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

Institution Submitting Proposal	Capitol Technology University

Each action below requires a separate proposal and cover sheet.

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

Payment Submitted: (●) Yes ( ) No Payment Type: ( ) R*STARS # 99113 (●) Check # 99113 Payment Amount: 850.00 Date Submitted: 10/20/25

Department Proposing Program	Engineering	
Degree Level and Degree Type	Bachelor of Science (B.S.)	
Title of Proposed Program	Bachelor of Science in Artificial Intelligence and Autonomous Systems	
Total Number of Credits	120	
Suggested Codes	HEGIS: 909.00	CIP: 14.4201
Program Modality	( ) On-campus ( ) Distance Education (fully online) (●) Both	
Program Resources	(●) Using Existing Resources ( ) Requiring New Resources	
Projected Implementation Date (must be 60 days from proposal submisison as per COMAR 13B.02.03.03)	(●) Fall ( ) Spring ( ) Summer	Year: 2026
Provide Link to Most Recent Academic Catalog	URL: https://catalog.captechu.edu	
Preferred Contact for this Proposal	Name: Dr. Mohamed Shehata	
	Title: Dean of Academics	
	Phone: (240) 965-2437	
	Email: mshehata@captechu.edu	
President/Chief Executive	Type Name: Bradford Sims	
	Signature: [signature]	Date: 10-31-25
	Date of Approval/Endorsement by Governing Board: Oct. 31, 2025	

Revised 1/2021

CAPITOL
Technology University

November 1, 2025

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

Dear Dr. Rai,

Capitol Technology University is requesting approval to offer **a Bachelor of Science in Artificial Intelligence and Autonomous Systems (AIAS)**. This interdisciplinary degree is designed to prepare graduates for leadership roles in the rapidly growing fields of autonomous systems, robotics, and artificial intelligence across industries such as transportation, defense, aerospace, manufacturing, and smart infrastructure.

The curriculum integrates foundational engineering and computer science principles with advanced topics in machine learning, embedded systems, robotics, and real-time decision-making. The program will be delivered by existing university faculty with expertise in artificial intelligence, control systems, robotics, and computer engineering, supported by instructional resources in data science, cybersecurity, and automation technologies.

Capitol Technology University's mission is to deliver career-relevant education in engineering, computer science, information technology, and business—preparing individuals for professional success and lifelong learning. The proposed AIAS program reflects this mission by combining theoretical knowledge with hands-on, project-based learning experiences that emphasize interdisciplinary design, systems integration, and intelligent autonomy.

There is a strong and growing demand for professionals capable of developing, deploying, and managing autonomous systems that operate in complex, real-world environments. The B.S. in Artificial Intelligence and Autonomous Systems directly responds to this need and supports Maryland's State Plan for Postsecondary Education by advancing goals in innovation, workforce development, and technological leadership.

To support this request, we respectfully submit the enclosed proposal for your review. Please also find the required documentation affirming the adequacy of Capitol Technology University's faculty, library, and instructional resources to serve students enrolled in this degree program.

Thank you for your consideration.

Respectfully,

Bradford L. Sims, PhD
President

CAPITOL
Technology University

November 1, 2025

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

Dear Dr. Rai,

This letter is in response to the need for confirmation of the adequacy of the library of Capitol Technology University to support the proposed **Bachelor of Science in Artificial Intelligence and Autonomous Systems (AIAS)**. As president of the university, I confirm that the library resources, including support staff, are more than adequate to support the B.S. in Artificial Intelligence and Autonomous Systems. Additionally, the university remains dedicated and committed to the continuous improvement of its library resources by providing sufficient budget to ensure the success of our students.

Respectfully,

Bradford L. Sims, PhD

President

99113 VENDOR NO. 17911 DATE 10/29/2025 CHECK NO. 99113

CAPITOL TECHNOLOGY UNIVERSITY

INVOICE NUMBER	INVOICE DATE	DESCRIPTION	GROSS AMOUNT	DISCOUNT/ADJUSTMENTS	PAYMENT AMOUNT
10272025-2	10/27/2025	New Degree Proposal BS Artificial	850.00	0.00	850.00
			850.00	0.00	850.00

ORIGINAL CHECK HAS A COLORED BACKGROUND PRINTED ON CHEMICAL REACTIVE PAPER - SEE BACK FOR DETAILS

CAPITOL Technology University

11301 SPRINGFIELD ROAD, LAUREL, MD 20708
PH: 301-369-2800

FIRST NATIONAL BANK
60-1809/433

99113

DATE 10/29/2025

CHECK AMOUNT
$ *********850.00

PAY EIGHT HUNDRED FIFTY AND NO/100 DOLLARS

TO THE ORDER OF
Maryland Higher Education Commissic
217 E.Redwood Street Suite 2100
Baltimore, MD 21202

CAPITOL TECHNOLOGY UNIVERSITY

⑈099113⑈ ⑆043318092⑆ 030112666⑈

PROPOSAL FOR:

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

CAPITOL Technology University

Institution Submitting Proposal

Fall 2026
Projected Implementation Date

Bachelor of Science
Award to be Offered

Artificial Intelligence and Autonomous Systems
Title of Proposed Program

0909
Suggested HEGIS Code

14.4201
Suggested CIP Code

Engineering
Department of Proposed Program

Dr. Mohamed Shehata
Name of Department Head

Dr. Mohamed Shehata
Dean of Academics

mshehata@captechu.edu
Contact E-Mail Address

(240) 965-2473
Contact Phone Number

10-31-25
Signature and Date

President/Chief Executive Approval

OCT. 31, 2025
Date

Date Endorsed/Approved by Governing Board

Bachelor of Science (B.S.)
in
Artificial Intelligence and Autonomous Systems (AIAS)

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 and Autonomous Systems is a 120-credit undergraduate program designed to prepare students for professional careers in artificial intelligence, robotics, automation, and intelligent systems engineering. The program focuses on the integration of AI algorithms, autonomous decision-making, machine learning, control systems, and embedded technologies to design and implement intelligent machines and autonomous platforms that interact safely and effectively with the physical world. Students learn to design, analyze, and manage systems that combine perception, computation, and control — from industrial robots and drones to intelligent vehicles and smart infrastructures.

The curriculum provides a solid foundation in engineering and computer science principles, followed by advanced studies in artificial intelligence, data analytics, machine learning, control theory, and autonomous system design. Through project-based coursework and laboratory experiences, students develop practical skills in programming, modeling, simulation, and system integration using industry-standard tools such as Python, MATLAB, TensorFlow, and ROS. The program culminates in a two-course capstone sequence where students work in multidisciplinary teams to design and demonstrate an AI-driven or autonomous system that addresses a real-world problem.

In addition to the technical core, the program includes coursework in mathematics and science (33 credits), humanities and social sciences (21 credits), and general education in communication, business, and ethics. This balanced curriculum ensures that students graduate with strong analytical, communication, and ethical reasoning skills, while fostering innovation, teamwork, and lifelong learning.

The program aligns with the mission of Capitol Technology University to educate individuals for professional opportunities in engineering, computer and information sciences, and business—providing relevant, hands-on learning experiences that lead to success in an evolving global community. The B.S. in Artificial Intelligence and Autonomous Systems fulfills this mission by preparing graduates to lead in one of the most rapidly growing and impactful technology sectors of the 21st century. The program strengthens Capitol's leadership in STEM education by expanding its portfolio into the high-demand domains of AI, robotics, and autonomous system development.

The program supports the university's Strategic Vision 2025 by advancing the goals of innovation, interdisciplinary learning, and workforce development. It promotes applied research, ethical design, and real-world engagement, aligning with regional and national priorities for automation, digital transformation, and intelligent system integration.

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 and Autonomous Systems directly supports Capitol Technology University's strategic goals of expanding its portfolio in emerging technologies, fostering interdisciplinary innovation, and strengthening alignment with high-demand workforce sectors. The program was developed to meet the growing need for engineers and computer scientists capable of designing and maintaining AI-driven and autonomous systems across multiple industries—including defense, aerospace, manufacturing, transportation, and healthcare.

The program contributes to Goal I: Expand Educational Offerings and Increase Program Completion by introducing a specialized, cross-disciplinary degree that builds upon Capitol's established strengths in computer engineering, robotics, and systems design. The curriculum integrates AI, data science, and embedded systems to provide a unified platform for innovation and applied research in intelligent automation.

It supports Goal II: Increase Enrollment and Institutional Awareness by attracting students from diverse academic backgrounds—including traditional high school graduates, transfer students from community colleges, and working professionals seeking re-skilling opportunities in artificial intelligence and robotics. The program's interdisciplinary nature, combined with project-based learning, positions Capitol as a regional leader in applied AI education.

The program advances Goal III: Improve Utilization of University Resources and Institutional Effectiveness by leveraging existing laboratories, equipment, and instructional capacity within the School of Engineering and Computer Sciences. Shared foundational courses in electronics, control, and programming ensure instructional efficiency and cost-effective delivery.

Finally, the program supports Goal IV: Strengthen Industry and Community Partnerships by establishing collaborations with companies and agencies working in automation, robotics, and AI-driven system development. These partnerships will facilitate student internships, capstone projects, and joint applied research initiatives that enhance both student employability and institutional visibility.

Evidence that this program is an institutional priority includes:

a. The program was developed under the direction of the Office of Academic Affairs and the Dean of Engineering, as part of Capitol's long-term strategic initiative to expand degree offerings in artificial intelligence, robotics, and autonomous systems.
b. The concept received endorsement during academic planning retreats and Undergraduate Academic Council meetings, aligning with the university's goal to establish Capitol as a center of excellence in intelligent technologies.
c. The curriculum was designed by faculty with expertise in AI, data science, and robotics, ensuring consistency with ABET accreditation standards and emerging industry needs.
d. The program leverages shared laboratories supporting existing courses in microcontrollers, control systems, robotics, and digital electronics, demonstrating efficient resource utilization.
e. The development of this degree supports institutional enrollment growth by appealing to students interested in next-generation technologies such as machine learning, robotics, and automation.
f. The program aligns with Capitol's strategic partnerships with industry and government agencies focused on artificial intelligence and autonomous systems innovation.

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 and Autonomous Systems will be funded through existing institutional resources, tuition revenue, and reallocation of instructional capacity within the School of Engineering. The university's five-year financial model confirms the program's sustainability through modest initial enrollment projections and steady growth supported by targeted recruitment and articulation agreements.

Most of the program's courses already exist within Capitol's Electrical Engineering, Mechatronics, and Computer Science curricula, minimizing new course development costs. Existing laboratories supporting electronics, control, microcontrollers, and robotics will be used for the AIAS program, and are already equipped with necessary software such as MATLAB, Python, TensorFlow, and Arduino-based hardware. Incremental investments in computing infrastructure will be integrated into the university's annual technology enhancement plan.

Faculty staffing will primarily draw from existing full-time and adjunct instructors with expertise in AI, robotics, and control systems. As enrollment expands, additional adjunct faculty may be hired to teach upper-level AI specialization courses such as Neural Networks, Machine Learning, and Computer Vision. These anticipated costs have been accounted for in the academic budget.

The program is projected to generate sufficient tuition revenue to cover its operating costs by Year 3, with sustainability ensured through resource sharing and efficient course scheduling. The university will also explore opportunities for external partnerships and grants supporting AI workforce development and applied research collaborations.

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

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

a) Ongoing administrative, financial, and technical support
The program will be administered by the School of Engineering under the supervision of the Dean of Engineering, with oversight from the Office of Academic Affairs. Financial and technical support are included in the university's operational planning and budget. The program will utilize existing computing and robotics laboratories, which will continue to be updated through the institution's scheduled lab modernization and equipment renewal plan. Faculty development funding will be allocated to ensure instructional staff remain current with emerging AI and automation technologies.

b) Continuation of the program to allow students to complete their degrees
Capitol Technology University guarantees that the program will be maintained for a sufficient period to enable all enrolled students to complete their degrees. The institution will ensure consistent course sequencing, academic advising, and faculty assignment for each cohort. In the unlikely event of program restructuring, a formal teach-out plan will be implemented in accordance with MHEC and ABET requirements to ensure uninterrupted degree completion.

The proposed Bachelor of Science in Artificial Intelligence and Autonomous Systems embodies Capitol Technology University's mission-driven approach to providing career-relevant, industry-aligned education. It leverages institutional strengths, responds to national and state workforce needs, and advances the university's strategic vision for innovation, excellence, and leadership in the intelligent systems era.

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

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

a) The need for the advancement and evolution of knowledge.

The Bachelor of Science in Artificial Intelligence and Autonomous Systems addresses a critical and expanding need for expertise in AI, robotics, automation, and intelligent system design. As Maryland and the broader Mid-Atlantic region invest in digital transformation, smart infrastructure, and autonomous technologies, there is growing demand for engineers who understand how to integrate AI with real-world systems. This program advances the body of knowledge by bridging foundational engineering with state-of-the-art tools in machine learning, neural networks, embedded systems, and autonomous control. Students will learn to design and deploy intelligent machines that perceive, decide, and act in dynamic environments. Graduates will be equipped to contribute to advances in smart manufacturing, intelligent transportation, precision agriculture, unmanned systems, and cyber-physical infrastructure — all of which are priority sectors in Maryland's innovation economy.

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

The Artificial Intelligence and Autonomous Systems program expands access to one of the most in-demand and transformative technology fields for a wide range of learners. Capitol Technology University has a long-standing commitment to supporting nontraditional students, transfer learners, and underrepresented populations in STEM. The program's flexible structure and applied focus make it accessible to students with associate degrees in engineering, technology, or computer science from Maryland community colleges. Capitol's emphasis on small class sizes, hands-on learning, and personal advising fosters a supportive environment where educationally disadvantaged students can thrive. The program is especially attractive to students motivated by emerging career pathways in robotics, AI, and automation — fields that are rapidly reshaping Maryland's economy and public sector. By providing access to high-tech careers through targeted academic support and financial aid, the program promotes equity and economic mobility in alignment with statewide workforce development and inclusion goals.

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

While Capitol Technology University is not a historically black institution, it is committed to building partnerships with Maryland's HBIs and minority-serving institutions to promote inclusion in AI and autonomous systems education. The program will serve as a platform for dual-degree pathways, 2+2 articulation agreements, and summer research experiences for students from partner institutions. The university intends to collaborate with HBI faculty on curriculum innovation, faculty development, and

joint grant opportunities in intelligent systems. These collaborations can expand the capacity of HBIs to offer specialized AI coursework and strengthen the representation of African American and minority engineers in sectors such as defense, transportation, and manufacturing — all of which increasingly rely on autonomous and AI-enabled technologies.

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

The Maryland State Plan for Postsecondary Education outlines three core goals: Student Access, Student Success, and Innovation. The proposed Bachelor of Science in Artificial Intelligence and Autonomous Systems aligns directly with each of these goals by creating equitable pathways into high-growth technology fields, supporting students through applied and experiential learning, and advancing innovation in academic program delivery.

Goal 1: Student Access

"Ensure equitable access to affordable and quality postsecondary education for all Maryland residents."
Capitol Technology University is committed to making high-demand STEM education accessible to Maryland residents, especially in emerging areas such as AI and automation. The program was specifically designed to support transfer students, adult learners, and military-affiliated individuals seeking to enter or advance in intelligent systems careers. Through articulation agreements, prior learning assessments, and flexible course formats, the university reduces barriers to entry for students from diverse backgrounds. The program's alignment with state economic priorities ensures that students are not only accessing education but doing so in fields with strong labor market demand. Institutional initiatives to support affordability — including need-based aid, targeted scholarships, and tuition discounts — further ensure that underrepresented students can participate fully in Maryland's innovation-driven future.

Goal 2: Student Success

"Promote and implement practices and policies that will ensure student success."
The Artificial Intelligence and Autonomous Systems program integrates experiential learning, industry tools, and team-based design into every stage of the curriculum. Students engage with programming, modeling, simulation, and system integration using tools such as Python, MATLAB, TensorFlow, and ROS. Courses are supported by hands-on laboratory experiences that promote retention and academic confidence. The two-course senior design sequence requires students to solve real-world engineering problems, preparing them for careers in research, development, and systems integration. With dedicated advising, mentoring, and faculty interaction, the program creates a learning environment where students are supported through to graduation. These design features align with the State Plan's emphasis on quality instruction, skill development, and improved degree completion outcomes.

Goal 3: Innovation

"Foster innovation in all aspects of Maryland higher education to improve access and student success."
The proposed program embodies innovation in both content and delivery. It combines foundational engineering education with frontier topics such as neural networks, autonomous decision-making, human-AI interaction, and ethical design of intelligent systems. Students learn how to build AI-driven technologies that are not only technically advanced but also socially responsible. The program also

supports pedagogical innovation through flipped classrooms, online labs, and interdisciplinary collaboration. It enables applied learning through capstone projects and internships with employers in Maryland's technology and defense sectors. These elements reinforce the State Plan's goals to promote innovation in curriculum, expand access to high-impact learning practices, and increase the alignment between higher education and workforce needs.

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

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

Graduates of the Bachelor of Science in Artificial Intelligence and Autonomous Systems program will be prepared for professional roles in a wide range of industries where automation, machine learning, and intelligent systems are transforming operations and services. These include sectors such as advanced manufacturing, transportation, defense, logistics, agriculture, energy, health care, and public safety. Maryland's strong presence in defense contracting, cybersecurity, and government R&D creates especially rich opportunities for autonomous systems engineers and AI specialists.

Graduates will be qualified for entry-level positions such as AI engineer, robotics software engineer, autonomous systems engineer, machine learning engineer, control systems developer, embedded systems programmer, and computer vision analyst. In addition, students will be equipped for roles in intelligent transportation design, unmanned vehicle development, and automation integration. Employers include federal agencies (e.g., DoD, NASA, NIST), technology companies, robotics startups, national laboratories, and large manufacturers implementing Industry 4.0 solutions.

Typical entry-level roles will begin at the junior engineer or systems analyst level, with pathways for advancement to project lead, senior engineer, or AI systems architect based on experience or graduate education. The curriculum's emphasis on hands-on robotics, algorithm design, and capstone project integration ensures that students are ready to contribute to multidisciplinary engineering and innovation teams upon graduation.

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

National and state-level labor data reveal strong and accelerating demand for professionals trained in artificial intelligence and autonomous systems. According to the U.S. Bureau of Labor Statistics (BLS, 2024), employment of computer and information research scientists—including AI and machine learning specialists—is projected to grow 23 percent from 2022 to 2032, significantly faster than the average for all occupations. More than 37,000 new positions are expected nationally, with annual median wages exceeding $136,620.

Other relevant categories such as robotics engineers, embedded systems developers, and data scientists also show sustained double-digit growth rates. The BLS Occupational Outlook Handbook (2024) notes that demand is being driven by the adoption of AI in cybersecurity, robotics, autonomous vehicles,

logistics, and advanced manufacturing. Maryland, with its concentration of defense, aerospace, and federal research employers, is especially well-positioned to benefit from this trend.

In Maryland alone, job postings related to AI, robotics, and autonomous systems have increased sharply. Lightcast (formerly Emsi-Burning Glass) reports that over 3,500 AI-related job postings were listed in Maryland between 2023 and 2024, with significant demand in Montgomery, Howard, Anne Arundel, and Prince George's counties. Major employers include Lockheed Martin, Northrop Grumman, Booz Allen Hamilton, Johns Hopkins APL, and Amazon Web Services. These employers seek graduates with skills in Python, C++, TensorFlow, ROS, MATLAB, computer vision, and ethical AI development — all of which are addressed within the AIAS curriculum.

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

Recent national and regional studies underscore the urgent need for trained professionals in artificial intelligence and autonomous systems. The 2024 U.S. Artificial Intelligence Workforce Report (Georgetown CSET) identifies a severe talent shortage in AI engineering, robotics, and machine learning, with employers reporting difficulties in finding graduates who possess both technical proficiency and system integration capabilities.

According to the World Economic Forum's Future of Jobs Report (2023), AI and machine learning specialists rank among the top three emerging professions worldwide. The report estimates that by 2027, more than 97 million new roles will emerge in the AI and automation sectors globally. U.S. employers are expected to fill tens of thousands of positions in AI design, robotic process automation, and autonomous systems management.

Maryland's 2024–2028 Workforce Innovation and Opportunity Act (WIOA) Plan highlights intelligent systems engineering and AI integration as priority occupational areas for development. The Maryland Technology Council also emphasizes the strategic importance of AI and autonomous technologies in state economic competitiveness, calling for stronger alignment between higher education and the needs of innovation-driven employers.

Data from Lightcast (2024) shows that from 2023 to 2024, Maryland averaged 2,800 job postings annually in roles directly related to AI engineering, robotics, or autonomous systems. The top-requested skills included machine learning (48%), Python programming (44%), embedded systems (31%), and robotics engineering (28%), confirming the program's strong alignment with market expectations.

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

Currently, few Maryland institutions offer undergraduate degrees specifically focused on artificial intelligence and autonomous systems. While some universities provide computer science or robotics tracks, comprehensive programs that integrate AI theory with real-world autonomy applications remain limited. As a result, regional employers frequently recruit out-of-state or from graduate-level programs to fill entry-level AI and robotics positions.

IPEDS data (2022) indicates that Maryland produced approximately 380 bachelor's-level computer science and engineering graduates in 2022, yet fewer than 10 percent of those students completed specialized coursework in AI, machine learning, or embedded systems. No Maryland institution

currently offers a standalone Bachelor of Science in Artificial Intelligence and Autonomous Systems, highlighting a clear gap in the state's STEM education ecosystem.

Capitol Technology University projects an initial enrollment of 15 to 18 students in the program's first year, with steady growth to 65–75 students by year five. Assuming standard retention and graduation rates, the program anticipates producing 12 to 18 graduates annually beginning in year four. These graduates will be well-prepared for Maryland's advanced technology workforce and will help meet the rapidly growing demand for engineers in AI, automation, and smart systems.

In establishing the AIAS program, Capitol Technology University addresses a documented and persistent workforce need while positioning Maryland to lead in emerging technologies essential to economic resilience, defense innovation, and ethical autonomous system development.

D. Reasonableness of Program Duplication

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

While several institutions in Maryland offer degree programs in computer science, data science, and robotics, there are no dedicated undergraduate programs titled Artificial Intelligence and Autonomous Systems that offer a comprehensive, interdisciplinary curriculum bridging AI theory, machine learning, robotics, and real-time autonomous decision-making. The proposed program at Capitol Technology University is distinctive in its integration of artificial intelligence, machine perception, control systems, ethics, and autonomous technologies within a unified educational framework.

Relevant existing programs under related CIP codes include:

- University of Maryland, College Park – B.S. in Computer Science with electives in AI and machine learning
- Johns Hopkins University – B.S. in Computer Engineering with robotics and AI coursework
- University of Maryland, Baltimore County (UMBC) – B.S. in Computer Science and B.S. in Data Science
- Morgan State University – B.S. in Electrical or Computer Engineering with AI and automation electives
- Bowie State University – B.S. in Computer Science with data science tracks

These programs typically provide core education in computing, data structures, and algorithms, with optional courses or concentrations in artificial intelligence or robotics. However, they do not offer a specialized and integrated curriculum focused specifically on the intersection of AI and autonomous systems, nor do they combine applied robotics, human–AI interaction, ethics, and systems engineering into a single degree path.

The proposed B.S. in Artificial Intelligence and Autonomous Systems is uniquely positioned to provide students with:

- A systems-level understanding of AI integration into autonomous platforms
- Hands-on experience in robotic systems, computer vision, and deep learning

- Courses in AI ethics, security, and policy implications
- A two-semester capstone sequence focused on building real-world autonomous systems

This integrated approach is distinct from broader computer science or engineering degrees and directly prepares graduates for careers in autonomous vehicles, defense systems, industrial automation, and intelligent robotics—areas of strategic importance to Maryland and the nation.

2. Provide justification for the proposed program

The proposed B.S. in Artificial Intelligence and Autonomous Systems is justified by clear workforce demand, academic innovation, and institutional alignment with Capitol Technology University's mission and the State's strategic needs.

a. Workforce Demand:
AI and autonomous technologies are among the fastest-growing fields in both the public and private sectors. Employers in transportation, aerospace, defense, manufacturing, and health technologies require engineers and scientists who can design and implement autonomous systems powered by artificial intelligence. Existing graduates from traditional computer science or engineering programs may lack the interdisciplinary skillset required to address AI integration, sensor fusion, machine learning, and autonomy as a unified system. This program directly addresses those needs.

b. Academic Innovation:
The program offers a structured pathway through the key technical areas of AI, robotics, data science, human–machine interaction, and control systems. It emphasizes practical implementation alongside theoretical foundations and provides unique course offerings not typically found together in traditional computing or engineering degrees. This innovation allows the program to stand apart from generalist degrees.

c. Accessibility and Flexibility:
The program is structured to attract both traditional students and transfer students from community colleges with backgrounds in engineering, computer science, or robotics technology. Its design supports flexibility and stackability through course equivalencies, industry certifications, and project-based assessments. This creates broader access for students seeking to enter high-demand sectors of the AI and robotics workforce.

d. Institutional Alignment:
Capitol Technology University has longstanding strengths in engineering, computer science, cybersecurity, and mechatronics. The proposed program aligns with the institution's focus on emerging technologies and professional preparation, and it complements Capitol's existing offerings in unmanned systems, cybersecurity, and software engineering.

e. Strategic Differentiation:
While AI and robotics are taught as subtopics at other Maryland institutions, Capitol's proposed program is the only one to fully integrate these fields into a dedicated, undergraduate degree that targets autonomous intelligent systems. The program will contribute to Maryland's higher education diversity by filling a gap in preparing students for careers in autonomous technology sectors such as self-driving systems, drone operations, industrial robotics, and intelligent infrastructure.

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

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

The proposed Bachelor of Science in Artificial Intelligence and Autonomous Systems is designed to complement—not compete with—existing high-demand technology and engineering programs at Maryland's Historically Black Institutions (HBIs). Institutions such as Morgan State University, Bowie State University, and University of Maryland Eastern Shore play a critical role in preparing underrepresented students for careers in computer science, robotics, cybersecurity, and data science—fields that intersect with but do not comprehensively address the full integration of artificial intelligence with autonomous system engineering.

While HBIs in the state offer courses and concentrations in AI-related domains, none currently offer a dedicated undergraduate degree that systematically integrates artificial intelligence, machine learning, robotics, embedded systems, human–AI interaction, and autonomous decision-making within a unified curriculum. The proposed program at Capitol Technology University fills this curricular gap by offering a highly interdisciplinary and systems-oriented education specifically targeted at the growing need for engineers and developers of autonomous intelligent platforms.

Rather than drawing students away from HBI programs, the proposed program has the potential to support and enhance HBI offerings in several strategic and collaborative ways:

- Transfer and Dual-Degree Pathways: The program can serve as a transfer destination for students from HBI computer science, robotics, or engineering technology programs who seek to specialize in autonomous systems, AI implementation, or robotics engineering.
- Collaborative Projects and Research Opportunities: HBIs and Capitol Tech may collaborate on research in AI ethics, drone technologies, autonomous vehicles, or smart infrastructure—leveraging faculty expertise and promoting joint grant applications or senior design partnerships.
- Workforce Capacity Building: As Maryland aims to grow its technology sector—including defense innovation, transportation autonomy, and AI-driven public infrastructure—the program expands the state's capacity to prepare students from diverse backgrounds for high-skill, high-demand roles.
- Shared Access to Emerging Technologies: Through potential inter-institutional agreements or MOUs, students from HBI programs may gain access to specialized labs, software, or applied AI coursework that complements their existing degrees.

In this way, the B.S. in Artificial Intelligence and Autonomous Systems supports the broader mission of equitable STEM education across Maryland, ensuring that underrepresented students benefit from multiple educational pathways into one of the most rapidly evolving and strategically important technological domains.

The program therefore reinforces Maryland's collective commitment to diversity, inclusion, and technological innovation, while promoting academic complementarity—not duplication—with Maryland's HBI programs.

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

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

The proposed Bachelor of Science in Artificial Intelligence and Autonomous Systems is not expected to adversely affect the uniqueness or institutional missions of Maryland's Historically Black Institutions (HBIs). Instead, the program complements statewide efforts to expand access to high-demand, future-focused education in emerging technological fields such as artificial intelligence, robotics, and autonomous platforms.

Maryland's HBIs—including Morgan State University, Bowie State University, Coppin State University, and the University of Maryland Eastern Shore—have long served as cornerstones of inclusive higher education. Their missions prioritize leadership development, community advancement, and the empowerment of African American and other underrepresented students in science, technology, engineering, and mathematics (STEM) disciplines.

The proposed program differs from current HBI offerings in its specific integration of machine learning, robotics, autonomous system design, and ethical AI deployment. It is designed to prepare students for rapidly evolving careers in defense, smart mobility, aerospace, industrial automation, and other sectors where autonomous systems are increasingly essential. The program also serves a diverse student population, including traditional undergraduates, community college transfers, and working professionals who seek specialized training in AI and automation technologies.

Rather than duplicating or displacing existing HBI programs, the Artificial Intelligence and Autonomous Systems degree supports Maryland's broader educational and workforce strategies by offering a complementary pathway focused on cutting-edge innovation. It broadens the landscape of academic options for students interested in AI-related careers and creates opportunities for inter-institutional collaboration with HBIs. These collaborations may include faculty exchanges, joint research projects in autonomous technology, and articulation agreements that allow seamless transfer from pre-engineering or computing programs.

By reinforcing statewide goals to increase diversity in advanced technology fields, the program contributes positively to the collective mission of HBIs. It supports Maryland's commitment to equity, innovation, and excellence in higher education while helping to prepare a diverse workforce equipped to lead in the age of artificial intelligence and autonomy.

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

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

The Bachelor of Science in Artificial Intelligence and Autonomous Systems was developed through a collaborative effort involving faculty from computer science, engineering, and applied mathematics, with guidance from Capitol Technology University's Office of Academic Affairs and external stakeholders in the fields of robotics, machine learning, aerospace, and intelligent systems. The program responds directly to the accelerating demand for skilled professionals capable of designing,

programming, and managing AI-enabled systems across industries including defense, healthcare, transportation, and advanced manufacturing.

The program builds on Capitol's existing strengths in embedded systems, programming, robotics, and data science. It incorporates foundational courses already offered across the university and introduces new courses specifically in autonomous navigation, ethical AI, reinforcement learning, sensor fusion, and machine perception. The curriculum is designed to meet the educational expectations of both industry employers and ABET-aligned learning outcomes for multidisciplinary engineering and computing programs.

The program will be led by full-time faculty members with expertise in artificial intelligence, robotics, computer engineering, and embedded systems. These faculty hold terminal degrees in computer science, electrical and computer engineering, or related fields, and bring extensive experience in academic research, government-funded projects, and private sector innovation. Adjunct faculty with backgrounds in AI deployment, autonomy in defense and aerospace, and robotic systems integration may also contribute to course delivery.

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

The program will be delivered in a traditional in-person format with high emphasis on laboratory-based instruction, simulation environments, and project-based learning. Hybrid or online delivery may be used selectively to support flexible access for working students and transfer populations. Students will engage in hands-on work with sensors, microcontrollers, and autonomous platforms in both software and hardware settings. Emphasis is placed on iterative design, interdisciplinary collaboration, and ethical considerations in the deployment of AI systems.

Educational Objectives
Graduates of the Artificial Intelligence and Autonomous Systems program will:

1. Enter the workforce as knowledgeable, ethical professionals contributing to the design, programming, and deployment of AI-driven and autonomous systems.
2. Apply computational and engineering principles to develop intelligent solutions that integrate software, hardware, data, and real-world context.
3. Communicate effectively and work collaboratively in interdisciplinary environments involving AI, robotics, control, and data systems.
4. Pursue lifelong learning through professional development, certification, or graduate education in artificial intelligence or related fields.

Learning Outcomes
Upon graduation, students will be able to:

1. Identify, formulate, and solve complex computing or engineering problems using AI and machine learning principles.
2. Apply design thinking to develop intelligent and autonomous systems that meet user needs and constraints including safety, ethics, and sustainability.
3. Communicate technical information clearly in written, oral, and visual formats to a variety of audiences.

4. Analyze the societal, legal, and ethical implications of artificial intelligence and autonomy and make informed professional judgments.
5. Function effectively as members or leaders of diverse, multidisciplinary teams.
6. Design, conduct, and evaluate experiments or simulations to validate intelligent system performance.
7. Acquire and integrate new knowledge and tools to stay current in a rapidly changing technological landscape.

These outcomes are fully aligned with ABET outcomes for engineering and computing disciplines and support the program's goal of producing industry-ready graduates with both technical skill and professional responsibility.

3. Explain how the institution will:

a) Provide for assessment of student achievement of learning outcomes in the program
Student learning will be assessed using a combination of direct and indirect methods, including examinations, lab reports, system prototypes, technical documentation, and capstone presentations. Each course includes defined outcomes mapped to program-level outcomes and ABET criteria. Courses such as Neural Networks and Deep Learning, Ethical Autonomous Systems, and Capstone Design I and II will serve as critical points for outcome measurement using established rubrics.

Annual assessment reports will be compiled by the program chair, reviewed by the School of Engineering and Computer Sciences, and submitted to the Office of Academic Affairs. Feedback from the program's industry advisory board, alumni, and employers will be used to support continuous improvement.

b) Document student achievement of learning outcomes in the program
Capitol Technology University utilizes a structured learning outcomes management system for tracking student achievement across programs. Faculty will maintain digital archives of student work such as project code, simulation files, sensor data logs, design reports, and AI training models. These artifacts will serve as evidence for evaluating trends, implementing curricular improvements, and supporting accreditation and program review processes. Regular outcome reviews ensure alignment with industry standards and the university's educational mission.

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

The Bachelor of Science in Artificial Intelligence and Autonomous Systems is a 120-credit program that prepares students to develop, deploy, and evaluate intelligent autonomous systems. Students study programming, machine learning, robotics, sensor integration, AI ethics, and real-time system control. They engage in interdisciplinary design challenges, culminating in a two-semester capstone project that integrates hardware and software components into a fully autonomous application.

Program Requirements

Category	Description	Distribution
Engineering Core Courses	Engineering science and design, includes Capstone Design I & II EL 100, EL 200, EL 204, EE 362, EE 406, EE 453, ROB 200, ROB 382, UAS 102, SDE 457, SDE 458	33 credits
Computer Science and Artificial Intelligence	Additional technical coursework related to AI and computing CS 120, CS 150, CS 200, CS 230, DS 235, AIT 201, AIT 370, AIT 440, AIT 445, AIT 210, IAE 201	33 credits
Mathematics and Science	College-level mathematics and basic science (with laboratory) MA 114, MA 124, MA 128, MA 261, MA 262, MA 330, MA 340, MA 345 PH 201, PH 202	33 credits
General Education	Communications, humanities, social sciences, ethics, management EN 101, EN 102, HU 331, SS 351, HU/SS elective, BUS 174, BUS 301	21 credits

B.S. in Artificial Intelligence and Autonomous Systems (120 credits)

Engineering Courses (33)	CR
EE 453 – Control I	3
EL 100 - Introduction to DC/AC Circuits	3
EL 200 - Electronic Devices & Circuits	3
EL 204 – Digital Electronics	3
EE 362 – Microcontroller System Design	3
EE 406 – Signals and Systems	3
UAS 102 - Mechanics of Uncrewed and Autonomous Systems	3
ROB 200 - Robotics Systems Engineering and Analysis	3
ROB 382 - Robotic Systems	3
SDE 457-AI & Autonomous Systems Project I	3
SDE 458-AI & Autonomous Systems Project II	3

Mathematics & Science (33)	CR
MA 114 - Algebra and Trigonometry	4
MA 124 - Discrete Mathematics	3
MA 261 – Calculus I	4
MA 262 – Calculus II	4
MA 330 – Linear Algebra	3
MA 340 - Ordinary Differential Equations	3
MA 345 - Probability & Statistics for Engineers	3
MA 128 - Introduction to Statistics	3
PH 201 – General Physics I (Mechanics)	3
PH 202 – General Physics II (Electricity & Magnetism)	3

Computing and AI Courses (33)	
CS 120 - Introduction to Programming Using Python	3
CS 150 - Programming in C	3
CS 200 - Programming in C++	3
CS 230 - Data Structures	3

General Education (21)	
EN 101 – English Communications I	3
EN 102 – English Communications II	3
HU 331 - Arts and Ideas	3
SS 351 - Ethics	3

DS 235 - Introduction to Data Mining	3	BUS 174 - Introduction to Business and Management	3
AIT 201 - Introduction to Artificial Intelligence	3	BUS 301 - Project Management	3
AIT 440 - Advanced Machine Learning	3	HU/SS electives (Humanities & Social Sciences)	3
AIT 370 - Computer Vision	3		
AIT 445 - Neural Networks and Deep Learning	3		
AIT 210 – Human–AI Interaction and Ethics	3		
IAE 201 - Introduction to Information Assurance Concepts	3		

Courses Descriptions

Course Descriptions for Engineering Courses (33):

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

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.

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

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

Course Description for Computer Science and Artificial Intelligent (33 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 nin 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. rerequisite(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 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 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 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 201and CS 230

AIT 210 – Human–AI Interaction and Ethics (3 credits): This course explores the interaction between humans and artificial intelligence systems with a focus on ethical, societal, and human-centered design considerations. Topics include responsible AI, bias and fairness in algorithms, explainability, transparency, user experience design, human-machine teaming, and the ethical implications of autonomous decision-making. Case studies and discussions address real-world applications and challenges in fields such as healthcare, autonomous systems, surveillance, and employment. Prerequisites: None

IAE 201 - Introduction to Information Assurance Concepts (3 credits): This course covers topics related to administration of network security. Topics include a survey of encryption and authentication algorithms; threats to security; operating system security; IP security; user authentication schemes; web security; email security protocols; intrusion detections; viruses; firewalls; Virtual Private Networks; network management and security policies and procedures. Laboratory projects are assigned as part of the homework requirements. Classes are a mixture of lecture, current event discussions, and laboratory exercises. NOTE: Students enrolled in this course incur an additional lab fee of $100. Prerequisite(s): MA 110 or MA 112 or MA 114 or MA 261

Course Description for Mathematics and Science (33 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 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 128 - Introduction to Statistics (3 credits): This course addresses probability: definitions, theorems, permutations and combinations; binomial, hypergeometric, Poisson and normal distributions; sampling distribution and central limit theorem; and estimation and hypothesis testing. Prerequisite(s): MA 110, MA 111 or MA 112.

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 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

Course Description for Humanities, Social Sciences, and Communication (21 Credits)

BUS 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

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.

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.

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

The AIAS program meets all general education requirements as specified by the Maryland Higher Education Commission and COMAR 13B.02.03. The curriculum incorporates coursework in English composition (EN 101, EN 102), ethics (SS 351), arts and humanities (HU 331), business (BUS 174), project management (BUS 301), and a general elective in humanities or social sciences. Quantitative reasoning and scientific literacy requirements are fulfilled through required courses in college-level mathematics and physical sciences, including algebra, calculus, statistics, linear algebra, discrete mathematics, and physics. These components ensure that students graduate with strong communication, ethical reasoning, and problem-solving skills in addition to their technical competencies in artificial intelligence and autonomous systems.

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

The university does not anticipate specialized accreditation for the AIAS program beyond institutional accreditation by the Middle States Commission on Higher Education. However, the program has been designed to align with ABET student learning outcomes to support academic rigor and professional readiness. The curriculum includes substantial coursework in computer science, engineering, mathematics, and AI-related disciplines, and culminates in a two-semester design sequence. This ensures that graduates are prepared for careers in AI, robotics, and autonomous systems, as well as for potential graduate study in computing, engineering, or data science fields.

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

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

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

Students in the AIAS program will receive detailed and timely information regarding academic expectations, program structure, and available resources. This information is communicated through the academic catalog, university website, Canvas learning management system, and new student orientation.

Key areas covered include:

- A published curriculum map and course sequencing guide
- Course syllabi with learning objectives and technology expectations
- Advising support from assigned faculty or professional advisors
- Requirements for programming tools and platforms (e.g., Python, MATLAB, simulation environments, microcontroller kits)
- Access to technical support and Canvas tutorials
- Academic services including tutoring, the Writing Center, and library resources
- Career support services, including internship placement and resume review
- Financial aid information, tuition and fee schedules, and payment plans coordinated through the Business and Financial Aid offices

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

All promotional materials for the AIAS program will be developed in coordination with the Office of Marketing and Communications and the Office of Admissions. These materials will accurately describe the curriculum, learning outcomes, career opportunities, and institutional support services.

Examples of communication strategies include:

- Dedicated AIAS program pages on the university website
- Print and digital brochures for outreach and recruitment events
- Faculty and admissions staff trained to provide consistent and accurate program information
- Alignment of public-facing materials with catalog content and university standards

These practices ensure prospective students receive accurate and comprehensive information to make well-informed decisions about enrollment.

H. Adequacy of Articulation

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

Capitol Technology University maintains multiple articulation and partnership agreements that facilitate student transfer and academic progression from two-year institutions into its bachelor's degree programs. These agreements are aligned with the goals of the proposed Bachelor of Science in Artificial Intelligence and Autonomous Systems (AIAS), which emphasizes interdisciplinary learning in artificial intelligence, robotics, autonomous systems, and embedded computing.

The AIAS program is structured to be highly transfer-friendly and will benefit from existing agreements with partner institutions such as Cecil College, Community College of Rhode Island (CCRI), Columbia Southern University, and Notre Dame of Maryland University. The university will formally include the AIAS degree among its articulated transfer pathways, ensuring alignment with associate-level programs in computer science, information technology, engineering technology, and robotics.

The curriculum incorporates lower-division coursework in programming, digital systems, mathematics, physics, and introductory engineering, all of which are commonly offered at community colleges and military-affiliated education centers. This design allows students who have earned associate degrees or

equivalent credits to transition into the upper-division AIAS curriculum and complete the bachelor's degree in approximately two years of full-time study.

Capitol Technology University also maintains strong engagement with pre-college STEM initiatives through its participation in Project Lead The Way (PLTW), dual-enrollment programs, and its role on the Prince George's County Public Schools (PGCPS) PLTW Engineering Program Advisory Committee. These efforts expand access to computing and AI-related education for high school students and support early exposure to university-level STEM disciplines.

The university will continue to expand its articulation partnerships across Maryland and beyond, working with academic partners to establish program-specific course mappings, dual-admissions options, and transfer advising protocols. Formal articulation agreements and supporting documentation will be included in the appendices of this proposal as they are finalized.

I. Adequacy of Faculty Resources

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

The Bachelor of Science in Artificial Intelligence and Autonomous Systems (AIAS) will be delivered by an experienced and interdisciplinary team of full-time and adjunct faculty with expertise spanning artificial intelligence, embedded systems, computer science, robotics, control systems, engineering design, and project-based instruction.

The program is supported by faculty with terminal degrees in engineering, computer science, data science, and analytics, as well as practical industry experience in AI development, system integration, machine learning, and autonomous technologies. Faculty have actively contributed to program and course development and will continue to support innovation in delivery and assessment.

Full-Time Faculty

Dr. Mohamed Shehata (Ph.D., Engineering, Purdue University), Dean of Academics and Chair of the Engineering Department, leads the program's academic vision and teaches engineering design, control systems, and autonomous systems applications.

Dr. Charles D. Conner (Ph.D., Electrical Engineering, The Catholic University of America) brings expertise in embedded systems and signal processing, supporting instruction in microcontroller programming and sensor integration.

Dr. Gregory P. Behrmann (Ph.D., Mechanical Engineering, The Catholic University of America) teaches robotics, engineering mechanics, and systems engineering. His applied research includes intelligent systems and human-robot collaboration.

Dr. Amelia Wear (M.S., Software Engineering; B.S., Mechanical Engineering) is a practicing systems engineer with experience in embedded control systems and agile development. She teaches robotics, systems analysis, and capstone design.

Dr. Andrew Mehri (Ph.D., Computer Science) provides instruction in digital logic, computer systems, and technical computing. He also supports curriculum integration between electronics and software.

Dr. Najam Ul Hassan (Ph.D., Business Analytics and Decision Sciences) leads data science instruction and provides interdisciplinary support for AI courses involving analytics, optimization, and system modeling.

Dr. Jeff Chi (Ph.D., Project Management) supports the program's systems engineering and project management components. His background includes industry experience in project integration, planning, and sustainability.

Dr. Nisma M. Omar (Ph.D., Analytical Chemistry) teaches foundational science courses and supports general education in technical writing, communication, and scientific literacy.

Dr. Kellep Charles (Ph.D., Cybersecurity, Capitol Technology University) teaches in the areas of artificial intelligence, cybersecurity, and autonomous systems. He also holds an M.S. in Telecommunication Management from the University of Maryland University College and a B.S. in Computer Science from North Carolina Agricultural and Technical State University.

Mr. Joe Harvey (M.A., Information Technology Management, Webster University; B.S., Computer Science, Bowie State University) teaches artificial intelligence, software systems, and applied computing. He is currently a Ph.D. candidate in Artificial Intelligence at Capitol Technology University.

Mr. Jeff Volosin (B.S., Space Science, Florida Institute of Technology) is Chair of Astronautical and Space Engineering at Capitol Technology University. He brings over 38 years of industry and NASA experience in spacecraft systems, mission operations, and autonomous systems development. He supports instruction in systems integration and AI applications in space systems.

Adjunct Faculty

Dr. Edwige F. Songong (Ph.D., Civil Engineering; M.S., Technology Management) teaches applied physics and mathematics and contributes to instruction in engineering fundamentals.

Ms. Megan Miskovish (M.S., Education) teaches English composition and humanities, supporting students' communication skills within a technical context.

Course-Faculty Assignment Matrix

	Baabdallah	Mehri	Wear	Shehata	Behrmann	Conner	Najam	Nisma	Songong	Charles	Harvey	Volosin	Chi	Miskovish
	FF	FF	FF	FF	FF	FF	FF	FF	PT	FT	FT	FT	FF	PT
AIT 201	X													
AIT 210							X							
AIT 370	X													
AIT 440							X							
AIT 445	X													
BUS 174													X	
BUS 301													X	
CS 120											X			
CS 150											X			
CS 200		X												
CS 230										X				
DS 235	X													
EE 362			X											
EE 406						X								
EE 453				X										
EL 100			X											
EL 200		X												
EL 204			X											
EN 101														X
EN 102														X
HU 331														X
IAE 201										X				
MA 114								X						
MA 124								X						
MA 128									X					
MA 261									X					
MA 262									X					
MA 330						X								
MA 340						X								
MA 345									X					
PH 201					X									
PH 202		X												
ROB 200					X									
ROB 382					X									

SDE 457							X							
SDE 458							X							
SS 351														X
UAS 102												X		

2. 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 ongoing training and professional support to ensure that faculty remain current with evidence-based teaching practices and emerging technologies relevant to AI and autonomous systems education.

a) Pedagogy That Meets the Needs of Students

Faculty receive training in inclusive, student-centered pedagogy with a focus on active learning, project-based instruction, and team-oriented design experiences. These methods are particularly important in the AIAS program, where students must integrate technical, ethical, and societal considerations in the development of intelligent and autonomous technologies. Training includes strategies for supporting diverse learners, including adult students, military-affiliated learners, and underrepresented groups in computing and engineering.

b) Learning Management System

The university uses Canvas as its learning management platform. All faculty are trained during onboarding and have access to ongoing support, including helpdesk services, tutorials, and workshops. Training covers the use of Canvas tools for assignment submission, rubrics, peer review, grade tracking, and analytics to support student progress and engagement.

c) Distance Education (if applicable)

Not applicable. The AIAS program is currently offered in an in-person format. If distance education is implemented in the future, faculty will receive dedicated training in online instructional design and best practices for virtual learning environments.

J. Adequacy of Library Resources

1. Library Resources and Access

Capitol Technology University's Puente Library provides strong academic support for students and faculty participating in the proposed Bachelor of Science in Artificial Intelligence and Autonomous Systems (AIAS) program. The library maintains a well-curated collection of digital and physical resources that align with the program's interdisciplinary focus on artificial intelligence, robotics, computer science, control systems, data analytics, and ethical implications of autonomous technologies.

Students and faculty have full-text access to premier academic and technical databases, including:

- IEEE Xplore: Comprehensive access to publications in artificial intelligence, robotics, embedded systems, autonomous vehicles, sensors, and control systems.
- ACM Digital Library: Extensive coverage of computing disciplines, including machine learning, software engineering, human-computer interaction, and data structures.
- ScienceDirect and SpringerLink: Resources covering applied mathematics, computer vision, algorithmic modeling, and intelligent systems design.
- ProQuest and JSTOR: Access to peer-reviewed literature across a wide range of disciplines, including ethics, communications, social sciences, and technology management.

In addition, the library provides access to standards databases (such as IEEE Standards and ASTM Compass) and specialized technical manuals to support coursework in robotics, AI frameworks, systems engineering, and ethical design.

2. Instructional Support and Research Assistance

The Puente Library offers individualized research assistance and instruction on information literacy skills critical to student success in technical fields. Library staff provide training in scholarly search techniques, use of citation tools (RefWorks, EndNote), and ethical research practices. Interlibrary loan services are available to obtain materials beyond the university's holdings, and these services are offered both in-person and online to ensure access for all learners.

3. Program-Specific Resource Development

To ensure that the AIAS program is supported by relevant and current library materials, the following initiatives will be undertaken:

- Targeted acquisitions: Library staff will collaborate with program faculty to acquire specialized resources on artificial intelligence, machine learning, autonomous systems, algorithmic ethics, and sensor networks.
- Annual review: Library holdings will be reviewed each year to assess their alignment with curriculum updates, emerging industry technologies, and accreditation expectations.
- Faculty collaboration: Faculty will be encouraged to submit recommendations for new acquisitions, particularly in support of senior design, robotics integration, and applied AI research projects.

4. Digital and Remote Access

All major library resources are available online through the university's library portal and learning management system (Canvas). This infrastructure ensures that students—whether on campus or participating in hybrid or asynchronous components—can access materials necessary for their coursework, collaborative projects, and capstone development.

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

1. Classroom, Office, and Laboratory Space

Capitol Technology University affirms that it possesses adequate classrooms, laboratory, offices, and support infrastructure to successfully launch and sustain the Bachelor of Science in Artificial Intelligence and Autonomous Systems (AIAS) program.

Instruction will be conducted in modern classrooms equipped with multimedia projectors, smart boards, wireless connectivity, and audiovisual support systems. These learning environments are designed to facilitate lectures, collaborative projects, and hybrid or flipped instructional models.

Faculty and staff supporting the AIAS program are provided with dedicated office spaces to enable academic advising, course preparation, and mentorship. Office resources are reviewed annually and scaled to accommodate additional faculty as program enrollment grows.

Hands-on and project-based learning will be delivered through shared access to laboratories currently supporting electrical engineering, robotics, computer engineering, and systems design. Key instructional laboratories include:

- Robotics and Mechatronics Lab: Provides access to programmable robots, autonomous navigation kits (e.g., mBot, Arduino, Raspberry Pi), robotic arms, drive systems, vision sensors, and workspace for prototyping and testing.
- Digital and Embedded Systems Lab: Includes microcontroller development platforms (Arduino Uno, Raspberry Pi Pico, Curiosity Nano), logic analyzers, simulation tools (MPLAB, Logisim), and soldering/rework stations.
- Artificial Intelligence and Machine Learning Lab: Supports coursework and research in data modeling, neural networks, and machine learning using high-performance computers, GPU workstations, and cloud-based platforms (e.g., AWS, Google Colab, MATLAB Online).
- Control Systems and Sensor Integration Lab: Equipped with sensors, actuators, motor controllers, PLC modules, and interfacing boards for control and automation exercises.
- Software Development and Simulation Lab: Provides licensed access to MATLAB, Simulink, Python, Jupyter, C++, and simulation environments for AI algorithm testing and systems modeling.

All laboratories meet applicable safety requirements and are furnished with personal protective equipment (PPE), emergency shut-offs, and appropriate signage. These facilities are sufficient to support the AIAS curriculum with its strong emphasis on applied learning, experimentation, and multidisciplinary systems integration.

2. Support for Distance Education Students and Faculty

Capitol Technology University provides robust infrastructure to support students and faculty participating in hybrid or online components of the program. The following systems are in place:

a) Institutional Email System

All students and faculty are issued university email accounts through Microsoft Office 365. This platform supports secure, integrated communication for coursework, academic advising, and university operations.

b) Learning Management System

Canvas serves as the university's primary Learning Management System (LMS). It enables flexible delivery of AIAS course materials through:

- Synchronous and asynchronous content access

- Discussion boards and group collaboration
- Assignment submissions and online grading
- Multimedia content delivery and lecture capture
- Integration with Zoom, Turnitin, and Git-based tools

Faculty are trained in Canvas best practices and receive support from instructional designers. Students are introduced to Canvas during orientation and have access to 24/7 technical assistance.

Capitol Technology University's combined physical and digital infrastructure ensures that the AIAS program can be delivered effectively across in-person, hybrid, and online modalities, with the flexibility to adapt as instructional technologies evolve.

L. Adequacy of Financial Resources with Documentation

1. Program Resources

The proposed Bachelor of Science in Artificial Intelligence and Autonomous Systems (AIAS) program will be launched using existing institutional infrastructure, including laboratories, computing resources, and faculty expertise across engineering, computer science, and robotics disciplines. No existing programs will be reduced or restructured to support the launch of this new program.

Table 1: Program Resources

Resource Category	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	$0	$0	$0	$0	$0
2. Tuition and Fee Revenue (c + g)	$365,312	$739,078	$1,121,596	$1,521,796	$1,940,316
a. Number of Full-Time Students	8	16	24	32	40
b. Annual Tuition/Fee Rate	$28,276	$28,983	$29,708	$30,451	$31,212
c. Total Full-Time Revenue (a × b)	$226,208	$463,728	$713,000	$974,432	$1,248,480
d. Number of Part-Time Students	7	13	19	25	31
e. Credit Hour Rate	$1,519	$1,557	$1,596	$1,636	$1,677
f. Annual Credit Hours	13	13	13	13	13
g. Total Part-Time Revenue (d × e × f)	$139,104	$275,350	$408,596	$547,364	$691,836
3. Grants, Contracts, and Other Sources	$0	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0
TOTAL (1–4)	**$365,312**	**$739,078**	**$1,121,596**	**$1,521,796**	**$1,940,316**

Narrative Rationale for Table 1:

- **Reallocated Funds**: The program will launch without diverting funds from existing programs. Instruction will initially be handled by current full-time and adjunct faculty.
- **Tuition and Fee Revenue**: Conservative estimates project an initial cohort of 8 full-time and 7 part-time students in Year 1, increasing to 40 full-time and 31 part-time by Year 5. Tuition is projected to increase by ~2.5% annually. Part-time students are assumed to enroll in 13 credit hours per year.

- **Grants and Contracts**: No external funding is required at launch; however, the university will explore grant opportunities related to AI education, autonomous systems, and workforce innovation.
- **Other Sources**: No additional revenue streams are identified at this time.

2. Program Expenditures

Projected expenditures reflect incremental growth in faculty, technical support, instructional materials, and administrative overhead. The program will leverage shared resources with existing engineering and computing programs.

Table 2: Program Expenditures

Expenditure Category	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	$117,240	$162,784	$249,511	$340,164	$435,741
a. FTE Faculty	1.5	2.0	3.0	4.0	5.0
b. Faculty Salaries	$97,700	$135,653	$207,926	$283,470	$363,118
c. Faculty Benefits (20%)	$19,540	$27,131	$41,585	$56,694	$72,623
2. Administrative Staff (b + c below)	$6,013	$6,163	$6,317	$6,475	$6,637
a. FTE Admin Staff	0.08	0.08	0.08	0.08	0.08
b. Admin Salaries	$5,020	$5,146	$5,275	$5,407	$5,542
c. Admin Benefits (20%)	$993	$1,017	$1,042	$1,068	$1,095
3. Support Staff (b + c below)	$62,400	$96,300	$132,100	$169,400	$208,200
a. FTE Support Staff	1.0	1.5	2.0	2.5	3.0
b. Support Salaries	$52,000	$80,250	$110,083	$141,167	$173,500
c. Support Benefits (20%)	$10,400	$16,050	$22,017	$28,233	$34,700
4. Technical Support and Equipment	$1,800	$2,500	$3,300	$4,500	$6,200
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7. Other Expenses	$6,900	$15,450	$27,600	$42,900	$60,400
TOTAL (1–7)	**$194,353**	**$283,197**	**$418,828**	**$563,439**	**$717,178**

Narrative Rationale for Table 2:

- **Faculty**: Faculty FTE increases from 1.5 to 5.0 over five years to accommodate upper-division coursework in AI, robotics, autonomous systems, and senior design. Includes salaries and 20% fringe benefits.
- **Administrative Staff**: 0.08 FTE administrative support is included to assist with scheduling, reporting, and student services.
- **Support Staff**: Includes lab coordinators, IT staff, and technicians supporting AI/robotics equipment and computing infrastructure. Staff scale from 1.0 to 3.0 FTE.
- **Technical Support and Equipment**: Funds cover licenses (MATLAB, Python IDEs, ROS), cloud services, lab consumables (robot kits, sensors), and equipment maintenance.

- **Library**: No additional cost anticipated; Puente Library's digital holdings (IEEE Xplore, ScienceDirect, SpringerLink) already support the program.
- **New or Renovated Space**: Not required at this time; AIAS courses will utilize existing labs and classrooms.
- **Other Expenses**: Includes professional development, ABET accreditation preparation, marketing and outreach, and senior design support.

M. Adequacy of Provisions for Evaluation of Program

1. Procedures for Evaluating Courses, Faculty, and Student Learning Outcomes

Capitol Technology University maintains a comprehensive and structured system for evaluating courses, faculty performance, and student learning outcomes, aligned with institutional assessment policies and national accreditation standards.

Courses are evaluated at the end of each semester using a standardized course evaluation instrument. These evaluations measure instructional effectiveness in areas such as course organization, clarity of instruction, level of engagement, assessment fairness, and attainment of learning objectives. Results are reviewed by department chairs and faculty members to guide instructional improvement and curricular planning.

Faculty are evaluated through a combination of student feedback, peer observation, and administrative review. The process includes:

- Student course evaluations collected each term;
- Peer observations of teaching;
- Annual performance reviews conducted by the Dean of Academic Affairs in collaboration with the faculty member's department chair.

Student learning outcomes (SLOs) are assessed at both the course and program levels. Designated faculty are responsible for collecting evidence of student performance on assignments, projects, presentations, and exams that align with mapped SLOs. These assessments are evaluated using standardized rubrics aligned with ABET's Engineering Accreditation Commission (EAC) criteria to ensure rigor and consistency. Assessment results are compiled annually and reviewed by the academic department and the University's assessment committee.

2. Evaluation of Program Educational Effectiveness

The Bachelor of Science in Artificial Intelligence and Autonomous Systems will be subject to a multi-dimensional evaluation framework designed to assess the program's educational effectiveness, student achievement, and alignment with industry needs. Key elements of this framework include:

- Assessment of Student Learning Outcomes:
  The program will measure student achievement on a set of ABET-aligned outcomes, such as engineering problem-solving, system design, ethical judgment, teamwork, experimentation, and lifelong learning. Assessment instruments will include capstone projects, design assignments, technical reports, simulations, and oral presentations. Annual review of SLO data by faculty will inform curricular and pedagogical refinements.

- Retention and Graduation Metrics:
  Student retention and graduation rates will be tracked by the Office of Institutional Research and regularly reported to academic leadership. These indicators will be used to identify barriers to student progression and to refine academic support mechanisms such as structured advising, early alert systems, and co-curricular interventions.
- Student and Faculty Satisfaction:
  Annual surveys will collect feedback from students and faculty on key areas such as instruction, advising, technology infrastructure, learning resources, and overall program quality. Feedback will be used to inform programmatic improvements. Additional qualitative input will be collected through student focus groups and faculty roundtables.
- Cost-Effectiveness and Resource Utilization:
  The Division of Business and Finance, in collaboration with Academic Affairs, will conduct annual financial reviews of the program. These reviews will assess enrollment levels, instructional cost per credit hour, staffing, and use of instructional technology to ensure that the program remains financially sustainable while delivering high-quality education.
- Accreditation and Industry Engagement:
  The program will pursue accreditation through the Engineering Accreditation Commission (EAC) of ABET. An industry advisory board composed of employers, alumni, and subject matter experts will be convened to provide guidance on curriculum relevance, emerging trends in artificial intelligence and autonomous systems, and opportunities for student engagement with industry. The board will meet regularly and offer strategic input to maintain program alignment with workforce demands.

Through this system of ongoing evaluation and stakeholder feedback, the Artificial Intelligence and Autonomous Systems program will ensure that it achieves its educational objectives, fosters student success, and remains current with evolving technological and industry developments.

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

1. Access and Success for Minority Students

The proposed Bachelor of Science in Artificial Intelligence and Autonomous Systems (AIAS) is fully aligned with the goals of the Maryland State Plan for Postsecondary Education, especially those related to access, success, and equity. The program is designed to expand educational opportunities for underrepresented minorities in emerging fields of artificial intelligence, robotics, and autonomous systems, supporting the objectives of COMAR 13B.02.03.05.

Capitol Technology University has a longstanding institutional commitment to cultural diversity, equity, and inclusion in STEM education. The AIAS program builds on this commitment by eliminating traditional barriers, broadening recruitment efforts, and implementing structured support systems to increase persistence and graduation rates among minority students.

Key strategies that support access and success for minority students include:

- Transfer Pathways and Community College Partnerships
  The program is designed to be transfer-friendly and will accept qualified students from Maryland's community colleges, which often serve a high percentage of minority and first-generation students. Through articulation agreements, clearly mapped transfer pathways, and

individualized advising, these students can transition seamlessly into the AIAS upper-division curriculum.

- Inclusive Curriculum and Pedagogy
  The curriculum emphasizes project-based learning and real-world applications, which have been shown to increase engagement among students from historically underserved backgrounds. Faculty will incorporate culturally responsive pedagogy and Universal Design for Learning (UDL) strategies to support students with diverse learning styles and educational preparation.
- Advising and Retention Support
  The University maintains a proactive advising structure that includes academic coaching, early alert systems, and individualized success plans. These tools are especially important for students who may face additional challenges due to socioeconomic or educational disadvantages. Advisors regularly track academic progress and coordinate interventions when necessary.
- Financial Aid and Scholarships
  Capitol Technology University offers institutional aid, federal financial assistance, and access to external scholarships targeted at underrepresented populations in STEM. These financial supports help reduce economic barriers that disproportionately impact minority students.
- Campus Diversity Initiatives
  The University fosters a welcoming and inclusive campus climate through multicultural programming, student affinity groups, and active engagement in equity-focused institutional planning. These efforts support a sense of belonging and contribute to improved retention and academic success for students of color.

The AIAS program advances Goal 1 (Access) and Goal 2 (Success) of the Maryland 2022 State Plan for Postsecondary Education. By increasing participation in high-growth, high-demand technological fields and ensuring the availability of wraparound support systems, the program will contribute to closing equity gaps and enhancing degree attainment among underrepresented student populations in the state.

O. Relationship to Low Productivity Programs Identified by the Commission

1. Reallocation of Resources from Low Productivity Programs

The proposed Bachelor of Science in Artificial Intelligence and Autonomous Systems (AIAS) is not a direct continuation, merger, or redesign of any program currently identified by the Maryland Higher Education Commission (MHEC) as low productivity. However, the program has been developed as part of Capitol Technology University's ongoing academic realignment strategy, which is informed by internal assessments of program enrollment trends, graduation rates, and market relevance.

In particular, the University has identified a need to consolidate resources previously dedicated to narrowly specialized or declining engineering and technology programs and to redirect these resources toward more interdisciplinary, emerging fields that align with workforce demand and student interest. The AIAS program represents a forward-looking response to these findings.

Key areas of resource reallocation include:

- **Reassignment of Faculty Expertise**
  Faculty with backgrounds in robotics, embedded systems, computer science, artificial intelligence, and control systems—many of whom were previously assigned to programs with declining enrollment—will be repositioned to support instruction in the AIAS curriculum. This allows the University to maximize faculty impact without requiring new hires at launch.

- **Utilization of Existing Laboratory and Technological Resources**
  The AIAS program will leverage existing lab infrastructure already in use across mechatronics, robotics, microcontrollers, and computing programs. Facilities such as the Digital and Microcontroller Lab, the Control and Automation Lab, and the Robotics Lab are already equipped to support key components of the AIAS curriculum, including sensor integration, autonomous navigation, and machine learning applications.
- **Optimized Use of Physical Space**
  No new construction or expansion is required. Classrooms, labs, and faculty offices currently assigned to underutilized or phased-out programs will be reallocated to support the AIAS program. This ensures that space utilization remains efficient and aligned with institutional priorities.
- **Enhanced Program-Level Sustainability and Growth Potential**
  Unlike low-productivity programs that offer limited career versatility, the AIAS program is structured to prepare graduates for a wide range of roles in industries such as defense, transportation, manufacturing, healthcare, and smart infrastructure. Its interdisciplinary design and alignment with high-demand technologies are expected to drive stronger enrollment, higher retention, and improved graduation outcomes.

While the AIAS program is not formally replacing a specific MHEC-designated low-productivity program, it is a clear example of proactive academic restructuring. It reflects Capitol Technology University's commitment to continuous improvement, market responsiveness, and the strategic use of institutional resources to meet evolving student and employer needs.

P. Adequacy of Distance Education Programs

1. Institutional Eligibility to Offer Distance Education

Capitol Technology University is fully authorized by the Maryland Higher Education Commission (MHEC) to offer distance education programs. The institution has extensive experience delivering high-quality online and hybrid instruction in engineering, technology, computer science, cybersecurity, and related disciplines. Capitol is an active participant in the National Council for State Authorization Reciprocity Agreements (NC-SARA), which enables the university to offer distance education to students residing in other SARA-participating states.

This authorization and interstate participation confirm the university's adherence to state and national standards governing the design, delivery, and assessment of distance education.

2. Compliance with C-RAC Guidelines

Capitol Technology University complies with the Interregional Guidelines for the Evaluation of Distance Education established by the Council of Regional Accrediting Commissions (C-RAC). The institution affirms the following practices:

- Academic Quality and Rigor
  Distance education courses meet the same academic standards and learning outcomes as their face-to-face counterparts. Course content and assessments are reviewed to ensure alignment with program goals and institutional expectations for academic integrity.
- Faculty–Student Interaction
  Regular and substantive interaction between faculty and students is maintained through

scheduled virtual sessions, asynchronous communication, timely feedback on assignments, and online discussion boards.

- Student Identity Verification
  Student identity is verified using secure login credentials, access controls in the learning management system (Canvas), and proctoring protocols as appropriate.
- Access to Student Services
  Online students have full access to academic advising, career services, tutoring, the university library, writing assistance, and IT support. These services are delivered via digital platforms and supported by staff trained in remote service provision.
- Technology Infrastructure
  The university's online programs are supported by a robust technological framework, including the Canvas learning management system and integrated communication tools. Faculty and students receive technical support and training to ensure the effective use of instructional technology.
- Faculty Training and Support
  Faculty assigned to online and hybrid courses complete formal training in instructional design, online pedagogy, and the use of digital teaching tools. Ongoing support is provided through the university's Center for Teaching and Learning.

While the Bachelor of Science in Artificial Intelligence and Autonomous Systems is primarily structured for in-person delivery to support its hands-on components in robotics, sensors, and autonomous systems, several general education and computing theory courses may be offered in hybrid or fully online formats. All online offerings will conform to Capitol Technology University's distance education policies and meet applicable C-RAC standards to ensure educational quality and regulatory compliance.