated learners, and underrepresented populations in STEM disciplines. The program’s applied, engineering-focused structure supports students entering from Maryland community colleges with associate degrees in engineering, technology, or computer science, directly advancing the State Plan priority of strengthening transfer pathways and reducing barriers to degree completion.

Capitol’s emphasis on small class sizes, hands-on laboratories, and individualized academic advising promotes persistence, retention, and academic success. The program provides clear pathways into high-wage, high-growth careers in artificial intelligence engineering, automation, robotics, and intelligent systems integration—fields that are increasingly critical to Maryland’s public agencies, private industry, and national security workforce. By expanding access to these career pathways and supporting students through targeted academic and financial support mechanisms, the program advances the State Plan’s priorities related to equity, affordability, and workforce inclusion.

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

Although Capitol Technology University is not a historically black institution, it is committed to supporting statewide efforts to expand access to advanced engineering education through collaboration with Maryland’s historically black institutions and minority-serving institutions. The Artificial Intelligence Engineering program provides opportunities for partnership through dual-degree pathways, 2+2 articulation agreements, summer research initiatives, and joint academic experiences focused on applied artificial intelligence and systems engineering.

The university intends to pursue faculty collaboration and curriculum-alignment efforts in areas such as artificial intelligence engineering, applied machine learning, and intelligent systems integration. These partnerships support the State Plan priority of strengthening statewide institutional capacity and expanding participation of African American and minority students in high-demand STEM fields, including defense systems, transportation infrastructure, manufacturing, and healthcare technologies that increasingly rely on AI-enabled solutions.

2. Evidence that the perceived need is consistent with the Maryland State Plan for Postsecondary Education

The Maryland State Plan for Postsecondary Education (2022) identifies three overarching goals: Student Access, Student Success, and Innovation, supported by specific priorities related to workforce alignment, equity, affordability, and academic relevance. The proposed Bachelor of Science in Artificial Intelligence Engineering directly supports these goals and priorities.

Goal 1: Student Access

“Ensure equitable access to affordable and quality postsecondary education for all Maryland residents.”

Capitol Technology University is committed to expanding access to high-demand engineering education in emerging fields such as artificial intelligence. The Artificial Intelligence Engineering program supports State Plan priorities related to transfer efficiency, adult learner access, and affordability by offering articulation agreements, prior learning assessment, and flexible scheduling options. These pathways reduce barriers to entry while maintaining academic rigor and program quality.

The program’s alignment with Maryland’s workforce and economic development priorities ensures that students gain access to educational opportunities that lead directly to sustainable, in-demand careers. Institutional initiatives supporting affordability—including need-based financial aid, targeted scholarships, and tuition support programs—further advance the State Plan’s priorities related to access and equity.

Goal 2: Student Success

“Promote and implement practices and policies that will ensure student success.”

The Artificial Intelligence Engineering program is intentionally designed to promote student success through experiential learning, structured skill development, and close faculty engagement, consistent with State Plan priorities emphasizing retention, completion, and workforce readiness. Students gain hands-on experience with programming, modeling, simulation, experimentation, and system integration throughout the curriculum. Laboratory-based courses reinforce theoretical knowledge and support student engagement and persistence.

The two-course senior capstone design sequence requires students to design, implement, test, evaluate, and document a complete AI-enabled engineering system, providing a culminating academic experience aligned with professional engineering practice. Dedicated academic advising, mentoring, and faculty interaction further support timely degree completion and measurable learning outcomes.

Goal 3: Innovation

“Foster innovation in all aspects of Maryland higher education to improve access and student success.”

The proposed program reflects innovation in both curriculum design and instructional delivery by integrating traditional engineering education with advanced topics in machine learning, neural networks, intelligent decision-making, and ethical AI system development. The program supports State Plan priorities related to academic innovation, interdisciplinary learning, and alignment with emerging technologies.

Project-based learning, interdisciplinary collaboration, and industry-engaged capstone experiences ensure that students apply innovative solutions to real-world problems. Partnerships with employers in Maryland’s technology, defense, healthcare, and engineering sectors strengthen applied learning and workforce alignment, reinforcing the State Plan’s emphasis on innovation-driven economic growth and student success.

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

1. Description of potential industries, employment opportunities, and expected level of entry for graduates of the proposed program

Graduates of the **Bachelor of Science in Artificial Intelligence Engineering** will be prepared for professional engineering roles in industries where artificial intelligence, data-driven decision-making, and intelligent automation are transforming products, services, and infrastructure. Key sectors include advanced manufacturing, defense and aerospace, transportation systems, logistics and supply chain management, energy systems, healthcare technologies, agriculture, cybersecurity, and public safety.

Maryland's strong concentration of defense contractors, federal research laboratories, and technology firms creates a particularly robust employment environment for AI engineering graduates.

Graduates will be qualified for entry-level positions such as **Artificial Intelligence Engineer, Machine Learning Engineer, Robotics and Automation Engineer, Embedded Systems Engineer, Intelligent Systems Engineer, Control Systems Engineer, and Computer Vision Engineer**. Additional opportunities exist in intelligent transportation systems, autonomous and semi-autonomous vehicle development, industrial automation integration, and AI-enabled infrastructure design. Employers include federal agencies, defense contractors, research laboratories, technology companies, system integrators, and manufacturers implementing Industry 4.0 and smart automation solutions.

Graduates are expected to enter the workforce at the **junior engineer, associate engineer, or systems analyst level**, with opportunities for advancement to senior engineering, project leadership, or systems architect roles through professional experience or graduate education. The program's emphasis on engineering design, applied artificial intelligence, and system-level capstone projects ensures that graduates are prepared to contribute immediately to multidisciplinary engineering teams.

2. Data and analysis projecting market demand and the availability of openings in the job market

National and state labor market data demonstrate strong and sustained demand for professionals trained in artificial intelligence and related engineering fields. According to the **U.S. Bureau of Labor Statistics (2024)**, employment of computer and information research scientists—an occupational category that includes artificial intelligence and machine learning specialists—is projected to grow **23 percent from 2022 to 2032**, much faster than the average for all occupations. This growth represents more than **37,000 new positions nationally**, with median annual wages exceeding **\$136,000**.

Related occupations relevant to Artificial Intelligence Engineering—including data scientists, robotics engineers, and embedded systems engineers—also show double-digit growth rates. The BLS attributes this growth to expanding use of AI in cybersecurity, automation, robotics, intelligent transportation, healthcare systems, and advanced manufacturing. Maryland's economy, which includes a high concentration of defense, aerospace, and federal research organizations, is particularly aligned with these growth areas.

State-level labor market analytics further confirm strong demand. **Lightcast (2024)** reports that Maryland experienced **more than 3,000 annual job postings** related to artificial intelligence, machine learning, robotics, and intelligent systems between 2023 and 2024. High-demand geographic areas include Montgomery, Howard, Anne Arundel, and Prince George's counties. Employers seek candidates with skills in Python, C/C++, machine learning frameworks, control systems, data analytics, embedded systems, and system integration—all core components of the Artificial Intelligence Engineering curriculum.

3. Evidence from market surveys and workforce studies documenting educational and training needs

Recent national and regional workforce studies underscore a persistent shortage of engineers trained in artificial intelligence and intelligent systems integration. The **2024 U.S. Artificial Intelligence Workforce Report** identifies a significant talent gap in AI engineering, machine learning, and robotics,

particularly among candidates who possess both strong technical foundations and applied system design skills. Employers report difficulty recruiting graduates who can move beyond algorithm development to deploy AI within operational engineering systems.

The **World Economic Forum's Future of Jobs Report (2023)** ranks artificial intelligence and machine learning specialists among the fastest-growing professions globally, projecting substantial growth in AI-enabled engineering roles through the end of the decade. The report emphasizes the need for applied engineering education that integrates AI with hardware, control systems, and real-world constraints.

At the state level, Maryland workforce planning documents identify artificial intelligence, intelligent automation, and advanced engineering systems as priority areas for economic growth and competitiveness. Industry organizations within the state have highlighted the importance of stronger alignment between undergraduate engineering education and employer needs in AI-enabled system design.

Lightcast workforce analytics (2024) indicate that Maryland averaged approximately **2,800 annual job postings** between 2023 and 2024 for roles requiring artificial intelligence or intelligent systems expertise. The most frequently requested skills included machine learning, Python programming, embedded systems, robotics engineering, and data-driven system modeling—confirming strong alignment between market demand and the learning outcomes of the proposed program.

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

Currently, relatively few Maryland institutions offer undergraduate programs specifically focused on **Artificial Intelligence Engineering**. While some universities offer computer science or robotics concentrations, comprehensive undergraduate programs that integrate artificial intelligence with engineering design, embedded systems, control, and system deployment remain limited. As a result, employers frequently recruit from out-of-state institutions or rely on graduate-level programs to meet entry-level workforce needs.

IPEDS data indicate that Maryland produces several hundred bachelor's-level graduates annually in computer science and engineering disciplines; however, only a small proportion of these graduates complete coursework focused on artificial intelligence, machine learning, and intelligent system integration. The absence of a dedicated undergraduate Artificial Intelligence Engineering program contributes to a persistent supply-demand gap within the state.

Capitol Technology University projects an initial cohort of approximately **15 to 18 students** in the program's first year, with steady enrollment growth to **65–75 students by the fifth year**. Based on anticipated retention and graduation rates, the program is expected to produce **12 to 18 graduates annually** beginning in the fourth year of operation. These graduates will help address Maryland's growing demand for engineers capable of designing, deploying, and sustaining AI-enabled engineering systems.

By establishing the **Bachelor of Science in Artificial Intelligence Engineering**, Capitol Technology University directly addresses a documented workforce need while strengthening Maryland's capacity to lead in artificial intelligence, intelligent automation, and advanced engineering innovation.

D. Reasonableness of Program Duplication

1. Identification of similar programs in the State and discussion of similarities and differences

Several institutions in Maryland offer undergraduate programs in computer science, data science, electrical engineering, computer engineering, and related computing disciplines. Programs with Classification of Instructional Programs (CIP) code 11.0102 and closely related fields were reviewed as part of this proposal. While these programs address aspects of artificial intelligence, none offer a dedicated undergraduate degree titled Artificial Intelligence Engineering that integrates artificial intelligence as a core engineering discipline across hardware, software, control, and system-level design.

Examples of related undergraduate programs currently offered in Maryland include:

- University of Maryland, College Park – B.S. in Computer Science with elective coursework in artificial intelligence and machine learning
- University of Maryland Global Campus – B.S. in Computer Science and related computing programs offered in an online modality
- University of Baltimore – B.S. in Data Science and analytics-focused programs
- University of Maryland, Baltimore County – B.S. in Computer Science and B.S. in Data Science
- Johns Hopkins University – B.S. in Computer Engineering with access to robotics and AI-related coursework
- Morgan State University – B.S. in Electrical Engineering and B.S. in Computer Engineering with AI-related electives
- Bowie State University – B.S. in Computer Science with concentrations in data science

These programs generally emphasize computing theory, software development, data analytics, or traditional engineering foundations, with artificial intelligence offered as a concentration, elective sequence, or specialization. Data Science programs focus primarily on statistical analysis, data management, and analytics, while computer science programs emphasize algorithms, programming languages, and theoretical foundations. Engineering programs typically address hardware, control, and systems topics but do not position artificial intelligence as the central organizing framework of the curriculum.

In contrast, the proposed Bachelor of Science in Artificial Intelligence Engineering is intentionally designed as an engineering degree, with artificial intelligence serving as the unifying discipline across hardware, software, control systems, robotics, and system integration. Key distinctions include:

- A primary emphasis on the engineering design, deployment, and validation of AI-enabled systems, rather than standalone algorithm development or data analysis
- Integrated coursework spanning artificial intelligence, embedded systems, control systems, robotics, and systems engineering
- A required two-semester senior engineering capstone focused on the design, implementation, testing, evaluation, and documentation of a complete AI-enabled engineering system

- Explicit consideration of real-world engineering constraints, including safety, reliability, ethics, system performance, and lifecycle considerations

This systems-oriented, engineering-focused structure differentiates the program from existing computer science, data science, and traditional engineering offerings and avoids unnecessary duplication.

2. Justification for the proposed program

The proposed Bachelor of Science in Artificial Intelligence Engineering is justified by documented workforce demand, academic differentiation, institutional alignment, and its contribution to the diversity of Maryland's undergraduate engineering offerings.

a. Workforce demand

Artificial intelligence-enabled engineering systems are increasingly central to sectors such as defense, aerospace, manufacturing, transportation, healthcare technologies, and intelligent infrastructure. Employers in these sectors seek engineers who can integrate AI algorithms with sensors, embedded hardware, control systems, and software platforms. Graduates of traditional computer science or engineering programs may receive partial exposure to these areas but often lack integrated, system-level preparation. The proposed program addresses this gap by preparing graduates specifically for AI engineering and intelligent system integration roles.

b. Academic innovation

The program offers a structured curriculum that combines foundational engineering principles with advanced artificial intelligence topics, including machine learning, deep learning, computer vision, natural language processing, and intelligent control. Unlike programs in which AI is treated as a specialization, artificial intelligence is positioned as a core engineering discipline reinforced through laboratories, applied projects, and system-level design experiences.

c. Accessibility and flexibility

The program is designed to serve both traditional undergraduate students and transfer students from Maryland community colleges with backgrounds in engineering, computer science, or technology. Clear prerequisite pathways, applied coursework, and project-based assessment support accessibility while maintaining academic rigor and workforce relevance.

d. Institutional alignment

Capitol Technology University has established strengths in engineering, computer science, cybersecurity, robotics, unmanned systems, and applied technology education. The proposed program aligns directly with the university's mission to deliver career-focused, industry-relevant education in emerging technological fields and complements existing programs while extending institutional capacity in artificial intelligence engineering.

e. Strategic differentiation

While artificial intelligence concepts are incorporated into a range of programs across the State, the proposed Bachelor of Science in Artificial Intelligence Engineering is distinctive in its explicit engineering focus and its integration of AI with physical systems, control, and system-level design. The program fills a clear gap in Maryland's undergraduate education landscape by preparing engineers specifically for careers in intelligent automation, AI-enabled infrastructure, robotics, and advanced engineering systems.

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

1. Program impact on the implementation or maintenance of high-demand programs at HBIs

The proposed **Bachelor of Science in Artificial Intelligence Engineering** is designed to **complement and support**, rather than compete with, high-demand engineering and technology programs offered at Maryland's Historically Black Institutions (HBIs). Institutions such as Morgan State University, Bowie State University, and University of Maryland Eastern Shore play a vital role in educating underrepresented students in computer science, engineering, cybersecurity, robotics, and data science—disciplines that intersect with, but do not fully encompass, the integrated engineering focus of artificial intelligence systems design.

While several HBIs offer coursework or concentrations related to artificial intelligence, data analytics, or automation, none currently offer a **dedicated undergraduate engineering degree** that systematically integrates **artificial intelligence, software engineering, embedded systems, control systems, robotics, and system-level design** within a single, cohesive curriculum. The proposed program at Capitol Technology University addresses this gap by providing an engineering-centered pathway focused on the design, deployment, and evaluation of AI-enabled systems operating under real-world constraints.

Rather than diverting students from HBI programs, the proposed Artificial Intelligence Engineering program has the potential to **enhance and extend HBI educational capacity** through collaborative and complementary mechanisms, including the following:

Transfer and Dual-Degree Pathways:

The program may serve as an upper-division transfer or specialization pathway for students completing foundational coursework in computer science, engineering, or engineering technology at HBIs who seek advanced preparation in artificial intelligence engineering, intelligent automation, or system integration.

Collaborative Projects and Research Opportunities:

Capitol Technology University may pursue collaborative initiatives with HBI faculty and students in areas such as ethical AI system design, intelligent infrastructure, robotics, autonomous platforms, and applied machine learning. These collaborations may include shared senior design projects, joint research activities, and coordinated grant proposals.

Workforce Capacity Building:

As Maryland continues to expand its technology-driven economy—particularly in defense systems, transportation infrastructure, public safety, and intelligent manufacturing—the program strengthens the State's capacity to prepare a diverse engineering workforce. Graduates from multiple institutions, including HBIs, benefit from expanded pathways into high-skill, high-demand AI engineering roles.

Shared Access to Specialized Resources:

Through potential memoranda of understanding or cooperative agreements, students from HBI programs may benefit from access to specialized laboratories, software platforms, or applied artificial intelligence coursework that complements their home institution's offerings.

In these ways, the **Bachelor of Science in Artificial Intelligence Engineering** supports Maryland's broader goals of **equity, inclusion, and collaboration in STEM education**. The program reinforces the State's commitment to expanding opportunities for underrepresented students while ensuring academic complementarity and avoiding unnecessary duplication of existing HBI programs.

The proposed program therefore contributes positively to Maryland’s higher education ecosystem by strengthening pathways into artificial intelligence engineering careers and supporting the continued success of high-demand programs at the State’s Historically Black Institutions.

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

The proposed **Bachelor of Science in Artificial Intelligence Engineering** is not expected to adversely affect the uniqueness, institutional identities, or missions of Maryland’s Historically Black Institutions (HBIs). Instead, the program supports statewide efforts to expand access to high-demand, future-oriented engineering education while maintaining respect for the distinct historical, cultural, and academic roles of HBIs within Maryland’s higher education system.

Maryland’s HBIs—including Morgan State University, Bowie State University, Coppin State University, and University of Maryland Eastern Shore—serve as vital centers of academic excellence, leadership development, and community engagement. Their missions emphasize expanding educational access, promoting social mobility, and preparing African American and other underrepresented students for success in STEM disciplines and professional careers.

The proposed Artificial Intelligence Engineering program differs from existing HBI offerings in its **explicit engineering focus on the design, deployment, and validation of AI-enabled systems** that integrate software, hardware, control, and data-driven intelligence. While HBIs offer strong programs in computer science, engineering, data science, and related fields, the proposed program is structured as a specialized engineering pathway centered on artificial intelligence as a system-level discipline. This distinction ensures that the program does not duplicate or diminish existing HBI programs, but instead broadens the range of academic options available to students across the State.

The program is designed to serve a diverse student population, including traditional undergraduates, community college transfer students, and working professionals seeking advanced technical preparation in artificial intelligence engineering. By offering a complementary pathway focused on emerging technologies such as intelligent automation, robotics, smart infrastructure, and AI-enabled engineering systems, the program contributes to Maryland’s broader workforce and innovation objectives without encroaching upon the established missions of HBIs.

Furthermore, the program creates opportunities for **inter-institutional collaboration** that reinforce, rather than weaken, HBI identities. Potential collaborative activities include articulation and transfer agreements, shared research initiatives in artificial intelligence engineering, joint senior design or applied research projects, and faculty collaboration on curriculum development and grant-funded research. These activities support knowledge exchange and capacity building while preserving each institution’s unique mission and academic strengths.

By expanding educational pathways into high-growth engineering fields and supporting collaboration across institutions, the **Bachelor of Science in Artificial Intelligence Engineering** contributes positively to Maryland’s commitment to equity, diversity, and excellence in higher education. The program strengthens the statewide ecosystem for artificial intelligence education while respecting and reinforcing the distinctive identities and missions of Maryland’s Historically Black Institutions.

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

1. Establishment of the proposed program and faculty oversight

The **Bachelor of Science in Artificial Intelligence Engineering** was developed through a collaborative effort involving faculty from engineering, computer science, and mathematics, with guidance from Capitol Technology University's Office of Academic Affairs and input from external stakeholders in applied artificial intelligence, automation, cybersecurity, and intelligent systems integration. The program responds directly to the accelerating demand for professionals who can design, implement, and sustain AI-enabled engineering systems across sectors including defense, advanced manufacturing, transportation, healthcare technologies, logistics, and critical infrastructure.

The program builds on Capitol Technology University's established strengths in electronics, digital systems, embedded computing, control systems, robotics, and applied computing. The curriculum integrates existing foundational courses already offered by the University with specialized upper-division coursework in artificial intelligence, machine learning, deep learning, computer vision, natural language processing, data mining, and AI security concepts. The curriculum is designed to provide the rigor and breadth expected of an engineering baccalaureate program and to support ABET-aligned student outcomes through design, experimentation, teamwork, ethics, and continuous improvement practices.

The program will be overseen by full-time faculty within the Engineering and Computer Science departments with expertise in artificial intelligence, software development, robotics, embedded systems, controls, and systems engineering. These faculty hold terminal degrees in engineering, computer science, or closely related disciplines and bring academic, research, and applied industry experience relevant to AI-enabled engineering systems. As needed, adjunct faculty with specialized professional backgrounds in AI deployment, intelligent automation, cybersecurity, and engineering systems integration may support selected upper-division courses.

2. Educational objectives and learning outcomes appropriate to rigor, breadth, and modality

Program modality and instructional approach

The program is delivered primarily in a **traditional in-person** format with a strong emphasis on laboratory-based learning, hands-on projects, and applied system integration. Courses incorporate programming assignments, engineering analysis, simulation environments, and team-based design activities. Selective hybrid delivery may be used to support accessibility for working students and transfer learners, while maintaining consistent faculty–student interaction, structured learning activities, and required performance outcomes. Students engage in applied work using modern software tools and engineering platforms appropriate to AI system development, including programming environments, data science toolchains, and embedded/robotic system components.

Educational Objectives

Graduates of the **Artificial Intelligence Engineering** program will:

1. Enter the workforce as competent and ethical professionals contributing to the engineering design, implementation, and deployment of AI-enabled systems.
2. Apply engineering and computing principles to develop intelligent solutions that integrate software, hardware, data, and operational constraints.

3. Communicate effectively and work collaboratively in multidisciplinary environments involving artificial intelligence, robotics, control systems, and data-driven modeling.
4. Pursue lifelong learning through professional development, industry certification, or graduate study in artificial intelligence engineering or related fields.

Student Learning Outcomes

Upon graduation, students will be able to:

1. Identify, formulate, and solve complex engineering and computing problems using artificial intelligence and data-driven methods.
2. Apply engineering design to develop AI-enabled systems that meet specified needs and constraints, including safety, ethics, sustainability, and performance.
3. Communicate technical information clearly in written, oral, and visual forms to diverse audiences.
4. Recognize ethical and professional responsibilities in engineering practice and make informed judgments considering the societal impacts of AI technologies.
5. Function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and produces measurable outcomes.
6. Design, conduct, and evaluate experiments and/or simulations to validate system performance and support engineering conclusions.
7. Acquire and apply new knowledge as needed, using appropriate learning strategies and modern tools in a rapidly evolving technological landscape.

These outcomes support ABET-aligned expectations for engineering programs and prepare graduates for professional practice in artificial intelligence engineering and intelligent systems integration.

3. Assessment and documentation of student achievement of learning outcomes

a) Assessment of student achievement of learning outcomes

Student learning will be assessed using both direct and indirect methods. Direct measures will include examinations, graded programming and modeling assignments, laboratory reports, design artifacts, technical documentation, and capstone design deliverables. Indirect measures will include student course evaluations, graduate feedback, employer and internship supervisor input, and advisory board feedback.

Each course will include defined course-level outcomes mapped to program learning outcomes. Key courses (including advanced AI courses, engineering systems courses, and the capstone sequence) will serve as primary assessment points using standardized rubrics. Annual assessment summaries will be compiled by the program leadership, reviewed within the Engineering and Computer Science departments, and submitted to the Office of Academic Affairs to support continuous improvement and curricular refinement.

b) Documentation of student achievement of learning outcomes

Capitol Technology University will maintain structured documentation of student work and outcome attainment through course archives and digital learning systems. Faculty will retain representative student artifacts such as source code repositories, datasets and model outputs, simulation results, laboratory records, design reviews, test results, technical reports, and presentation materials. These artifacts will be used to evaluate achievement trends, inform program-level improvement actions, and support institutional reporting and accreditation readiness.

4. Courses, program requirements, and course descriptions

The **Bachelor of Science in Artificial Intelligence Engineering** is a **120-credit** program that prepares students to develop, deploy, and evaluate AI-enabled engineering systems. Students complete coursework in programming, data structures, data mining, machine learning, deep learning, computer vision, natural language processing, cybersecurity fundamentals, electronics, microcontrollers, signals and systems, controls, robotics, and systems engineering. The program culminates in a two-semester capstone design sequence that requires students to design, implement, test, evaluate, and document a complete AI-enabled engineering system.

Program Requirements Summary

Table 1. Program Requirements Summary

Category	Description	Required Courses	Credits
General Education	Communication, humanities, ethics, management	EN 101, EN 102, HU 331, SS 351, HU/SS elective, BUS 174, BUS 301	21
Mathematics and Science	College-level mathematics and physics supporting engineering rigor	MA 114, MA 261, MA 262, MA 330, MA 124, MA 340, MA 345, PH 201, PH 202	30
Engineering Core	Engineering science, systems, robotics, controls, and design	EL 100, EL 200, EL 204, EE 362, EE 406, EE 453, ROB 200, ROB 382, EE 340, UAS 102	30
Computer Science & AI Core	Programming, data, and artificial intelligence	CS 120, CS 150, CS 200, CS 230, DS 235, AIT 201, AIT 440, AIT 370, AIT 445, AIT 360, AIT 442	30
Capstone Design	Senior engineering design and implementation	SDE 457, SDE 458	6
Total Program Credits			120

Table 2. Curriculum – Bachelor of Science in Artificial Intelligence Engineering

Total Credits: 120

Course No.	Course Title	Credits	Prerequisite
EN 101	English Communications I	3	Placement
EN 102	English Communications II	3	EN 101
HU 331	Arts and Ideas	3	EN 102
SS 351	Ethics	3	EN 102
HU/SS Elective	Humanities or Social Science Elective	3	None
BUS 174	Introduction to Business and Management	3	None
BUS 301	Project Management	3	BUS 101 or BUS 174
MA 114	Algebra and Trigonometry	4	MA 112 or placement
MA 261	Calculus I	4	MA 114
MA 262	Calculus II	4	MA 261
MA 330	Linear Algebra	3	MA 262
MA 124	Discrete Mathematics	3	MA 112, MA 114, or placement
MA 340	Ordinary Differential Equations	3	MA 262
MA 345	Probability & Statistics for Engineers	3	MA 262
PH 201	General Physics I	3	MA 114
PH 202	General Physics II	3	PH 201
EL 100	Introduction to DC/AC Circuits	3	MA 112
EL 200	Electronic Devices & Circuits	3	EL 100
EL 204	Digital Electronics	3	None
EE 362	Microcontroller System Design	3	EL 204
EE 406	Signals and Systems	3	MA 340
EE 453	Control Systems I	3	MA 340
ROB 200	Robotics Systems Engineering and Analysis	3	EL 100 and ROB 100 or UAS 102
ROB 382	Robotic Systems	3	EE 362
EE 340	Systems Engineering	3	BUS 301
UAS 102	Mechanics of Uncrewed and Autonomous Systems	3	None
CS 120	Introduction to Programming Using Python	3	None
CS 150	Programming in C	3	MA 111 or MA 112 and CS 120, or placement
CS 200	Programming in C++	3	CS 130 or CS 150
CS 230	Data Structures	3	CS 225 or CS 200; Coreq: MA 124
DS 235	Introduction to Data Mining	3	CS 120 or CT 206
AIT 201	Introduction to Artificial Intelligence	3	MA 128
AIT 440	Advanced Machine Learning	3	AIT 201, MA 340
AIT 370	Computer Vision	3	CS 120 or CT 206 or CS 150
AIT 445	Neural Networks and Deep Learning	3	AIT 201 and CS 230
AIT 360	Text Mining and Natural Language Processing	3	DS 235
AIT 442	Deep Generative Models	3	AIT 201
SDE 457	Senior Design I	3	Senior Standing
SDE 458	Senior Design II	3	SDE 457

Courses Descriptions

I. General Education (21 Credits)

EN-101 – English Communications I (3 credits):

This introductory college-level course focuses on effective oral and written communication skills and the development of analytical abilities through various reading and writing assignments. Students must demonstrate competence in writing mechanics, including grammar, sentence structure, logical content development, and research documentation through 4 essays/research papers. Rhetorical modes may include description, comparison/contrast, narrative, and process analysis. Students are expected to develop effective oral communication skills through speeches. Group projects will develop effective team skills such as decision-making, time management, and cooperation.

Prerequisite(s): Acceptance based on placement test scores.

EN-102 – English Communications II (3 credits):

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

Prerequisite(s): EN 1012.

HU 331 - Arts and Ideas (3 credits):

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

Prerequisite(s): EN 102

SS 351 – Ethics (3 credits):

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

Prerequisite(s): EN 102

Humanities or Social Science Electives (3 credits):

This elective allows students to broaden their educational experience by exploring topics beyond the technical disciplines of engineering. Students may choose from a range of approved courses in areas such as history, philosophy, sociology, psychology, economics, or cultural studies. This flexibility encourages intellectual exploration, enhances critical thinking, and promotes a deeper understanding of human behavior, societal structures, and cultural contexts. Such knowledge supports the development of well-

rounded engineering professionals who are capable of making informed, ethical, and socially responsible decisions in their professional practice.

US 174 - Introduction to Business and Management (3 credits):

This course presents a survey of the general business and management environment. Topics include an introduction to the various forms of business, organizational structure, and their legal implications. Modern management and supervision concepts, history and development of theory and practice, the roles of managers, and the relationship between manager and employee are examined. This is a seminar course with emphasis on class discussion and collaborative learning.

BUS 301 - Project Management (3 credits):

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

Prerequisite(s): BUS 101 or BUS 174

II. Mathematics and Science (30 Credits)

MA 114 - Algebra and Trigonometry (4 credits):

Designed for students needing mathematical skills and concepts for MA-261. Topics in this course are as follows. Algebra: basic operations on real and complex numbers, fractions, exponents and radicals. Determinates: Solution of linear, fractional, quadratic and system equations. Trigonometry: definition and identities, angular measurements, solving triangles, vectors, graphs and logarithms.

Prerequisite(s): MA 112 or placement test score.

MA 261 - Calculus I (4 credits):

This course covers lines, circles, ellipses; functions and limits, differentiation, power rule, higher-order derivatives, product, quotient and chain rules, implicit differentiation, and applications. Regarding integration, it addresses definite integrals; indeterminate forms; exponential, logarithmic, trigonometric and hyperbolic functions; differentiation and integration, and graphing.

Prerequisite(s): MA 114

MA 262 - Calculus II (4 credits):

This course centers on methods of integration, including completing the square, substitution, partial fractions, integration by parts, trigonometric integrals, power series, and parametric equations. It also addresses partial derivatives, directional derivatives, and an introduction to multiple integrals.

Prerequisite(s): MA 261

MA 330 - Linear Algebra (3 credits):

This course introduces the study of linear systems of equations, vector spaces, and linear transformations. Students will solve systems of linear equations as a basic tool in many mathematical procedures used in science and engineering. Topics include solving linear equations, performing matrix algebra, calculating determinants, finding eigenvalues and eigenvectors and developing an understanding of a matrix as a linear transformations relative to a basis of a vector space.

Prerequisite(s): MA 262

MA 124 - Discrete Mathematics (3 credits):

This course focuses on logic sets and sequences; algorithms, divisibility, and matrices; proof, induction, and recursion; counting methods and probability; relations, closure and equivalence relations, graphs and trees; and Boolean algebra.

Prerequisite(s): MA 112, MA 114 or placement test score.

MA 340 - Ordinary Differential Equations (3 credits):

This course addresses methods for solving first order equations with applications to mechanics and rate problems. It also covers solutions of second order equations by undetermined coefficients and variations of parameters. Applications to circuits are also included as well as an introduction to systems of equations and operational and numerical methods.

Prerequisite(s): MA 262

MA 345 - Probability & Statistics for Engineers (3 credits):

This course focuses on sets and methods of counting, as well as probability density functions, expected values, and correlations. Forms of distribution addressed included binomial, Poisson, exponential, and normal. Additional topics covered include the central limit theorem, statistical estimation, an introduction to stochastic processes, and applications to noise and reliability.

Prerequisite(s): MA 262

PH 201 - General Physics I (3 credits):

This is a non-calculus-based physics course intended for credit in engineering technology courses. PH-261 is to be used for electrical, computer, and software engineering courses. PH-201 addresses mechanics, focusing on units, conversion factors, vector diagrams, translational equilibrium, friction, torque and rotational equilibrium, uniformly accelerated motion, projectiles, Newton's Law, work energy and power, kinetic and potential energy, conservation of energy, and impulse and momentum. It also addresses heat, focusing on temperature scales, thermal properties of matter, heat and temperature change, heat and change of phase, physics of heat transfer, and applications. Students completing this course may not enroll in PH-261 for additional credit.

Prerequisite(s): MA 114

PH 202 - General Physics II (3 credits):

Non-calculus based physics intended for credit in engineering technology courses. Use PH-262 for electrical, computer and software engineering courses. Light and sound: wave motion, nature of light, reflection and mirrors, refraction, prisms, dispersion lenses; simple harmonic motion; sound transmission, resonance, interference. Doppler Effect. Electricity and magnetism: Static electricity, electric fields, magnetic fields, electric potential, capacitance; electricity in motion; magnetic induction; electromagnetic relations. Alternating currents.

Prerequisite(s): PH 201

III. Engineering Core (30 Credits)

EL 100 – Introduction to DC/AC Circuits (3 credits):

Basic electrical concepts and laboratory techniques. Current, voltage, resistance and power. Ohm's law, series and parallel resistive circuits. Kirchhoff's voltage and current laws. Loading effects on meters and supplies. Capacitors and Inductors. Charging and discharging. RC and RL time constants. Introduction to AC. Sinusoidal waveforms, phasors and use of the J operator. Reactance and admittance. Average values

and RMS. Laboratory emphasis is on the proper use of standard meters, testing equipment and circuit breadboarding. MATLAB Part I: Introduction to MATLAB, variables, MATLAB functions, data types, writing a MATLAB program, using basic plotting functions.

Corequisite(s): MA 112.

EL-200 – Electronic Devices/Circuits (3 credits):

Principles and characteristics of semiconductor devices. Devices covered include diodes, Zener diodes, bipolar junction transistors, field-effect transistors, and operational amplifiers. Includes bias networks, operating points, maximum output and optimum bias, and DC and AC load lines. Input and output impedances, voltage and current gains for each amplifier configuration.

Prerequisite(s): EL 150.

EL-204 – Digital Electronics (3 credits):

Number systems, including binary, octal and hexadecimal bases. Binary arithmetic. Boolean algebra, Karnaugh map simplification. Design of combinational circuits. Decoders, multiplexers, flip-flops and other multi-vibrator circuits. Logic families including TTL, CMOS, ECL and others. Memory, shift registers and counters.

Prerequisite(s): None

EE 362 - Microcontroller System Design (3 credits):

Study of a state of the art microcontroller and related families. Evaluation board hardware preparation and checkout. PC to board interfaces. Assembler and C-compiler. Configuration registers for code and program protection. On-chip memories. Serial peripheral interface and parallel I/O routines. A/D converter, real-time interrupts and timer applications. A series of three group projects are required leading up to a final stand-alone project.

Prerequisite(s): EL 262 or microcomputer, micro-assembly background.

EE 406 - Signals and Systems (3 credits):

Mathematical models, systems, signal classifications, I/O differential and difference equations, block diagram realizations, discrete-time systems. Convolutions: discrete-time and continuous-time. The Z-transform in linear discrete-time systems, transfer functions. Trigonometric Fourier series, polar and rectangular forms, odd/even functions, response of a linear system to periodic input. Fourier transform, symmetry properties, transform theorems, linear filtering, modulation theorem. Laplace and Fourier transforms and their properties. Offered during fall semester only. Offered during fall semester only.

Prerequisite(s): MA 262 and MA 340

EE 453 - Control I (3 credits) :

Introductory concepts. Feedback control systems and derivation of transfer function. System response for undamped and damped systems. Testing for system stability, coefficient test, Routh-Hurwitz technique. System performance, system types, steady state error and error coefficients calculation. Design of compensator. System bode plots, crossover frequencies, gain and phase margins. The course will stress use of a variety of famous industrial computer-aided control system design software packages.

Prerequisite(s): MA 340

ROB 200 - Robotics Systems Engineering and Analysis (3 credits):

This course introduces the mathematical foundations and physical principles underlying robotic motion within the context of systems engineering. Students will explore forward and inverse kinematics, coordinate transformations, trajectory planning, and robot dynamics for both robotic manipulators and mobile robots. The course also incorporates key aspects of industrial robotics, including practical

applications in work cell design, collaborative robotics, and safety standards. Through hands-on activities, students will design, program, and simulate robotic systems while integrating real-world industrial and autonomous system examples. The course emphasizes a systems engineering approach, from conceptualization to prototyping, ensuring students are prepared for both industrial and autonomous robotics challenges.

Prerequisite(s): EL-100, EL-150 and ROB 100 or UAS-102

ROB 382 - Robotic Systems (3 credits):

This course focuses on the design, control, and implementation of autonomous robotic systems. Students will explore advanced topics in perception, localization, decision-making, and navigation for autonomous systems operating in dynamic and uncertain environments. Emphasis will be placed on integrating sensors, machine learning, and control algorithms to enable autonomy in mobile robots, drones, and other robotic platforms. Topics include path planning, multi-robot coordination, environmental mapping (SLAM), human-robot interaction, and safety in autonomous systems. Students will apply theoretical concepts through team-based projects, culminating in the design, simulation, and implementation of an autonomous robotic system for real-world applications. This course prepares students for advanced roles in robotics and autonomous system design.

Prerequisite(s): EL 262, ROB 300

EE 340 - Systems Engineering (3 credits)

This course introduces the principles and practices of systems engineering, focusing on the design, management, and improvement of complex engineering systems. Students will learn systems lifecycle planning, project management, quality control, and risk analysis, with an emphasis on integrating safety and compliance with engineering standards. Topics include system modeling, production systems planning, and human factors, preparing students to tackle multifaceted projects. Designed for engineering students across disciplines, the course equips participants with the technical and managerial skills needed to develop safe, efficient, and sustainable systems in diverse engineering fields.

Prerequisite(s): BUS 301

UAS 102 - Mechanics of Uncrewed and Autonomous Systems (3 credits):

This course will provide the student an understanding of the component systems common to most Uncrewed and Autonomous Systems with an emphasis on effective integration and operations. The course focuses on the core technologies and includes examinations of the control systems, power plants (motors), servos/actuators, power sources, and communication technologies utilized in uncrewed systems. NOTE: Students enrolled in this course incur an additional lab fee of \$350.

IV. Computer Science and Artificial Intelligence Core (30 Credits)

CS 120 - Introduction to Programming Using Python (3 credits):

The course will cover basic concepts and elements of computer programming using Python. Topics include variables, constants, operators, expressions, statements, branching, loops, and functions. Additionally, Python specific data structures, built-in functions, library modules and working with external files will be applied in developing working code.

CS 150 - Programming in C (3 credits):

This introductory course in programming will enable students to understand how computers translate basic human instructions into machine executable applications. The language of choice for this course is

C. The C syntax that will be covered includes functions; variables and memory allocations including pointer notation; conditional statements and looping. Students will also learn binary to hexadecimal and decimal conversions along with basic computer architecture. Memory management, data input output and file manipulations will be among some other topics discussed and applied during this course. Formerly titled Introduction to Programming Using C.

Prerequisite(s): MA 111 or MA 112 and CS 120 or placement test.

CS 200 - Programming in C++ (3 credits):

Students learn how to program in C++ using an object oriented approach. Design of classes and objects, inheritance and polymorphism, use of pointers and data structured based projects are also covered in this course.

Prerequisite(s): CS 130 or CS 150

CS 230 - Data Structures (3 credits):

Advance pointers and dynamic memory usage. Concepts of object-oriented design and programming. Includes classes, friend functions, templates, operator overloading, polymorphism, inheritance, exception handling, containers, iterators and the standard template library. Applications involve the use of simple data structures such as stacks, queues, linked lists and binary trees. Recursion, searching and sorting algorithms. The above concepts are implemented through a series of hands-on programming projects, all of which are completed as part of the homework requirements.

Prerequisite(s): CS 225 or CS 200.

Corequisite(s): MA 124

DS 235 - Introduction to Data Mining (3 credits):

This course will introduce basic concepts of data mining including data exploration, preparation, supervised and unsupervised learning algorithms, model evaluation and deployment. Students will learn to utilize one or more tools used in data mining to apply their learned data mining techniques to such problems as predictive modeling.

Prerequisite(s): CS 120 or CT 206

AIT 201 - Introduction to Artificial Intelligence (3 credits):

Introduction to Artificial Intelligence explores the foundational principles and applications of AI. Students delve into key concepts such as machine learning, data representation, and problemsolving algorithms. The course introduces ethical considerations in AI development and its societal impact. Exploring various types of AI, from rule-based systems to machine learning approaches, students gain insights into the breadth of AI applications. Hands-on projects provide practical experience in implementing AI techniques. This course equips students with a broad understanding of AI's capabilities and challenges, laying the groundwork for advanced studies and real-world applications.

Prerequisite(s): MA 128

AIT 440 - Advanced Machine Learning (3 credits):

This course will provide coverage of advanced machine learning algorithms and their applications. Topics include supervised and semi-supervised learning, neural networks, deep learning, reinforcement learning and the applications of advanced machine learning techniques to image, text and stream processing.

Prerequisite(s): DS 235 or AIT 360

AIT 370 - Computer Vision (3 credits):

This course provides an introduction to computer vision. The topics will cover basics of image processing, segmentation, edge/line detection and object recognition. The students will also learn

applications of these techniques to various application domains which can include some of the following: surveillance, traffic and road recognition, medical imaging, affective computing, visual tracking, and activity monitoring.

Prerequisite(s): CS 120 or CT 206 or CS 150

AIT 445 – Neural Networks and Deep Learning (3 credits):

This course provides an in-depth study of artificial neural networks and their application in deep learning systems. Students will explore the structure, training, and optimization of feedforward, convolutional, recurrent, and generative neural networks. Topics include backpropagation, activation functions, regularization, dropout, autoencoders, and modern deep learning architectures such as CNNs, RNNs, LSTMs, and transformers. Practical implementation using Python libraries such as TensorFlow and PyTorch will be emphasized through hands-on projects and real-world datasets in image recognition, natural language processing, and autonomous systems.

Prerequisites: AIT 201 and CS 230

AIT 360 - Text Mining and Natural Language Processing (3 credits)

In this course, students will be introduced to a variety of basic principles, and techniques involved in carrying out data mining on textual datasets or textual attributes. Topics include document representation, tokenization, parsing, text categorization, text clustering, topic modeling, and sentiment analysis. Concepts of Natural Language Processing (NLP) and Information Retrieval (IR) relevant to text mining will also be covered.

Prerequisite(s): DS 235

AIT 442 - Deep Generative Models (3 credits)

Generative models are widely used in many subfields of AI and Machine Learning. Recent advances in parameterizing these models using neural networks, combined with progress in stochastic optimization methods, have enabled scalable modeling of complex, high-dimensional data including images, text, and speech. Course covers study the probabilistic foundations and learning algorithms for deep generative models, including Variational Autoencoders (VAE), Generative Adversarial Networks (GAN), and flow models. The course will also discuss application areas that have benefitted from deep generative models, including computer vision, speech and natural language processing, and reinforcement learning.

Prerequisite(s): AIT 201

V. Capstone Design Sequence (6 Credits)

SDE 457 - Senior Design I (3 credits):

Students/teams select a project, develop an understanding of the project scope that includes research and documentation of related work, prepare a feasibility study, develop project requirements (constraints) and engineering, software, and/or security specifications, propose solutions and multiple designs, analyze proposed designs, select a final proposed design, and prepare and present a preliminary design review (PDR). Students are expected to apply proper systems engineering and project management to their work. Additional components may be required in some projects. Students/teams submit a final report at the end of the semester.

Prerequisite(s): Senior standing.

SDE 458 - Senior Design II (3 credits):

Students/teams build and test their selected designs (completed in SDE 457). Each student team delivers a tested prototype and defends its project in front of a panel of experts. Students/teams submit a final report that includes description of the design, realization, and test processes as well as test results, discussion,

and conclusion. Failure to deliver a completed design and a working prototype that meets engineering, software, and/or security specifications by the end of the semester may result in failing the course.

Prerequisite(s): SDE 457

5. Discussion of how general education requirements will be met

The **Bachelor of Science in Artificial Intelligence Engineering** meets all general education requirements as specified by the Maryland Higher Education Commission and COMAR 13B.02.03. The curriculum incorporates a coherent set of general education courses designed to ensure that graduates develop strong communication, ethical reasoning, analytical thinking, and professional skills in addition to technical expertise.

General education requirements are satisfied through coursework in English composition (EN 101, EN 102), ethics (SS 351), arts and humanities (HU 331), business fundamentals (BUS 174), project management (BUS 301), and a humanities or social science elective. These courses support the development of written and oral communication skills, ethical decision-making, cultural awareness, and an understanding of organizational and managerial contexts relevant to engineering practice.

Quantitative reasoning and scientific literacy requirements are fulfilled through required coursework in college-level mathematics and physical sciences, including algebra, calculus, discrete mathematics, linear algebra, probability and statistics, differential equations, and general physics. Collectively, these components ensure that students graduate with a balanced education that integrates technical competence with communication, ethical responsibility, and critical thinking, consistent with statewide general education expectations.

6. Specialized accreditation or graduate certification requirements

The University does not anticipate specialized program accreditation beyond institutional accreditation by the Middle States Commission on Higher Education. However, the **Bachelor of Science in Artificial Intelligence Engineering** has been intentionally designed to align with **ABET student learning outcomes** to ensure academic rigor, engineering relevance, and professional readiness.

The curriculum includes substantial coursework in engineering, computer science, mathematics, and artificial intelligence, and culminates in a two-semester senior design sequence that emphasizes system-level design, implementation, testing, and documentation. This structure prepares graduates for immediate entry into professional practice in artificial intelligence engineering and related fields, as well as for graduate study in engineering, computing, data science, or applied artificial intelligence disciplines.

7. Contractual arrangements with other institutions or organizations

The proposed program does not involve any contractual agreements with other institutions or non-collegiate organizations. All instruction, academic oversight, advising, and program administration will be conducted by Capitol Technology University faculty and staff.

8. Assurance of clear, complete, and timely information for students

Capitol Technology University provides assurance that students enrolled in the **Bachelor of Science in Artificial Intelligence Engineering** will receive clear, complete, and timely information regarding all aspects of the program. Information related to curriculum requirements, course sequencing, degree completion, faculty–student interaction, and institutional policies is communicated through multiple official channels.

These include the University academic catalog, the University website, the Canvas learning management system, and new student orientation programs. Course syllabi clearly outline learning objectives, required technologies, assessment methods, and expectations for student engagement.

Students receive advising support from assigned faculty or professional advisors and have access to academic support services including tutoring, the Writing Center, library resources, and technical support. Program materials also identify required software, programming environments, simulation tools, and hardware platforms used throughout the curriculum. Financial aid information, tuition and fee schedules, and payment policies are coordinated through the Business Office and the Office of Financial Aid to ensure transparency and accessibility.

9. Accuracy of advertising, recruiting, and admissions materials

All advertising, recruiting, and admissions materials for the **Bachelor of Science in Artificial Intelligence Engineering** will be developed and reviewed in coordination with the Office of Marketing and Communications and the Office of Admissions. These materials will accurately represent the program's curriculum, learning outcomes, career pathways, delivery format, and student support services.

Public-facing materials will include dedicated program webpages, print and digital brochures, and outreach materials used for recruitment events. Faculty and admissions staff will be trained to provide consistent and accurate information aligned with the official academic catalog and approved program documentation.

These practices ensure that prospective students receive reliable and comprehensive information, enabling them to make informed enrollment decisions consistent with MHEC expectations for transparency and accuracy.

H. Adequacy of Articulation

Capitol Technology University maintains multiple articulation and partnership agreements that facilitate student transfer and academic progression from two-year institutions and partner universities into its bachelor's degree programs. These agreements directly support the goals of the proposed **Bachelor of Science in Artificial Intelligence Engineering**, which emphasizes interdisciplinary preparation in artificial intelligence, computing, engineering systems, and applied technology.

The Artificial Intelligence Engineering program is intentionally structured to be **transfer-friendly** and will benefit from existing articulation agreements with partner institutions such as Cecil College, Community College of Rhode Island, Columbia Southern University, and Notre Dame of Maryland University. As appropriate, the University will formally include the Artificial Intelligence Engineering degree within its articulated transfer pathways to ensure alignment with associate-level programs in computer science, information technology, engineering technology, robotics, and related technical disciplines.

The curriculum incorporates lower-division coursework in programming, digital systems, mathematics, physics, and introductory engineering—subjects that are commonly offered at community colleges and military-affiliated education centers. This alignment enables students who have completed associate degrees or equivalent transferable coursework to transition efficiently into the upper-division Artificial Intelligence Engineering curriculum and complete the bachelor's degree in approximately two years of full-time study.

Capitol Technology University also supports early articulation and pipeline development through its engagement with pre-college STEM initiatives, including Project Lead The Way (PLTW), dual-enrollment opportunities, and participation on the Prince George's County Public Schools PLTW Engineering Program Advisory Committee. These initiatives promote early exposure to engineering, computing, and artificial intelligence concepts and help prepare students for successful transition into university-level STEM programs.

The University will continue to expand and strengthen articulation partnerships across Maryland and beyond by developing program-specific course equivalency maps, dual-admissions pathways, and coordinated transfer advising. Formal articulation agreements and supporting documentation relevant to the Bachelor of Science in Artificial Intelligence Engineering will be included in the appendices of this proposal as they are finalized.

I. Adequacy of Faculty Resources

1. Faculty qualifications and instructional capacity

The **Bachelor of Science in Artificial Intelligence Engineering** will be delivered by an experienced, interdisciplinary team of full-time and adjunct faculty whose collective expertise spans artificial intelligence, computer science, embedded systems, robotics, control systems, cybersecurity, systems engineering, mathematics, physics, and project-based instruction. Faculty supporting the program possess strong academic credentials, including terminal degrees in engineering, computer science, analytics, and related fields, as well as extensive industry and applied research experience.

Program faculty have been actively involved in curriculum development, assessment planning, and instructional design for artificial intelligence and engineering programs. Their combined academic, research, and professional backgrounds ensure that students receive instruction grounded in both theoretical foundations and real-world engineering practice. The mix of full-time and adjunct faculty provides instructional depth, curricular continuity, and flexibility while maintaining academic quality and program stability.

2. Summary of faculty assignments

Full-Time Faculty

- **Dr. Mohamed Shehata**, Ph.D. in Engineering (Purdue University), Dean of Academics and Chair of Engineering. Dr. Shehata provides academic leadership for the program and teaches courses in engineering design, control systems, systems engineering, and autonomous systems applications.
- **Dr. Gregory P. Behrmann**, Ph.D. in Mechanical Engineering (The Catholic University of America). Dr. Behrmann teaches robotics, engineering mechanics, and systems engineering, with applied research interests in intelligent systems and human–robot collaboration.
- **Dr. Andrew Mehri**, Ph.D. in Computer Science. Dr. Mehri provides instruction in digital logic, computer systems, and technical computing, and supports integration between software and electronics curricula.

- **Dr. Jeff Chi**, Ph.D. in Project Management. Dr. Chi supports instruction in systems engineering and project management, with industry experience in project integration, planning, and sustainability.
- **Dr. Nisma M. Omar**, Ph.D. in Analytical Chemistry. Dr. Omar teaches foundational science courses and supports general education related to scientific literacy and technical communication.
- **Dr. Kellep Charles, Ph.D.** in Cybersecurity (Capitol Technology University), M.S. in Telecommunication Management (University of Maryland University College), B.S. in Computer Science (North Carolina Agricultural and Technical State University). Dr. Charles teaches courses in artificial intelligence, cybersecurity, and autonomous systems.
- **Mr. Joseph Harvey**, M.A. in Information Technology Management (Webster University), B.S. in Computer Science (Bowie State University). Mr. Harvey teaches artificial intelligence, software systems, and applied computing courses and is currently a Ph.D. candidate in Artificial Intelligence at Capitol Technology University.
- **Mr. Jeff Volosin**, B.S. in Space Science (Florida Institute of Technology), **Full-Time Faculty and Chair of Astronautical and Space Engineering**. Mr. Volosin brings over 38 years of industry and NASA experience in spacecraft systems, mission operations, and autonomous systems development, supporting instruction in systems integration and AI applications in aerospace systems.
- **Dr. Tahani Baabdullah**, Ph.D. in Computer Science, **Full-Time Faculty** specializing in artificial intelligence and machine learning, with research and industry experience in deep learning, cybersecurity, and blockchain-integrated AI systems.
- **Prof. Amelia Wear**, M.S. in Software Engineering; B.S. in Mechanical Engineering, **Full-Time Faculty and Lead Systems Engineer (industry background)**. Prof. Wear brings expertise in systems integration, controls, and agile development to instruction in applied systems design and mechatronics.

Adjunct Faculty

- **Ms. Megan Miskovish**, M.S. in Education. Ms. Miskovish teaches English composition and humanities courses supporting student communication and professional writing skills.

3. Course–Faculty Assignment Matrix

The following matrix summarizes faculty instructional responsibility for courses in the Artificial Intelligence Engineering program. Full-time and adjunct faculty assignments ensure coverage of all program components while supporting continuity and instructional quality.

Faculty Appointment and Teaching Assignment Summary

Faculty	Appointment Type	Course Numbers Taught
Dr. Mohamed Shehata	Full-Time Faculty	EE 406, MA 261, MA 262, MA 340
Dr. Gregory P. Behrmann	Full-Time Faculty	EE 453, PH 202, ROB 200, ROB 382

Dr. Andrew Mehri	Full-Time Faculty	CS 200, EL 200, SDE 457, SDE 458
Dr. Jeff Chi	Full-Time Faculty	BUS 174, BUS 301, HU/SS Elective
Dr. Nisma M. Omar	Full-Time Faculty	MA 114, MA 330, MA 345, PH 201
Dr. Kellep Charles	Full-Time Faculty	AIT 360, AIT 440, AIT 442, AIT 445
Mr. Joseph Harvey	Full-Time Faculty	CS 150, CS 230, DS 235
Dr. Tahani Baabdullah	Full-Time Faculty	AIT 201, AIT 370, CS 120
Mr. Jeff Volosin	Full-Time Faculty	EE 340, UAS 102
Prof. Amelia Wear	Full-Time Faculty	EE 362, EL 100, EL 204, MA 124
Ms. Megan Miskovich	Adjunct Faculty (Part-Time)	EN 101, EN 102, HU 331, SS 351

4. Faculty development and training

Capitol Technology University is committed to continuous faculty development through its **Center for Innovation in Teaching and Learning (CITL)**. The CITL provides structured professional development opportunities to ensure faculty remain current with evidence-based pedagogical practices and emerging technologies relevant to artificial intelligence and engineering education.

a. Pedagogy aligned with student needs

Faculty receive training in inclusive, student-centered instructional approaches, with emphasis on active learning, project-based instruction, and team-oriented design experiences. These pedagogical strategies are particularly important in the Artificial Intelligence Engineering program, where students must integrate technical, ethical, and societal considerations into system design and implementation. Faculty development initiatives also support instruction for diverse learner populations, including adult learners, military-affiliated students, and underrepresented groups in engineering and computing.

b. Learning management system support

The University uses **Canvas** as its learning management system. Faculty receive Canvas training during onboarding and have access to ongoing workshops, tutorials, and helpdesk support. Training includes effective use of Canvas tools for assignments, rubrics, assessments, analytics, and student engagement.

c. Distance education

The Artificial Intelligence Engineering program is currently offered in an **in-person format**. If distance or hybrid delivery is implemented in the future, faculty will receive dedicated training in online instructional design, accessibility, and best practices for virtual learning environments in accordance with institutional policies and MHEC guidelines.

J. Adequacy of Library Resources

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

Capitol Technology University's Puente Library provides comprehensive academic and research support for students and faculty in the proposed Bachelor of Science in Artificial Intelligence Engineering program. The library offers a robust collection of physical and digital resources that are routinely reviewed and updated to ensure alignment with program learning outcomes, curriculum content, and the rapidly evolving fields of artificial intelligence, computing, and engineering.

Students enrolled in the Artificial Intelligence Engineering program have access to an extensive range of scholarly journals, eBooks, reference materials, and technical publications supporting coursework and research in artificial intelligence, machine learning, data science, robotics, autonomous systems, computer engineering, software development, mathematics, and applied sciences. Key electronic resources include databases such as IEEE Xplore, ScienceDirect, SpringerLink, JSTOR, and ProQuest, which provide full-text access to peer-reviewed journals, conference proceedings, standards, and applied research relevant to AI and intelligent systems engineering.

The Puente Library also provides access to professional standards, industry white papers, and technical reference materials related to AI system design, cybersecurity, embedded systems, control systems, ethics in technology, and systems engineering. Required and recommended textbooks supporting both foundational and advanced courses are available in print and electronic formats, ensuring accessibility for students across instructional modalities.

To ensure the continued adequacy of library resources, the University's academic leadership works in close coordination with library staff and program faculty to assess discipline-specific needs and support targeted acquisitions. Faculty teaching in the Artificial Intelligence Engineering program may request new books, journals, datasets, software documentation, and instructional resources, which are evaluated and prioritized based on curriculum requirements, enrollment trends, and developments in AI research and industry practice.

Library services include online and in-person research assistance, interlibrary loan services, citation and reference management support, and instruction in information literacy and scholarly research practices. These services support students in developing the skills necessary to locate, evaluate, and apply technical and academic information effectively in coursework, capstone projects, and professional practice.

Capitol Technology University affirms that the Puente Library's collections, services, and acquisition processes are fully adequate to support the launch and ongoing operation of the Bachelor of Science in Artificial Intelligence Engineering program.

Measures to Ensure Adequate Support

- The university will conduct annual reviews of library holdings to ensure resources remain current and aligned with artificial intelligence engineering curricula and emerging industry trends.
- Additional textbooks, research monographs, technical manuals, datasets, and reference materials related to AI, machine learning, robotics, autonomous systems, and computing will be acquired as needed.
- Library staff will collaborate with Artificial Intelligence Engineering faculty to identify and obtain key academic, technical, and industry resources that enhance student learning, research, and capstone design activities.
- The university will continue to expand access to digital databases and online research tools, ensuring equitable availability for on-campus, hybrid, and future distance-learning students.

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

Provide an assurance that physical facilities, infrastructure, and instructional 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.

Capitol Technology University affirms that it possesses the physical facilities, infrastructure, and instructional equipment necessary to successfully launch and sustain the Bachelor of Science in Artificial Intelligence Engineering program. The university maintains modern instructional classrooms equipped with multimedia projection systems, high-speed wireless connectivity, and collaborative learning technologies that support lecture-based instruction, applied learning, and team-oriented project work.

Existing laboratory facilities currently supporting programs in engineering, computer science, robotics, and applied computing will be utilized to support the Artificial Intelligence Engineering curriculum. These laboratories are designed to support hands-on instruction, experimentation, and project-based learning in areas including:

- Artificial intelligence and machine learning development
- Programming, software systems, and data analytics
- Digital systems and computer architecture
- Embedded systems and microcontroller platforms
- Robotics, autonomous systems, and sensor integration
- Control systems, signal processing, and systems engineering
- Engineering design, simulation, and systems integration

Laboratory spaces are equipped with industry-standard instrumentation, computing workstations, development boards, sensors, robotics platforms, and prototyping equipment. Instructional software and tools include MATLAB, simulation environments, programming frameworks, and AI development libraries appropriate for undergraduate instruction. Safety equipment and established laboratory protocols are in place to support instructional activities involving hardware, electronics, and autonomous platforms. Existing resources are sufficient to support the proposed curriculum without requiring significant new capital investment at program initiation.

Faculty and staff offices are available and appropriately equipped to support academic advising, student mentoring, research activity, curriculum development, and program administration. Space utilization and infrastructure capacity are reviewed regularly to ensure continued adequacy as enrollment grows and instructional needs evolve.

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:

Capitol Technology University ensures that students and faculty participating in any hybrid or distance-supported components of the Artificial Intelligence Engineering program will have full access to the digital infrastructure required for effective instruction, communication, and academic support.

a) An institutional electronic mailing system

All students and faculty are provided with official university email accounts through Microsoft Office 365. These accounts serve as the primary means of academic and administrative communication, including course announcements, advising correspondence, instructional coordination, and institutional notifications.

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

Canvas serves as the university’s official learning management system. The platform supports course content delivery, assignments, assessments, discussion forums, group collaboration, and multimedia integration for both in-person and hybrid instruction. Faculty receive training and ongoing support in effective LMS use, and students are provided orientation resources and technical assistance to ensure successful engagement with course materials.

L. Adequacy of Financial Resources with Documentation

Complete Table 1: Resources and Narrative Rationale

The Bachelor of Science in Artificial Intelligence Engineering will be implemented using existing physical facilities, infrastructure, instructional equipment, and administrative resources currently available at Capitol Technology University. The university is well positioned to support the program using existing classrooms, laboratories, faculty offices, and instructional technologies that serve engineering, computer science, artificial intelligence, robotics, and applied computing programs.

TABLE 1: RESOURCES

Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	\$0	\$0	\$0	\$0	\$0
2. Tuition/Fee Revenue (c + g below)	\$350,060	\$707,940	\$1,065,072	\$1,449,072	\$1,851,644
a. Number of F/T Students	8	16	24	32	40
b. Annual Tuition/Fee Rate	\$27,808	\$28,503	\$29,216	\$29,946	\$30,695
c. Total F/T Revenue (a × b)	\$222,464	\$465,048	\$701,184	\$958,272	\$1,227,800
d. Number of P/T Students	7	13	19	25	31
e. Credit Hour Rate	\$1,519	\$1,557	\$1,596	\$1,636	\$1,677
f. Annual Credit Hours	12	12	12	12	12
g. Total P/T Revenue (d × e × f)	\$127,596	\$242,892	\$363,888	\$490,800	\$623,844
3. Grants, Contracts and Other External Sources	\$0	\$0	\$0	\$0	\$0
4. Other Sources	\$0	\$0	\$0	\$0	\$0
TOTAL (Add 1–4)	\$350,060	\$707,940	\$1,065,072	\$1,449,072	\$1,851,644

Narrative Rationale for Table 1: Program Resources

Reallocated Funds

No reallocated funds are required for the Bachelor of Science in Artificial Intelligence Engineering. The program leverages existing instructional, laboratory, computing, and administrative resources currently supporting engineering, computer science, and robotics programs. No existing programs will be reduced or eliminated to support this initiative.

Tuition and Fee Revenue

Tuition and fee revenue projections are based on conservative enrollment assumptions, beginning with 8 full-time and 7 part-time students in Year 1 and growing to 40 full-time and 31 part-time students by Year 5. Tuition rates reflect the university's published rates and assume an average annual increase of approximately 2.5 percent.

Part-time enrollment projections assume a 12-credit annual course load per student. These projections align with Capitol Technology University's strategic focus on engineering, artificial intelligence, and workforce-oriented STEM programs and are sufficient to support instructional staffing, laboratory operations, academic support services, and program administration.

Grants, Contracts, and External Sources

No external funding is included in the initial financial model. The university may pursue AI-focused workforce development grants, STEM education grants, and industry partnerships in later years to support student research, capstone projects, internships, and scholarships.

Other Sources

No additional funding sources are anticipated at program launch. Future opportunities may include philanthropic contributions, employer-sponsored initiatives, or state and federal innovation programs related to artificial intelligence and autonomous systems.

Complete Table 2: Program Expenditures and Narrative Rationale

TABLE 2: EXPENDITURES

Expenditure Category	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c)	\$113,468	\$155,071	\$238,421	\$325,843	\$417,486
a. # FTE	1.5	2	3	4	5
b. Total Salary	\$94,557	\$129,226	\$198,684	\$271,536	\$347,905
c. Total Benefits (20%)	\$18,911	\$25,845	\$39,737	\$54,307	\$69,581
2. Administrative Staff (b + c)	\$5,942	\$6,091	\$6,244	\$6,400	\$6,559
a. # FTE	0.08	0.08	0.08	0.08	0.08
b. Total Salary	\$4,952	\$5,076	\$5,203	\$5,333	\$5,466
c. Total Benefits	\$990	\$1,015	\$1,041	\$1,067	\$1,093
3. Support Staff (b + c)	\$59,885	\$92,076	\$125,837	\$161,230	\$198,313
a. # FTE	1	1.5	2	2.5	3
b. Total Salary	\$49,905	\$76,730	\$104,864	\$134,358	\$165,261
c. Total Benefits	\$9,980	\$15,346	\$20,973	\$26,872	\$33,052
4. Technical Support and Equipment	\$840	\$1,425	\$2,320	\$3,145	\$4,140
5. Library	\$0	\$0	\$0	\$0	\$0
6. New or Renovated Space	\$0	\$0	\$0	\$0	\$0
7. Other Expenses	\$5,850	\$14,210	\$25,370	\$39,330	\$56,090
TOTAL (Add 1–7)	\$185,985	\$268,873	\$398,192	\$535,948	\$682,588

Narrative Rationale for Table 2: Program Expenditures

Faculty

Faculty costs include salaries and benefits (estimated at 20%) for instructors teaching artificial intelligence, machine learning, programming, engineering systems, robotics, control systems, and capstone design courses. Faculty staffing increases from 1.5 FTE in Year 1 to 5 FTE by Year 5, reflecting enrollment growth and expanded upper-division AI and engineering coursework. Instruction will be delivered through a combination of full-time faculty and adjunct instructors with academic and industry expertise.

Administrative Staff

A fractional administrative allocation (0.08 FTE) supports advising coordination, scheduling, reporting, and student services. Costs reflect standard institutional rates and modest annual adjustments.

Support Staff

Support staff include laboratory coordinators, technical assistants, and instructional support personnel required for hands-on laboratories, computing environments, robotics platforms, and AI-related instructional activities. Staffing increases from 1 FTE to 3 FTE by Year 5 to support expanded lab usage and enrollment.

Technical Support and Equipment

These costs support software licenses, computing resources, equipment maintenance, consumable materials, and instructional technology associated with AI development, simulation, and laboratory activities. Increases correspond to growing enrollment and laboratory utilization.

Library

No additional library expenditures are required. The program relies on existing digital and physical library resources supporting artificial intelligence, engineering, computing, data science, and related disciplines.

New or Renovated Space

No new construction or renovation is required. Existing classrooms, computing laboratories, and engineering facilities are sufficient to support the program.

Other Expenses

Other expenses include marketing, faculty development, assessment activities, accreditation preparation, and continuous improvement efforts. These costs scale appropriately with enrollment growth.

M. Adequacy of Provisions for Evaluation of Program

Procedures for Evaluating Courses, Faculty, and Student Learning Outcomes

Capitol Technology University has established institutional processes for evaluating the quality and effectiveness of all academic programs, including the proposed Bachelor of Science in Artificial Intelligence Engineering. Courses will be evaluated at the conclusion of each semester through standardized student course evaluations that assess instructional effectiveness, course organization, learning resources, laboratory and project experiences, and perceived achievement of course learning outcomes. These evaluations are reviewed by the department chair and program leadership to identify strengths and areas for improvement.

Faculty performance is evaluated using multiple measures, including student feedback, peer observations, course portfolio review, and annual performance evaluations conducted by the department chair and the Dean of Academics. Faculty evaluations emphasize instructional quality, engagement with students, alignment of course content with program learning outcomes, incorporation of applied and project-based learning, and contributions to curriculum development and assessment activities.

Student learning outcomes (SLOs) are assessed at both the course and program levels. Faculty teaching courses mapped to specific program outcomes collect assessment data using examinations, programming assignments, laboratory exercises, system design projects, technical reports, presentations, and capstone deliverables. Standardized rubrics are used to ensure consistency in evaluation across sections and instructors. Assessment results are reviewed during departmental meetings and formal program review cycles to identify trends, address gaps, and guide continuous improvement of curriculum and instructional practices.

Evaluation of Educational Effectiveness

The educational effectiveness of the Bachelor of Science in Artificial Intelligence Engineering will be evaluated using a combination of quantitative and qualitative measures aligned with Capitol Technology University's institutional assessment framework. Key evaluation components include:

Assessment of Student Learning Outcomes:

The program will maintain a systematic process for mapping, measuring, and reviewing outcomes related to artificial intelligence fundamentals, engineering problem-solving, system design, data-driven decision-making, teamwork, communication, ethical responsibility, and lifelong learning. Data from embedded course assessments, laboratory and programming assignments, and the two-course capstone design sequence will be collected each semester and analyzed annually. Results will be used to inform curriculum refinement, sequencing adjustments, and instructional enhancements.

Student Retention and Graduation Rates:

Program-level retention and graduation data will be monitored to ensure that students progress effectively through the curriculum. The program will utilize early alert systems, structured academic advising, and targeted student support services to identify academic challenges and promote student persistence, particularly in mathematically and technically intensive coursework.

Student and Faculty Satisfaction:

Student satisfaction will be evaluated through course evaluations, program-level surveys, and informal feedback mechanisms. Faculty satisfaction will be assessed through annual surveys and departmental discussions addressing workload, resources, curriculum coherence, and instructional support. Feedback from students and faculty will be reviewed by program leadership to guide improvements in course delivery, advising, facilities, and instructional resources.

Cost-Effectiveness:

The Office of Academic Affairs, in collaboration with the Business and Finance Division, will conduct periodic reviews of enrollment trends, instructional costs, faculty utilization, and laboratory resource usage. These reviews ensure that the program remains financially sustainable while maintaining high instructional quality and adequate student support.

Advisory and Workforce Input:

Input from industry partners, employers, and the program's advisory board will be incorporated into periodic program reviews. This external feedback will help ensure that the curriculum remains aligned with evolving workforce needs, emerging technologies in artificial intelligence and autonomous systems, and employer expectations for graduates.

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

Minority Student Access, Success, and Institutional Diversity Initiatives

The Bachelor of Science in Artificial Intelligence Engineering aligns closely with Maryland's goals to promote minority student access, success, and educational equity, as articulated in COMAR 13B.02.03.05 and the Maryland State Plan for Postsecondary Education. Capitol Technology University maintains a strong institutional commitment to diversity, inclusion, and equitable access to STEM education, particularly in advanced technology and engineering disciplines where minority participation has historically been limited.

The proposed program is intentionally designed to expand access to high-demand careers in artificial intelligence, computing, and engineering for students from underrepresented and underserved populations, including African American, Hispanic/Latino, female, first-generation college students, military-affiliated learners, and adult students. The program's applied, interdisciplinary structure—combining engineering foundations, computer science, and artificial intelligence—provides multiple entry points for students who may not traditionally pursue highly specialized engineering pathways but seek rigorous, workforce-aligned education in emerging technologies.

The Bachelor of Science in Artificial Intelligence Engineering supports minority student access and success through several key strategies:

- **Transfer-Friendly Pathways:** The program is structured to support transfer students through articulation agreements and course alignment with Maryland community colleges, many of which serve large and diverse student populations. Lower-division coursework in programming, mathematics, physics, and engineering fundamentals facilitates seamless transfer and degree completion.
- **Comprehensive Academic Advising and Mentoring:** Students receive structured advising and mentoring supported by early alert and academic intervention systems designed to identify and address academic challenges early, particularly in mathematically and technically intensive coursework.
- **Financial Access and Support:** The university provides access to institutional scholarships, federal and state financial aid, and military and veteran education benefits, helping to reduce financial barriers for economically disadvantaged and underrepresented students pursuing AI and engineering degrees.
- **Applied and Project-Based Learning:** The curriculum emphasizes hands-on laboratories, programming projects, robotics and autonomous system design, and a two-semester capstone experience. Research indicates that applied and experiential learning approaches improve engagement, persistence, and completion rates among minority students in STEM disciplines.

- **Inclusive Instructional Practices:** Faculty participate in professional development focused on inclusive pedagogy, culturally responsive teaching, and Universal Design for Learning (UDL). These practices ensure that instruction accommodates diverse learning styles and supports student success across a broad range of academic backgrounds.

In addition to program-specific strategies, Capitol Technology University advances institutional diversity goals through campus-wide initiatives including inclusive recruitment practices, multicultural programming, student organizations that support underrepresented populations in STEM, and the integration of equity and inclusion principles into strategic planning and academic decision-making.

Through these combined efforts, the Bachelor of Science in Artificial Intelligence Engineering directly supports Maryland's statewide priorities related to minority student achievement. The program advances **Goal 1 (Student Access)** by expanding pathways into high-demand AI and engineering fields and **Goal 2 (Student Success)** by fostering a supportive, inclusive, and career-relevant academic environment that promotes persistence, degree completion, and workforce readiness for underrepresented students.

O. Relationship to Low Productivity Programs Identified by the Commission

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

The proposed Bachelor of Science in Artificial Intelligence Engineering is not a direct continuation, replacement, or restructuring of any low productivity program identified by the Maryland Higher Education Commission. Rather, the program has been developed as part of Capitol Technology University's strategic academic planning and continuous improvement efforts, informed by enrollment trends, internal program reviews, and documented workforce demand in artificial intelligence, computing, and engineering.

While the program is not formally linked to a designated low productivity program, it is intentionally designed to make efficient and effective use of existing institutional resources. The interdisciplinary nature of the Artificial Intelligence Engineering curriculum allows the university to leverage faculty expertise, instructional infrastructure, and support services that already serve engineering, computer science, and applied computing programs—some of which have experienced fluctuating enrollments in narrowly focused or traditional technical concentrations.

Specifically, the program will:

- **Leverage existing faculty expertise** in engineering, computer science, data science, robotics, control systems, and systems engineering, including faculty whose instructional capacity may not be fully utilized due to lower enrollments in specialized or legacy technical programs.
- **Utilize shared classroom and laboratory infrastructure**, including electronics laboratories, robotics and autonomous systems labs, computing facilities, and simulation environments, thereby minimizing duplication of equipment and reducing incremental operating costs.
- **Rely on established administrative, advising, and library support structures**, ensuring that academic oversight and student services are delivered efficiently without the need for additional administrative overhead.

- **Enhance overall academic productivity** by attracting transfer students, adult learners, and workforce-oriented students seeking preparation in high-demand AI and engineering fields, thereby strengthening enrollment, retention, and degree completion outcomes across related disciplines.

In this way, although the Bachelor of Science in Artificial Intelligence Engineering is not directly associated with a specific low productivity program identified by the Commission, it represents a strategic realignment of institutional resources toward a high-demand, interdisciplinary engineering program. This approach supports institutional sustainability while ensuring that instructional capacity, facilities, and academic support services are aligned with current student interests and workforce needs.

P. Adequacy of Distance Education Programs

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

Capitol Technology University is fully authorized by the Maryland Higher Education Commission (MHEC) to offer distance education programs. The university has a demonstrated history of delivering high-quality online and hybrid instruction at both the undergraduate and graduate levels in engineering, computer science, artificial intelligence, cybersecurity, and business disciplines.

Capitol Technology University is also an approved participant in the National Council for State Authorization Reciprocity Agreements (NC-SARA), which authorizes the institution to offer distance education to students residing in other SARA member states. Participation in NC-SARA confirms the university's compliance with applicable state and national requirements governing distance education delivery and interstate enrollment.

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

Capitol Technology University affirms full compliance with the Council of Regional Accrediting Commissions (C-RAC) guidelines for the delivery and evaluation of distance education. Institutional policies, instructional standards, and student support services ensure that courses delivered through distance modalities meet the same academic rigor, learning outcomes, and quality expectations as those offered in traditional on-campus formats.

Specifically, the university ensures that:

- Curriculum quality, academic rigor, and student learning outcomes are equivalent across on-campus, hybrid, and online delivery formats.
- Regular and substantive faculty–student interaction is maintained through scheduled virtual class sessions, discussion forums, timely feedback on assignments, and direct instructor communication.
- Student identity verification is conducted through secure authentication protocols within the Canvas learning management system and associated assessment platforms, safeguarding academic integrity.

- Student support services—including academic advising, tutoring, library resources, technical support, and career services—are fully accessible to students enrolled in distance education courses.
- Reliable technology infrastructure is maintained to support consistent access to Canvas, video conferencing tools, programming platforms, and AI-related software resources.
- Faculty assigned to teach online or hybrid courses receive training in online pedagogy, instructional design, and effective use of the learning management system.

The Bachelor of Science in Artificial Intelligence Engineering is designed to be delivered primarily in an on-campus format, reflecting the program’s emphasis on hands-on laboratories, engineering design, hardware–software integration, and project-based learning. However, selected courses—particularly in general education, programming, data science, management, and selected AI theory topics—may be offered in online or hybrid formats when appropriate.