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

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

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

Payment Submitted: <input checked="" type="radio"/> Yes	Payment Type: <input type="radio"/> R*STARS # 99930	Payment Amount: 850.00	Date Submitted: 3/15/2026
<input type="radio"/> No	<input checked="" type="radio"/> Check # 99930		

Department Proposing Program	Engineering		
Degree Level and Degree Type	Bachelor of Science (B.S.)		
Title of Proposed Program	Bachelor of Science in Systems Engineering		
Total Number of Credits	120		
Suggested Codes	HEGIS: 908.00	CIP: 14.2701	
Program Modality	<input type="radio"/> On-campus <input type="radio"/> Distance Education (fully online) <input checked="" type="radio"/> Both		
Program Resources	<input checked="" type="radio"/> Using Existing Resources <input type="radio"/> Requiring New Resources		
Projected Implementation Date <small>(must be 60 days from proposal submission as per COMAR 13B.02.03.03)</small>	<input checked="" type="radio"/> Fall <input type="radio"/> Spring <input type="radio"/> Summer            Year: 2026		
Provide Link to Most Recent Academic Catalog	URL: <a href="http://catalog.captechu.edu">http://catalog.captechu.edu</a>		

Preferred Contact for this Proposal	Name:	Dr. Mohamed Ghazy
	Title:	Dean of Academics
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President/Chief Executive	Type Name:	Dr. Bradford Sims
	Signature:	 Date: 3-15-26
	Date of Approval/Endorsement by Governing Board:	MARCA 15, 2026

Revised 1/2021



March 15, 2026

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

Dear Dr. Rai,

Capitol Technology University is requesting approval to offer a Bachelor of Science (B.S.) in Systems Engineering. This new degree program will be delivered by experienced faculty and supported by the University's existing instructional and laboratory infrastructure. The program is designed to meet the growing workforce demand for engineers with expertise in complex systems design, systems integration, modeling and simulation, optimization, and engineering decision-making.

The B.S. in Systems Engineering aligns with Capitol Technology University's mission to provide a hands-on, career-focused education in science, technology, engineering, and mathematics. The program prepares students for immediate entry into professional roles in sectors such as aerospace, defense, infrastructure systems, autonomous technologies, and advanced technology development. Students will gain practical experience through project-based learning, laboratory coursework, and a senior design capstone sequence, ensuring readiness to contribute to Maryland's evolving technological and industrial workforce.

Systems engineering plays a critical role in the design and management of complex technological systems across many industries. This program will expand access to high-quality STEM education for students in the region while supporting transfer pathways, workforce development initiatives, and future ABET accreditation.

We respectfully submit the full proposal for the Bachelor of Science in Systems Engineering for your review and approval. Enclosed is the required documentation, including the letter confirming the adequacy of library resources to support this program.

Respectfully,

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

Bradford L. Sims, PhD

President



March 15, 2026

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

Dear Dr. Rai,

This letter confirms the adequacy of the library resources at Capitol Technology University to support the proposed Bachelor of Science in Systems Engineering program. As President of the University, I affirm that the University's library resources, including professional library staff and research support services, are fully adequate to support the academic and research needs of students and faculty in the B.S. in Systems Engineering program.

Additionally, the University remains committed to the continuous improvement of its library resources and will ensure that sufficient funding is allocated to maintain and expand library collections, databases, and services in support of student learning and academic success.

Respectfully,

A handwritten signature in blue ink, appearing to read 'BLS', is written over the typed name.

Bradford L. Sims, PhD

President

PROPOSAL FOR:

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



Institution Submitting Proposal  
Fall 2026  
Projected Implementation Date

**Bachelor of Science**  
Award to be Offered

**Bachelor of Science in Systems  
Engineering**  
Title of Proposed Program

0908  
Suggested HEGIS Code

14.2701  
Suggested CIP Code

Engineering  
Department of Proposed Program

**Dr. Mohamed Shehata**  
Name of Department Head

**Dr. Mohamed Shehata**  
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Contact Phone Number

Rj/Sk 3-15-26  
Signature and Date

President/Chief Executive Approval

MARCH 15, 2026  
Date

Date Endorsed/Approved by Governing Board

# **Bachelor of Science in Systems Engineering**

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 Systems Engineering** is a 120-credit undergraduate engineering program designed to prepare students to design, analyze, integrate, and manage complex engineering systems using modern systems engineering principles and multidisciplinary engineering methodologies. The program emphasizes system architecture, modeling and simulation, optimization, complex networks, and engineering design integration through a strong foundation in mathematics, physics, electronics, computing, and engineering sciences.

Unlike traditional engineering programs that focus primarily on a single technical discipline, the Systems Engineering program emphasizes the **integration and coordination of multiple engineering domains** to address complex technological challenges. Students learn to design and manage large-scale systems that involve interactions among hardware, software, networks, and human decision processes. The program develops expertise in system modeling, architecture design, networked systems, optimization methods, and lifecycle engineering of complex technological systems.

The curriculum includes advanced coursework in calculus, differential equations, linear algebra, probability and statistics, circuits, electronics, signals and systems, digital systems, microcontroller-based design, and engineering mechanics. Specialized systems engineering courses focus on systems architecture and design, systems modeling and simulation, complex networks, optimization, and engineering management principles. A two-semester senior design sequence ensures that students apply engineering design methodologies to real-world system challenges while considering technical performance, reliability, safety, cost, ethics, and societal impact.

The program aligns directly with the mission of **Capitol Technology University** to educate individuals for professional opportunities in engineering, computer and information sciences, and business. The B.S. in Systems Engineering supports this mission by delivering a **career-oriented engineering program focused on interdisciplinary integration, applied systems thinking, and hands-on project-based learning**. Graduates will be prepared for careers in systems engineering, technology integration, aerospace systems, defense systems engineering, infrastructure systems design, autonomous systems development, and complex engineering project management.

The program also advances Capitol's strategic vision by expanding innovative engineering offerings, strengthening interdisciplinary STEM education, and supporting enrollment growth through programs addressing emerging technology systems and complex engineering integration challenges.

### **2. Explanation of How the Proposed Program Supports the Institution's Strategic Goals and Institutional Priorities**

The proposed **Bachelor of Science in Systems Engineering** directly supports Capitol Technology University's strategic goals by introducing a multidisciplinary engineering degree aligned with workforce

demand in complex system development, technology integration, infrastructure systems, and advanced engineering project environments.

The program contributes to **Goal I: Expand Educational Offerings and Increase Program Completion** by offering an engineering program that attracts students interested in interdisciplinary engineering, large-scale system design, and technology integration across multiple domains. It provides a pathway for high school graduates seeking applied engineering education as well as transfer students from community colleges in engineering, electronics, computer science, or related technical fields.

The program aligns with **Goal II: Increase Enrollment and Institutional Awareness** by positioning Capitol as a provider of applied systems engineering education focused on practical engineering integration rather than purely theoretical specialization. Its emphasis on modeling, networks, optimization, and systems architecture strengthens Capitol's identity as a university specializing in applied engineering and emerging technology systems.

The program supports **Goal III: Improve the Utilization of University Resources and Institutional Effectiveness** by leveraging existing strengths in electrical engineering, computing, control systems, and project-based engineering education. Foundational courses in mathematics, circuits, electronics, programming, microcontrollers, and engineering design are already offered within existing programs, enabling efficient implementation with minimal additional instructional investment. Systems engineering courses will utilize existing laboratory infrastructure and faculty expertise in engineering systems, computing, and automation.

The program advances **Goal IV: Increase the Number and Scope of Partnerships** through opportunities to collaborate with industries involved in complex system development including aerospace, defense systems, robotics, autonomous systems, infrastructure engineering, and advanced manufacturing. Capstone projects, internships, and industry-sponsored design experiences will strengthen experiential learning and employer engagement.

Institutional prioritization of the program is demonstrated by:

- a) Development under the leadership of the School of Engineering and the Office of Academic Affairs as part of Capitol's strategic expansion into interdisciplinary engineering programs.
- b) Review and prioritization through Academic Council and institutional planning discussions focused on workforce-aligned engineering programs addressing emerging technological systems.
- c) Alignment with existing faculty expertise in electrical engineering, computing systems, automation, systems design, and project-based engineering education.
- d) Support for enrollment growth strategies that emphasize interdisciplinary engineering programs attractive to both traditional and transfer students.
- e) Strategic reinforcement of Capitol's identity as an applied STEM institution focused on hands-on engineering education and real-world system integration challenges.

### **3. Description of How the Program Will Be Adequately Funded for at Least the First Five Years**

The **Bachelor of Science in Systems Engineering** will be funded through internal institutional resources, shared instructional capacity across engineering programs, and projected tuition revenue growth. A detailed financial analysis is provided in **Section L** of this proposal.

Many core courses required for the program—including mathematics, physics, circuits, electronics, digital systems, signals and systems, programming, and engineering mechanics—are already offered within existing engineering programs. These shared courses significantly reduce the need for additional full-time faculty hires during the initial phase of program implementation.

Existing laboratory infrastructure—including electronics laboratories, digital systems laboratories, microcontroller development workstations, and engineering design facilities—already supports many components of the curriculum. Systems engineering instruction will primarily utilize computing laboratories and modeling tools already available at the university.

Additional instructional resources such as **systems modeling software, simulation tools, and optimization analysis platforms** will be introduced incrementally as enrollment grows. These modest investments will support courses in systems modeling, optimization, and complex network analysis.

Tuition revenue generated through enrollment growth will support instructional costs, laboratory upgrades, adjunct faculty support as needed, and program coordination. The university's financial model anticipates the program achieving stable enrollment levels within three to five years.

Additional funding opportunities may include federal grants, industry-sponsored projects, and collaborative partnerships with organizations involved in aerospace systems, defense technology, autonomous systems, and infrastructure engineering.

#### **4. Description of the Institution's Commitment to the Program's Long-Term Success**

Capitol Technology University is fully committed to the long-term sustainability and success of the **B.S. in Systems Engineering** program.

##### **a) Administrative, Financial, and Technical Support**

Administrative oversight will be provided by the **School of Engineering** in coordination with program faculty and institutional support units including Academic Affairs, Institutional Effectiveness, and Information Technology. The program will be incorporated into regular budgeting processes to ensure stable operational support. Laboratory equipment, computing infrastructure, and engineering software platforms will be maintained and upgraded as necessary to support evolving systems engineering technologies.

##### **b) Continuation for Sufficient Time to Allow Students to Complete the Program**

The university commits to maintaining the program for a sufficient period to ensure that all enrolled students are able to complete their degrees. In the event of any future program restructuring, Capitol Technology University will implement a formal **teach-out plan** consistent with regional accreditation standards to ensure uninterrupted academic progression and degree completion for all students.

## **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 Systems Engineering** addresses the growing need for engineers capable of designing, integrating, and managing complex technological systems that span multiple engineering disciplines. Modern engineering challenges—such as autonomous systems, aerospace systems, cyber-physical infrastructure, advanced manufacturing systems, and intelligent transportation networks—require professionals who understand not only individual technologies but also the interactions among components within large-scale integrated systems.

Maryland hosts a diverse and technologically advanced ecosystem that includes federal research laboratories, aerospace and defense contractors, cybersecurity and technology firms, and advanced infrastructure development initiatives. The presence of federal agencies such as the National Aeronautics and Space Administration (NASA), the National Institute of Standards and Technology (NIST), and numerous Department of Defense installations, along with private-sector technology companies, has created sustained demand for engineers trained in **systems-level design, modeling, integration, and lifecycle management of complex systems**.

The proposed program responds to this evolution by emphasizing systems architecture, modeling and simulation, complex network analysis, optimization methods, and integrated engineering design. Students develop competencies in engineering systems integration, system performance analysis, multidisciplinary design, and engineering decision-making across the lifecycle of complex technological systems.

Unlike traditional engineering programs that focus primarily on a single technical discipline, the Systems Engineering program prepares students to coordinate and integrate multiple technologies and engineering domains. Graduates will contribute to the advancement of knowledge in areas such as **autonomous systems, aerospace systems integration, smart infrastructure, cyber-physical systems, and advanced engineering project management**, which are increasingly critical to technological innovation and national competitiveness.

#### **b) Societal Needs, Including Expanding Educational Opportunities and Choices for Minority and Educationally Disadvantaged Students at Institutions of Higher Education**

The proposed program expands access to engineering education for students interested in interdisciplinary engineering careers that involve technology integration, systems design, and large-scale engineering project development. Many students interested in engineering systems and technology integration may not find appropriate pathways within traditional single-discipline engineering programs.

By structuring the curriculum around **mathematics, physics, electronics, computing, and systems engineering methodologies**, the program offers a rigorous but accessible engineering pathway for students from diverse academic backgrounds, including transfer students from community colleges and students from groups historically underrepresented in engineering.

Capitol Technology University serves a diverse student population and has a demonstrated commitment to supporting minority, first-generation, and adult learners in STEM fields through small class sizes, individualized advising, hands-on laboratory experiences, and project-based learning. The Systems Engineering program provides additional opportunities for students to pursue high-demand engineering careers in industries such as aerospace systems, defense systems engineering, infrastructure systems development, robotics, and intelligent technology systems.

By offering this program, Capitol broadens educational opportunities within Maryland's higher education landscape and supports equitable access to engineering careers that contribute to technological innovation, economic growth, and national security.

### **c) The Need to Strengthen and Expand the Capacity of Historically Black Institutions to Provide High Quality and Unique Educational Programs**

Although Capitol Technology University is not a historically black institution (HBI), the proposed program complements statewide efforts to expand access to high-quality STEM education and supports opportunities for collaboration among Maryland's higher education institutions.

Maryland's HBIs—including **Morgan State University, Bowie State University, Coppin State University, and the University of Maryland Eastern Shore**—play a critical role in advancing diversity and representation in STEM disciplines. The Systems Engineering program may support collaborative articulation agreements, transfer pathways, joint research initiatives, and cooperative educational partnerships that expand opportunities for students across institutions.

The interdisciplinary and systems-oriented nature of the proposed program provides a distinctive academic approach that complements existing engineering programs offered by HBIs. Capitol's commitment to pursuing collaborative relationships with other Maryland institutions contributes to statewide capacity building and supports Maryland's broader objective of expanding high-quality engineering education across institutions serving diverse student populations.

### **2. Provide Evidence that the Perceived Need is Consistent with the Maryland State Plan for Postsecondary Education**

The **Maryland State Plan for Postsecondary Education** identifies three overarching goals:

1. **Student Access**
2. **Student Success**
3. **Innovation**

The proposed **Bachelor of Science in Systems Engineering** aligns with these goals and supports Maryland's higher education and workforce development priorities.

#### **Goal 1: Student Access**

*"Ensure equitable access to affordable and quality postsecondary education for all Maryland residents."*

The Systems Engineering program expands access to engineering education for students interested in interdisciplinary technology systems, engineering integration, and complex infrastructure development. The program provides a pathway for students transferring from two-year institutions, adult learners seeking career advancement, and underrepresented students pursuing STEM degrees.

Through articulation agreements, targeted recruitment, and applied laboratory-based instruction, the program broadens participation in engineering careers aligned with Maryland's technology and engineering industries.

The program supports **Priority 1 (Affordability and Financial Access)** by providing access to high-demand engineering careers with strong long-term employment prospects. It also aligns with **Priority 4 (Equitable Access for Underrepresented Students)** by expanding engineering pathways through transfer agreements, inclusive instructional practices, and structured student support.

#### **Goal 2: Student Success**

*"Promote and implement practices and policies that will ensure student success."*

The Systems Engineering program incorporates project-based learning, laboratory-supported engineering instruction, and a two-semester capstone design sequence that challenges students to solve complex real-world engineering problems. Students benefit from structured academic advising, faculty mentorship, and experiential learning opportunities through collaborative engineering design projects.

The integration of engineering fundamentals with systems-level problem solving ensures that students develop both analytical competency and practical engineering design experience.

The program advances **Priority 5 (Completion and Degree Attainment)** through structured advising, early-alert systems, and experiential learning approaches that improve retention and degree completion. It also supports **Priority 6 (Workforce Preparation and Career Readiness)** by aligning curriculum design with industry needs in systems integration, complex engineering systems design, and technology project management.

### **Goal 3: Innovation**

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

The Systems Engineering program represents an innovative interdisciplinary engineering approach that integrates multiple engineering domains into a cohesive curriculum focused on complex systems development.

By combining systems modeling, complex networks, optimization methods, control systems, computing, and engineering design within a single program, the curriculum reflects the evolving multidisciplinary nature of modern engineering challenges.

The program supports **Priority 8 (Academic Innovation and Modernization)** through its emphasis on systems engineering methodologies applied to emerging technology domains. It also aligns with **Priority 9 (Work-Based Learning and Industry Partnerships)** through internships, industry-sponsored projects, and capstone collaborations with organizations engaged in aerospace systems, defense technologies, intelligent infrastructure, and advanced technology development.

This approach advances statewide priorities related to academic innovation, applied engineering education, and workforce development in emerging technology sectors.

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

### **1. Describe Potential Industries, Employment Opportunities, and Expected Level of Entry for Graduates of the Proposed Program**

Graduates of the **Bachelor of Science in Systems Engineering** will be prepared for employment in industries that design, integrate, and manage complex technological systems across multiple engineering domains. These industries require professionals capable of coordinating multidisciplinary engineering efforts, integrating hardware and software systems, and managing the lifecycle of complex technologies.

Primary employment sectors include:

- Aerospace and defense systems engineering
- Autonomous systems and robotics development
- Advanced manufacturing and industrial automation
- Infrastructure and smart city systems
- Cyber-physical and intelligent technology systems
- Energy and power systems integration
- Federal research laboratories and government agencies
- Technology consulting and engineering services firms

Representative entry-level positions include:

- Systems Engineer
- Systems Integration Engineer
- Systems Design Engineer
- Aerospace Systems Engineer
- Autonomous Systems Engineer
- Infrastructure Systems Engineer
- Engineering Project Engineer
- Systems Modeling and Simulation Engineer

These positions typically require a bachelor's degree in engineering and involve system architecture development, requirements analysis, system modeling and simulation, integration testing, and lifecycle system management. Graduates generally enter the workforce as **junior systems engineers or systems integration specialists**, with advancement opportunities into systems architecture, engineering project leadership, technology program management, or advanced systems analysis roles.

The program's emphasis on **systems modeling, complex networks, optimization, control systems, and integrated engineering design** positions graduates to contribute immediately within multidisciplinary engineering environments.

## 2. Present Data and Analysis Projecting Market Demand and Availability of Openings

National labor market data demonstrate strong and sustained demand for engineers capable of managing complex technological systems.

According to the **U.S. Bureau of Labor Statistics (BLS)**:

- Employment of **Industrial Engineers**, a category closely aligned with systems engineering roles, is projected to grow approximately **12 percent from 2022 to 2032**, faster than the national average for all occupations.
- Employment of **Electrical Engineers** is projected to grow steadily, supporting industries such as aerospace systems, robotics, and advanced technology development.
- Median annual wages for systems-oriented engineering positions frequently exceed **\$100,000** depending on industry sector and experience.

Systems engineering expertise is particularly valued in industries where complex technological systems require coordinated design and integration across multiple technical domains. These include aerospace systems, defense technologies, intelligent infrastructure systems, autonomous vehicles, and advanced manufacturing.

Maryland's regional economy is strongly aligned with these industries. The state hosts:

- Major aerospace and defense contractors
- Federal research laboratories
- National security and technology development organizations
- Advanced manufacturing companies
- Infrastructure and transportation engineering firms

Major employers operating in Maryland include aerospace companies, defense contractors, federal research agencies, and technology firms involved in systems integration, cyber-physical systems, and autonomous technologies.

The **Maryland Department of Labor** identifies engineering and advanced technology occupations as priority workforce areas within the state’s STEM workforce strategy. Systems engineering expertise is particularly relevant to Maryland’s aerospace, defense, cybersecurity, and infrastructure sectors, which rely heavily on engineers capable of managing complex integrated systems.

The proposed program aligns directly with these workforce needs by preparing graduates with technical competencies in **system architecture, modeling and simulation, optimization methods, and multidisciplinary engineering design**.

### **3. Evidence from Market Surveys and Workforce Development Reports**

The **Georgetown University Center on Education and the Workforce** projects that more than **70 percent of jobs in Maryland will require postsecondary education by 2031**, with significant demand in STEM and advanced technology fields. Engineering disciplines that combine technical expertise with systems integration and project coordination skills are expected to experience strong labor market demand.

The **Maryland Statewide Workforce Development Plan (2024–2028)** identifies advanced technology sectors—including aerospace systems, cybersecurity technologies, advanced manufacturing, and infrastructure modernization—as priority areas for workforce development. These sectors rely heavily on systems engineers capable of integrating complex technological components and managing engineering systems across their full lifecycle.

Job posting analytics from workforce intelligence platforms such as **Lightcast and LinkedIn** consistently show strong employer demand in Maryland for positions such as:

- Systems Engineer
- Systems Integration Engineer
- Systems Modeling and Simulation Engineer
- Autonomous Systems Engineer
- Aerospace Systems Engineer
- Infrastructure Systems Engineer

Major employers posting such positions include aerospace firms, defense contractors, federal agencies, technology companies, and engineering consulting organizations located throughout the Maryland and Washington, D.C. metropolitan region. The frequency of these postings reflects sustained demand for engineers trained in **systems integration, modeling, and multidisciplinary engineering design**.

### **4. Current and Projected Supply of Prospective Graduates**

Maryland institutions currently award bachelor's degrees in several engineering disciplines, including electrical engineering, mechanical engineering, and computer engineering. However, relatively few undergraduate programs specifically emphasize **systems engineering as a distinct discipline focused on system integration, modeling, architecture design, and complex systems management**.

According to **Integrated Postsecondary Education Data System (IPEDS)** data, several Maryland universities award engineering degrees annually; however, many of these programs focus on traditional single-discipline engineering fields. Undergraduate programs explicitly centered on systems engineering concepts remain limited within the state.

The proposed **Bachelor of Science in Systems Engineering** provides a distinct academic pathway emphasizing interdisciplinary integration of engineering technologies, systems modeling, complex networks, and optimization methods. The program complements existing engineering degrees by preparing graduates to work at the **intersection of multiple engineering disciplines**, rather than focusing exclusively on a single technical domain.

Institutional enrollment projections indicate:

- Approximately **15 students in Year 1**
- Growth to **50–70 students by Year 5**
- Approximately **10–15 graduates annually by Year 5**

These graduates will contribute to Maryland's engineering workforce in sectors including aerospace systems, defense technologies, intelligent infrastructure, and advanced technology systems integration. The program expands the supply of engineers trained in systems-level design and integration while complementing existing engineering education pathways offered by other Maryland institutions.

## **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**

The proposed program is classified under **CIP 14.2701 – Systems Engineering**. A comprehensive review of Maryland public and private institutions offering programs under this CIP classification and closely related engineering disciplines was conducted to ensure that all potentially comparable undergraduate programs were identified. This review examined program titles, curricular structures, and institutional mission alignment across four-year institutions in the State.

While several institutions in Maryland offer engineering programs with components related to systems engineering—such as industrial engineering, engineering management, or interdisciplinary engineering—relatively few undergraduate programs explicitly focus on **systems engineering as a distinct discipline centered on system integration, modeling, architecture design, and complex systems analysis**.

Several institutions offer programs with partial overlap in engineering foundations; however, meaningful differences exist in curricular emphasis, program structure, and systems-level integration.

**United States Naval Academy – Systems Engineering Major**

The United States Naval Academy offers a Systems Engineering major designed to prepare naval officers for technical leadership roles in complex military systems. The program emphasizes engineering management, decision analysis, and systems integration within defense-related operational environments.

The proposed **Bachelor of Science in Systems Engineering at Capitol Technology University** differs in its applied engineering focus designed for civilian technology industries. While sharing common systems engineering principles such as modeling, optimization, and systems architecture, the Capitol program emphasizes engineering system integration across sectors such as aerospace systems, intelligent infrastructure, advanced manufacturing, and autonomous technologies. The curriculum integrates electrical systems, computing, and engineering design with systems engineering methodologies, providing a broader technology integration perspective suitable for diverse engineering industries.

### **University of Maryland, College Park – B.S. in Industrial Engineering**

The University of Maryland offers a Bachelor of Science in Industrial Engineering focusing on operations research, logistics systems, supply chain analysis, and production systems optimization. The program emphasizes efficiency improvements within industrial and manufacturing processes.

While industrial engineering shares certain analytical methods with systems engineering—such as optimization and decision analysis—the proposed **Systems Engineering program at Capitol Technology University** focuses on the design and integration of complex technological systems rather than industrial operations. The Capitol curriculum emphasizes systems architecture, modeling and simulation, control systems integration, complex networks, and multidisciplinary engineering design across technology domains including aerospace systems, autonomous systems, and cyber-physical infrastructure.

### **Morgan State University – B.S. in Industrial and Systems Engineering**

Morgan State University offers a Bachelor of Science in Industrial and Systems Engineering that integrates industrial engineering methods with systems analysis and operations research techniques. The program emphasizes production systems, quality engineering, and industrial optimization.

The proposed Systems Engineering program differs by focusing on **technology system integration and multidisciplinary engineering design** rather than industrial production systems. Capitol's curriculum emphasizes system architecture, control systems, embedded technologies, modeling and simulation, and complex technological systems rather than manufacturing optimization or industrial process engineering.

### **Johns Hopkins University – Systems Engineering Programs (Graduate Level)**

Johns Hopkins University offers highly regarded **graduate-level Systems Engineering programs**, particularly through the Whiting School of Engineering. These programs focus on advanced systems engineering methodologies for experienced professionals in engineering and technology industries.

However, these programs are offered primarily at the **graduate level** and are designed for professionals who already possess undergraduate degrees in engineering or related disciplines. The proposed **Bachelor of Science in Systems Engineering at Capitol Technology University** fills an important gap by providing an **undergraduate pathway into systems engineering**, preparing students earlier in their academic careers to pursue systems engineering roles or continue into graduate study.

## **2. Provide Justification for the Proposed Program**

The proposed **Bachelor of Science in Systems Engineering** is justified by demonstrated workforce demand, academic distinctiveness, and institutional capacity to deliver a high-quality engineering program aligned with Maryland's technology economy.

First, Maryland maintains a strong concentration of industries requiring engineers capable of designing and integrating complex systems. Aerospace companies, defense contractors, federal research laboratories, advanced manufacturing firms, and technology companies throughout the Maryland and Washington, D.C. region require engineers trained in **systems integration, modeling and simulation, systems architecture, and multidisciplinary engineering design**.

Second, while Maryland institutions offer traditional engineering programs such as electrical engineering, mechanical engineering, and industrial engineering, relatively few undergraduate programs emphasize **systems engineering as a distinct discipline focused on complex system integration and lifecycle engineering**. The proposed program provides a unique interdisciplinary engineering pathway that prepares students to manage interactions among hardware systems, software platforms, networks, and human decision processes within large-scale engineering systems.

Third, the program leverages **Capitol Technology University's existing strengths in electrical engineering, computing systems, automation, and applied engineering design**. The curriculum integrates established engineering core courses—including circuits, electronics, signals and systems, programming, and engineering mechanics—with specialized systems engineering coursework in modeling and simulation, optimization, complex networks, and systems architecture. This structure allows efficient use of existing faculty expertise and laboratory infrastructure while maintaining academic rigor.

Finally, the program supports statewide objectives related to **STEM workforce development, advanced technology innovation, and engineering education expansion**. By offering a systems engineering program focused on applied system integration and multidisciplinary engineering design, the university expands educational opportunities for students while addressing workforce needs in industries that depend on complex technological systems.

For these reasons, the **Bachelor of Science in Systems Engineering** is academically justified, economically aligned with Maryland's technology sectors, and strategically positioned to complement existing engineering programs while addressing workforce demand for engineers trained in complex systems integration.

## **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 Systems Engineering** is designed to complement—rather than compete with—high-demand engineering programs currently offered by Maryland's Historically Black Institutions (HBIs). Institutions such as **Morgan State University, Bowie State University, Coppin State University, and the University of Maryland Eastern Shore** play a vital role in advancing diversity, equity, and access within engineering and STEM education. Their engineering and technology

programs contribute significantly to Maryland's workforce development goals and to expanding representation in high-technology professions.

The Systems Engineering program at **Capitol Technology University** differs in its curricular emphasis and interdisciplinary systems integration focus. While HBI engineering programs provide strong foundations in traditional engineering disciplines such as civil engineering, electrical engineering, computer science, and industrial engineering, the proposed program emphasizes **systems-level design, modeling and simulation, optimization methods, complex networks, and integration of multidisciplinary engineering systems**.

The curriculum is structured around **applied systems engineering methodologies**, including system architecture design, system modeling, complex network analysis, and integrated engineering design across multiple technology domains. This approach prepares graduates to work on complex technological systems such as aerospace systems, autonomous systems, intelligent infrastructure, and cyber-physical engineering platforms.

The program is also structured to serve a **distinct and complementary student population**, including transfer students from community colleges, adult learners, and students seeking applied engineering education focused on technology integration and systems design. The systems-engineering orientation may attract students whose interests align more closely with **engineering systems integration, technology architecture, and multidisciplinary engineering design**, rather than traditional single-discipline engineering pathways.

Rather than diminishing HBI programs, the Systems Engineering program may support them in several ways:

- By expanding overall statewide capacity to meet growing employer demand for engineers skilled in **systems integration, modeling, and complex technology system design**.
- By creating potential **articulation pathways and transfer agreements** that allow students from HBI institutions to pursue specialized systems engineering coursework or collaborative capstone projects.
- By supporting **collaborative industry engagement initiatives** in areas such as aerospace systems development, intelligent infrastructure systems, advanced manufacturing technologies, and autonomous systems engineering.
- By reinforcing Maryland's broader objective of **increasing participation in engineering and STEM careers** without displacing the missions of existing institutions.

The introduction of this program will not reduce enrollment or diminish institutional support for high-demand engineering programs at HBIs. Instead, it provides a **complementary interdisciplinary engineering pathway** that expands educational options, strengthens statewide workforce responsiveness, and supports Maryland's commitment to **inclusive excellence in STEM education**.

## **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 Systems Engineering** is not expected to negatively impact the uniqueness, institutional missions, or enrollment priorities of Maryland's Historically Black Institutions (HBIs). Instead, the program complements statewide efforts to expand access to high-quality engineering education aligned with workforce needs in complex technological systems, infrastructure modernization, and advanced technology integration.

Maryland's HBIs—including **Morgan State University, Bowie State University, Coppin State University, and the University of Maryland Eastern Shore**—play a vital role in expanding educational opportunity and increasing participation of historically underrepresented populations in STEM disciplines. These institutions maintain strong academic missions centered on access, equity, research engagement, and the preparation of students for professional careers in engineering, computing, and applied sciences.

The proposed Systems Engineering program differs in both curricular structure and academic emphasis. While engineering programs at HBIs provide strong preparation in traditional engineering disciplines such as civil engineering, electrical engineering, computer science, and industrial engineering, the program at Capitol Technology University focuses specifically on **systems-level engineering integration, modeling and simulation, complex networks, optimization methods, and multidisciplinary engineering system design**.

The curriculum emphasizes the integration of multiple engineering technologies—including electronics, computing, control systems, and engineering design—within a **systems engineering framework focused on complex technological systems**. This approach prepares students to work on engineering systems such as aerospace platforms, intelligent infrastructure systems, autonomous technologies, and cyber-physical systems.

The program's design reflects **Capitol Technology University's institutional identity as an applied, laboratory-centered engineering institution emphasizing hands-on learning, embedded technologies, computing integration, and systems engineering methodologies**. This applied systems engineering orientation differs from the disciplinary and research-focused engineering models found at many institutions and therefore does not replicate the academic missions of HBIs.

The program may also support **collaborative opportunities that reinforce HBI missions**, including articulation agreements, shared capstone initiatives, industry partnerships, and cooperative workforce development activities in areas such as aerospace systems engineering, infrastructure systems design, and advanced technology integration.

By expanding educational opportunities in a high-demand engineering field without altering the institutional missions or enrollment strategies of HBIs, the Systems Engineering program respects the **distinct identities of Maryland's historically black institutions while contributing to the shared statewide goal of strengthening diversity, equity, and innovation within STEM education**.

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

### **1. Description of Program Development and Faculty Oversight**

The **Bachelor of Science in Systems Engineering** was developed through a collaborative process involving faculty from Capitol Technology University's **School of Engineering** and academic leadership within the **Office of Academic Affairs**. The program was designed in response to growing workforce demand for engineers capable of designing, integrating, and managing complex technological systems across multiple engineering domains.

Program development included review of nationally recognized systems engineering curricula, consultation with industry professionals working in aerospace systems, defense technologies, infrastructure systems, and advanced technology development, and alignment with **Engineering Accreditation Commission (EAC) of ABET criteria** for engineering programs. The curriculum builds upon Capitol Technology University's established strengths in electronics, computing systems, embedded technologies, systems engineering, and applied laboratory-based instruction.

Many foundational courses—including mathematics, physics, circuits, electronics, signals and systems, programming, and engineering mechanics—are already offered within existing engineering programs. Specialized systems engineering courses were developed to address system architecture design, modeling and simulation, optimization methods, complex networks, and multidisciplinary systems integration.

The program is structured to meet **EAC-ABET expectations for engineering programs** by ensuring:

- One year of mathematics and basic sciences
- One and one-half years of engineering topics
- Design experiences integrated throughout the curriculum
- A culminating two-semester capstone design sequence

The program will be overseen by full-time faculty holding doctoral degrees in engineering or closely related disciplines. Faculty expertise includes electrical engineering, control systems, computing systems, systems engineering, and applied engineering design. Adjunct faculty with industry experience in systems engineering, aerospace systems, autonomous technologies, and engineering project management may support specialized upper-level courses and senior design mentorship as enrollment grows.

## **2. Educational Objectives and Student Learning Outcomes**

### **Program Modality**

The **Systems Engineering program** will be delivered primarily in a **face-to-face format on campus** to support strong laboratory engagement, collaborative engineering design activities, and hands-on learning experiences. Selected courses may be offered in hybrid format where appropriate, particularly foundational mathematics or computing courses, while core engineering laboratories and senior design experiences will remain in-person.

The curriculum emphasizes:

- Laboratory-based engineering instruction
- System modeling and simulation using computational tools
- Engineering system integration and architecture design
- Programming and computational analysis using Python and related tools
- Team-based engineering design and project development

### **Program Educational Objectives**

Within **three to five years of graduation**, alumni of the Systems Engineering program are expected to:

1. Be employed in systems engineering, engineering integration, aerospace systems development, infrastructure systems design, or related engineering fields.
2. Apply engineering principles and systems thinking to the design, analysis, and integration of complex technological systems.
3. Demonstrate professional and ethical responsibility when working in multidisciplinary engineering environments.
4. Pursue continued professional development through graduate education, professional certifications, or leadership roles in engineering practice.

### **Student Learning Outcomes**

Upon graduation, students will be able to:

1. **Identify, formulate, and solve complex engineering problems** by applying principles of engineering, science, and mathematics.
2. **Apply engineering design to produce systems engineering solutions** that meet specified needs while considering public health, safety, sustainability, and economic factors.
3. **Communicate effectively with diverse audiences**, including engineering teams, project stakeholders, and technical decision-makers.
4. **Recognize ethical and professional responsibilities** in engineering situations and make informed judgments considering societal impacts.
5. **Function effectively on engineering teams** that establish goals, plan tasks, meet objectives, and integrate multidisciplinary perspectives.
6. **Develop and conduct appropriate experimentation, analyze and interpret data**, and use engineering judgment to draw conclusions about system performance.
7. **Acquire and apply new knowledge as needed** using appropriate learning strategies to adapt to evolving engineering technologies and system requirements.

These outcomes align directly with **ABET Student Outcomes (1–7)** for engineering programs.

### **3. Assessment and Documentation of Student Achievement**

#### **a) Assessment of Student Learning Outcomes**

Student learning outcomes will be assessed using both **direct and indirect assessment methods** across required courses in the curriculum.

Direct assessment methods include:

- Examinations in mathematics and engineering science courses
- Laboratory reports and engineering experimentation analyses
- Programming and computational modeling assignments
- Engineering design projects in core engineering courses
- Capstone design project deliverables
- Oral presentations and technical documentation

Each required course includes mapped learning outcomes aligned with program-level outcomes and **ABET criteria**. Faculty will use standardized rubrics to evaluate student achievement.

The **two-semester Senior Design sequence (SDE 457 and SDE 458)** serves as the primary integrative assessment experience. During this sequence, students design, prototype, test, and evaluate complex engineering systems under realistic engineering constraints including cost, performance, safety, sustainability, and ethical considerations.

Assessment results will be reviewed annually by program faculty and academic leadership. Continuous improvement actions will be documented and implemented based on assessment findings, faculty review, and industry advisory board feedback.

#### **b) Documentation of Student Achievement**

Capitol Technology University maintains an **institution-wide assessment framework** to document course-level and program-level learning outcomes.

Faculty will archive:

- Assessment instruments
- Student work samples and project artifacts
- Rubrics used for evaluation
- Capstone reports and presentations
- Annual learning outcome summaries

These materials will be reviewed as part of the university's continuous improvement process and will support internal program evaluation and future accreditation review, including potential **EAC-ABET accreditation**.

#### **4. Program Requirements and Course Structure**

The **Bachelor of Science in Systems Engineering** is a **120-credit engineering degree** structured to provide rigorous preparation in mathematics, science, engineering fundamentals, and systems engineering methodologies.

The curriculum is distributed across the following major categories:

<b>Category</b>	<b>Description</b>	<b>Distribution (Credits)</b>
<b>General Education</b>	Foundational courses that develop written communication, ethical reasoning, humanities awareness, and social science perspectives. These courses support students' ability to communicate effectively, understand societal impacts of technology, and function professionally in multidisciplinary environments.	<b>21</b>
<b>Mathematics and Applied Sciences</b>	Courses providing the mathematical and scientific foundations necessary for engineering analysis and system modeling. Topics include calculus, differential equations, linear algebra, probability and statistics, discrete mathematics, and calculus-based physics.	<b>32</b>
<b>Engineering Core</b>	Fundamental engineering coursework introducing electrical systems, electronics, digital systems, control systems, mechanics, programming, artificial intelligence, and data science. These	<b>36</b>

	courses provide multidisciplinary engineering knowledge necessary for system integration and technology development.	
<b>Systems Engineering Core</b>	Specialized courses focusing on systems engineering principles including systems architecture, modeling and simulation, complex networks, optimization methods, and a two-semester senior design experience where students apply systems engineering methods to real-world engineering challenges.	<b>21</b>
<b>General Electives</b>	Elective coursework allowing students to explore additional areas of interest, deepen technical expertise, or pursue interdisciplinary study aligned with career goals.	<b>9</b>
<b>Total Program Credits</b>		<b>120</b>

### Curriculum Structure (120 Credits)

#### Bachelor of Science (B.S.) in Systems Engineering

**Total Credits: 120**

#### I. General Education (21 Credits)

Course Number & Title	Credits	Prerequisites
EN 101 – English Composition I	3	Placement or EN 099
EN 102 – English Composition II	3	EN 101
HU 331 – Arts and Ideas	3	EN 102
SS 351 – Ethics	3	EN 102
Social Science Elective	3	Varies
BUS 174 – Introduction to Business	3	None
BUS 301 – Project Management	3	EN 101 and BUS 174

#### II. Mathematics and Applied Sciences (32 Credits)

Course Number & Title	Credits	Prerequisites
MA 114 – Algebra and Trigonometry	4	MA 112 or placement
MA 261 – Calculus I	4	MA 114
MA 262 – Calculus II	4	MA 261
MA 330 – Linear Algebra	3	MA 262
MA 340 – Ordinary Differential Equations	3	MA 262
MA 345 – Probability & Statistics for Engineers	3	MA 262
PH 261 – Engineering Physics I	4	MA 261; Coreq: MA 262
PH 262 – Engineering Physics II	4	PH 261
MA 124 – Discrete Mathematics	3	MA 112, MA 114, or placement test score

#### III. Engineering Core (36 Credits)

Course Number & Title	Credits	Prerequisites
EL 100 – Introduction to DC/AC Circuits	3	Coreq: MA 112
EL 200 – Electronic Devices	3	EL 100
EL 204 – Digital Electronics	3	None
EE 362 – Microcontroller System Design	3	EL 204
EE 406 – Signals and Systems	3	MA 262 and MA 340

EE 453 – Control I	3	MA 340
MEC 210 – Engineering Mechanics – Statics	3	MA 261; Coreq: PH 261
MEC 215 – Introduction to Engineering Design Computer-Aided Design	3	None
MEC 255 – Mechanics of Materials and Materials Science	3	MEC 210
CS 120 – Introduction to Programming Using Python	3	None
AIT 201 – Introduction to Artificial Intelligence	3	MA 128 or equivalent
DS 101 – Introduction to Data Science	3	MA 112

#### IV. Systems Engineering Core (21 Credits)

Course Number & Title	Credits	Prerequisites
SE 200 – Systems Engineering Seminar	1	Sophomore standing (Systems Engineering major)
EE 340 – Systems Engineering	3	BUS 301
SE 340 – Systems Modeling & Simulation	3	MA 340
SE 320 – Complex Networks for Engineers	3	MA 330, MA 345
SE 330 – Optimization	3	MA 330
SE 310 – Systems Architecture and Design	3	BUS 301, EN 102
SDE 457 – Senior Design I	3	Senior standing
SDE 458 – Senior Design II	3	SDE 457

#### V. General Electives (9 Credits)

Course	Credits	Prerequisites
General Elective 1	3	Varies
General Elective 2	3	Varies
General Elective 3	3	Varies

#### Total Program Credits: 120

The curriculum integrates systems engineering concepts with foundational engineering principles, providing students with both **technical depth and multidisciplinary integration skills**.

#### Courses Descriptions

##### *I. General Education (21 Credits)*

**EN-101 – English Communications I (3 credits):** This introductory college-level course focuses on effective oral and written communication skills and the development of analytical abilities through various reading and writing assignments. Students must demonstrate competence in writing mechanics, including grammar, sentence structure, logical content development, and research documentation through 4 essays/research papers. Rhetorical modes may include description, comparison/contrast, narrative, and process analysis. Students are expected to develop effective oral communication skills through speeches. Group projects will develop effective team skills such as decision-making, time management, and cooperation. Prerequisite(s): Acceptance based on placement test scores.

**EN-102 – English Communications II (3 credits):** This sequel to EN-101 involves more sophisticated reading, writing, speaking, and research assignments. Students must demonstrate competence in writing mechanics, as well as advanced research skills, the ability to handle complex information, and effective team skills. Students write research papers: an information paper, a cause-and-effect paper, an argument paper, and a final research paper. Course includes group work. Presentations are required. Prerequisite(s): EN 1012.

**HU 331 - Arts and Ideas (3 credits):** This course enables students to study and appreciate various forms of art, including painting, sculpture, architecture, music, drama, film, and literature through in-class and on-site experiences. The arts are also surveyed from an historical perspective, focusing primarily on eras in Western civilization. This enables students to sense the parallel development of the arts, of philosophy, and of sociopolitical systems and to recognize various ways of viewing reality. Prerequisite(s): EN 102

**SS 351 – Ethics (3 credits):** This course is designed to help students improve their ability to make ethical decisions. This is done by providing a framework that enables the student to identify, analyze, and resolve ethical issues that arise when making decisions. Case analysis is a primary tool of this course. Prerequisite(s): EN 102

**Social Science Elective (3 credits):** A university-approved elective course in the social sciences that supports an understanding of human behavior, social systems, or global dynamics. Options may include sociology, psychology, economics, or political science.

**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

## *II. Mathematics and Applied Sciences (32 Credits)*

**MA 114 - Algebra and Trigonometry (4 credits):** Designed for students needing mathematical skills and concepts for MA-261. Topics in this course are as follows. Algebra: basic operations on real and complex numbers, fractions, exponents and radicals. Determinates: Solution of linear, fractional, quadratic and system equations. Trigonometry: definition and identities, angular measurements, solving triangles, vectors, graphs and logarithms. Prerequisite(s): MA 112 or placement test score.

**MA 261 - Calculus I (4 credits):** This course covers lines, circles, ellipses; functions and limits, differentiation, power rule, higher-order derivatives, product, quotient and chain rules, implicit differentiation, and applications. Regarding integration, it addresses definite integrals; indeterminate

forms; exponential, logarithmic, trigonometric and hyperbolic functions; differentiation and integration, and graphing. Prerequisite(s): MA 114

**MA 262 - Calculus II (4 credits):** This course centers on methods of integration, including completing the square, substitution, partial fractions, integration by parts, trigonometric integrals, power series, and parametric equations. It also addresses partial derivatives, directional derivatives, and an introduction to multiple integrals. Prerequisite(s): MA 261

**MA 330 – Linear Algebra (3 Credits):** This course introduces the study of linear systems of equations, vector spaces, and linear transformations. Students will solve systems of linear equations as a basic tool in many mathematical procedures used in science and engineering. Topics include solving linear equations, performing matrix algebra, calculating determinants, finding eigenvalues and eigenvectors and developing an understanding of a matrix as a linear transformations relative to a basis of a vector space. Prerequisite: 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: 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 261 – Engineering Physics I (4 credits):** This calculus-based physics course covers displacement, velocity, and acceleration; equations of motion; Newton’s laws and their applications; gravitation; work and energy; impulse and momentum; conservation laws; rotational motion and dynamics; equilibrium; elasticity; and periodic motion. Students completing this course may not enroll in PH 201 for additional credit. Prerequisite(s): MA 261. Corequisite(s): MA 262.

**PH 262 – Engineering Physics II (4 credits):** Continuation of PH 261 covering wave motion, vibration and sound, electricity and magnetism, Coulomb’s Law, electric fields, and induction. Prerequisite(s): PH 261.

**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.

### ***III. Engineering Core (36 Credits)***

**EL 100 – Introduction to DC/AC Circuits (3 credits):** Basic electrical concepts and laboratory techniques. Current, voltage, resistance and power. Ohm’s law, series and parallel resistive circuits. Kirchhoff’s voltage and current laws. Loading effects on meters and supplies. Capacitors and Inductors. Charging and discharging. RC and RL time constants. Introduction to AC. Sinusoidal waveforms, phasors and use of the J operator. Reactance and admittance. Average values and RMS.

Laboratory emphasis is on the proper use of standard meters, testing equipment and circuit breadboarding. MATLAB Part I: Introduction to MATLAB, variables, MATLAB functions, data types, writing a MATLAB program, using basic plotting functions. Corequisite(s): MA 112.

**EL-200 – Electronic Devices/Circuits (3 credits):** Principles and characteristics of semiconductor devices. Devices covered include diodes, Zener diodes, bipolar junction transistors, field-effect transistors, and operational amplifiers. Includes bias networks, operating points, maximum output and optimum bias, and DC and AC load lines. Input and output impedances, and voltage and current gains for each amplifier configuration. Prerequisite(s): EL 150.

**EL 204 – Digital Electronics (3 credits):** Covers number systems including binary, octal, and hexadecimal, along with binary arithmetic and Boolean algebra. Introduces logic simplification using Karnaugh maps and the design of combinational and sequential circuits such as decoders, multiplexers, flip-flops, and multivibrators. Examines logic families including TTL, CMOS, and ECL, as well as memory devices, shift registers, and counters.

**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: 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

**MEC 210 – Engineering Mechanics – Statics (3 credits):** Introduces static equilibrium principles and their applications in engineering systems. Topics include force and moment analysis, centers of gravity, centroids, and moments of inertia. Uses engineering software tools for modeling and visualization. Prerequisite(s): MA 261. Corequisite(s): PH 261

**MEC 215 – Introduction to Engineering Design – Computer-Aided Design (3 credits):** Introduces fundamentals of engineering and CAD design with emphasis on product design, 3D modeling, GD&T, and simulation. Students complete individual and team projects using advanced CAD tools for stress and motion analysis.

**MEC 255 – Mechanics of Materials and Materials Science (3 credits):** Covers the mechanical behavior of engineering materials and analysis of stresses, strains, and deformations in structural components under various loading conditions. Topics include axial loading, torsion, bending, shear, and material failure theories. Also introduces the fundamentals of materials science, including crystal structure, phase diagrams, heat treatment, and common failure mechanisms such as fatigue and fracture. Emphasizes applications in aerospace structural design and material selection. **Prerequisite(s):** MEC 210.

**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.

**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

**DS 101 - Introduction to Data Science (3 credits):** Fundamental coursework on the standards and practices for collecting, organizing, managing, exploring, and using data. Topics include preparation, analysis, and visualization of data and creating analysis tools for larger data sets. **Corequisite(s):** MA 112

#### ***IV. Systems Engineering Core (21 Credits)***

**SE 200 – Systems Engineering Seminar (1 Credit):** This seminar introduces students to the systems engineering discipline, professional practice, and emerging applications of systems engineering across technology sectors. Topics include systems thinking, interdisciplinary engineering design, project lifecycle concepts, and career pathways in systems engineering. The seminar may include guest speakers from industry, case studies of complex engineering systems, and discussions of ethical and professional responsibilities. *Prerequisite: Sophomore standing in the Systems Engineering program.*

**EE 340 – Systems Engineering (3 Credits):** This course introduces the principles and practices of systems engineering. Students learn the systems engineering lifecycle, including requirements analysis, system design, integration, verification and validation, and lifecycle management. Topics include systems thinking, stakeholder requirements, trade studies, system decomposition, and risk management. Case studies and team exercises are used to illustrate the development and management of complex engineering systems. *Prerequisite: BUS 301.*

**SE 340 – Systems Modeling & Simulation (3 Credits):** This course introduces the principles and practices of systems engineering, focusing on the design, management, and improvement of complex engineering systems. Students will learn systems lifecycle planning, project management, quality control,

and risk analysis, with an emphasis on integrating safety and compliance with engineering standards. Topics include system modeling, production systems planning, and human factors, preparing students to tackle multifaceted projects. Designed for engineering students across disciplines, the course equips participants with the technical and managerial skills needed to develop safe, efficient, and sustainable systems in diverse engineering fields. . *Prerequisite: MA 340.*

**SE 320 – Complex Networks for Engineers (3 Credits):** This course examines the structure, analysis, and behavior of complex networks found in engineering and technological systems. Topics include graph theory, network topology, network dynamics, resilience, and performance analysis. Applications include communication networks, infrastructure systems, social networks, and cyber-physical systems. Students apply analytical and computational methods to evaluate network performance and reliability.

*Prerequisites: MA 330 and MA 345.*

**SE 330 – Optimization (3 Credits):** This course introduces optimization methods used in engineering decision-making and system design. Topics include linear programming, nonlinear optimization, constrained optimization, and numerical solution techniques. Students learn to formulate optimization problems and apply algorithms to determine optimal solutions for engineering systems, resource allocation, and operational planning. *Prerequisite: MA 330.*

**SE 310 – Systems Architecture and Design (3 Credits):** This course focuses on the architectural design of complex systems and the integration of multidisciplinary engineering components. Topics include system architecture frameworks, functional decomposition, interface definition, design trade studies, and system integration strategies. Students learn structured approaches for developing system architectures that satisfy stakeholder requirements while addressing performance, cost, and lifecycle considerations.

*Prerequisites: BUS 301 and EN 102.*

**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. Note: Course must be completed with a grade of “C” or higher to enroll in SDE 458. (This course was formerly AE 457, BUS 457, CE 457, CS 457, EE 457, IAE 457, SE 457, UAS 457 and MEC 455). *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. Note: Course must complete with a grade of “C” or higher to meet undergraduate graduation requirements. (This course was formally AE 458, BUS 458, CE 458, CS 458, EE 458, IAE 458, SE 458, UAS 458 and MEC 462). *Prerequisite(s): SDE 457*

## ***V. General Electives (9 Credits)***

**General Electives (9 Credits):** General electives allow students to select courses that complement their academic interests and career goals. These courses may be chosen from engineering, computer science,

mathematics, data science, business, or other related technical fields offered by the university. Electives provide opportunities for students to broaden their knowledge, develop additional technical skills, or explore interdisciplinary topics relevant to systems engineering.

## **5. Discuss How General Education Requirements Will Be Met, if Applicable**

The Bachelor of Science in Systems Engineering satisfies the general education expectations established by the Maryland Higher Education Commission (MHEC) and the standards outlined in COMAR 13B.02.03. The curriculum includes **21 credits of designated general education coursework** designed to develop critical thinking, effective communication, ethical reasoning, and an understanding of the social and professional context in which engineering systems operate.

The general education component includes **English composition (EN 101 and EN 102), humanities (HU 331 – Arts and Ideas), ethics (SS 351 – Ethics),** and a **social science elective**. These courses strengthen students' abilities to communicate effectively, evaluate societal impacts of technological decisions, and understand ethical responsibilities in professional practice.

Additional coursework in **BUS 174 – Introduction to Business** and **BUS 301 – Project Management** supports professional preparation and leadership development. These courses introduce students to organizational structures, project coordination, teamwork, and management principles that are essential for systems engineers working in multidisciplinary environments.

Quantitative reasoning and scientific literacy are addressed through **32 credits of mathematics and applied science coursework**, including algebra and trigonometry, calculus, linear algebra, differential equations, probability and statistics, discrete mathematics, and calculus-based physics. These courses provide the analytical foundation required for system modeling, optimization, and engineering analysis.

Together, these components ensure that graduates of the Systems Engineering program possess strong technical preparation as well as the communication, ethical reasoning, and societal awareness necessary to function effectively as engineering professionals.

## **6. Identify Any Specialized Accreditation or Graduate Certification Requirements for This Program and Its Students**

Capitol Technology University intends to seek accreditation for the **Bachelor of Science in Systems Engineering** from the **Engineering Accreditation Commission (EAC) of ABET**, consistent with the university's long-term accreditation strategy for engineering programs. The curriculum has been designed to align with the **ABET General Criteria for Baccalaureate-Level Programs**, particularly **Criterion 5: Curriculum**.

### **a) General Criteria – Curriculum Requirements**

The curriculum includes:

- **At least one year of college-level mathematics and basic sciences**, including algebra and trigonometry, Calculus I and II, linear algebra, differential equations, probability and statistics, discrete mathematics, and calculus-based Physics I and II.
- **At least one and one-half years of engineering topics**, including circuits, electronics, digital systems, microcontroller system design, signals and systems, control systems, engineering mechanics, materials science, programming, artificial intelligence, data science, and systems engineering methods.

- **A major design experience** consisting of the two-semester senior design sequence (**SDE 457 – Senior Design I** and **SDE 458 – Senior Design II**). These courses require students to apply systems engineering principles to the design, integration, testing, and evaluation of complex engineering systems while considering realistic constraints such as cost, reliability, safety, sustainability, and stakeholder requirements.

#### **b) Program Criteria – Systems Engineering**

The program emphasizes key competencies expected of systems engineering graduates, including:

- Systems thinking and interdisciplinary engineering integration
- System modeling and simulation
- System architecture and design
- Optimization and decision analysis
- Analysis of complex networks and large-scale engineering systems
- Integration of electrical, mechanical, and computational technologies within complex systems

Accreditation will be pursued following the graduation of the program's first cohort. Upon accreditation, graduates will be eligible to pursue **Professional Engineer (PE) licensure** in states recognizing ABET-accredited engineering degrees and will be well prepared for graduate study in systems engineering or related engineering 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, curriculum development, academic oversight, and student support services for the **Bachelor of Science in Systems Engineering** will be provided exclusively by **Capitol Technology University** using its existing faculty, academic infrastructure, laboratories, and administrative resources.

#### **8. Provide Assurance That Students Will Receive Clear, Complete, and Timely Information**

Capitol Technology University affirms that students enrolled in the **Bachelor of Science in Systems Engineering** program will receive accurate, complete, and timely information regarding all academic and administrative aspects of the program.

Information will be provided through several mechanisms:

- The **academic catalog and program webpage** will include detailed information on curriculum structure, credit requirements, course descriptions, program learning outcomes, and degree pathways. These resources are reviewed annually to ensure accuracy and compliance.
- Upon admission, students are assigned an **academic advisor** who provides individualized guidance on course sequencing, prerequisite completion, and career preparation.
- Each course includes a **detailed syllabus** outlining course objectives, learning outcomes, grading policies, laboratory requirements, faculty contact information, and expectations for student participation.
- **Technology requirements**, including necessary software tools such as programming environments, modeling and simulation software, and engineering analysis tools, are communicated during student orientation and through the university website.

- Capitol Technology University utilizes **Canvas** as its official learning management system. Course materials, assignments, laboratory instructions, and grades are delivered through this platform, and students receive technical support and orientation to ensure effective use.
- **Academic support services** including tutoring, writing assistance, library resources, and research support are available both in person and online. Career services assist students with internships, resume development, and job placement preparation.
- Information regarding **tuition, fees, financial aid, scholarships, and payment options** is clearly communicated through the university's Financial Aid and Business Offices.

These measures ensure that students receive consistent, transparent, and comprehensive information throughout their academic experience.

### **9. Provide Assurance That Advertising, Recruiting, and Admissions Materials Will Clearly and Accurately Represent the Proposed Program**

Capitol Technology University affirms that all advertising, recruitment, and admissions materials related to the **Bachelor of Science in Systems Engineering** will accurately and clearly represent the program's academic content, structure, learning outcomes, and available services.

The **Office of Marketing and Communications**, in collaboration with academic leadership, will ensure that all promotional materials:

- Accurately reflect the approved curriculum and program learning outcomes
- Clearly state the total credit requirements and program structure
- Transparently communicate tuition, fees, laboratory expectations, and technology requirements
- Describe accurately the engineering focus and systems engineering emphasis of the program

Program information will be disseminated through the **university website, academic catalog, brochures, open houses, recruitment events, and articulation partner visits**. Admissions counselors and faculty representatives will provide consistent and accurate information during advising and recruitment interactions.

All materials will be reviewed periodically to ensure compliance with institutional policy and accreditation standards, ensuring that prospective students receive reliable information necessary to make informed educational decisions.

## **H. Adequacy of Articulation**

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

The **Bachelor of Science in Systems Engineering** is designed to support seamless transfer and articulation with community colleges and other institutions offering associate degrees in engineering, engineering science, computer science, information technology, and related STEM disciplines. The program includes a strong foundation in mathematics, physics, programming, and introductory engineering courses, which align with standard lower-division coursework offered across Maryland's community college system.

Capitol Technology University maintains articulation agreements with several regional institutions, including **Cecil College, Howard Community College, Anne Arundel Community College, and Montgomery College**. These agreements provide structured transfer pathways for students completing associate degrees in engineering, computer science, electronics, information technology, or related technical programs. Additional partnerships exist with institutions such as the **Community College of Rhode Island (CCRI)** and **Columbia Southern University**.

The Systems Engineering curriculum has been designed to align with **Maryland Higher Education Commission (MHEC) transfer guidelines** to facilitate efficient credit transfer. Lower-division coursework in **Calculus I and II, Physics I and II, programming, and introductory engineering courses** closely parallels offerings at Maryland community colleges. This alignment allows students who complete an **Associate of Science in Engineering or related STEM degree** to transfer into the upper-division systems engineering curriculum with minimal loss of credit.

The university also supports early STEM pipeline development through **dual enrollment programs, Project Lead The Way (PLTW) participation, and advisory partnerships with regional high schools**, including **Prince George's County Public Schools**. These initiatives encourage students to develop strong preparation in mathematics, engineering fundamentals, and computational thinking, strengthening readiness for entry into the Systems Engineering program.

Following program approval, Capitol Technology University will update existing articulation agreements to explicitly include **Systems Engineering** as a transfer destination and will pursue additional articulation agreements with institutions offering associate-level preparation in engineering, computer science, and related technical disciplines.

## **I. Adequacy of Faculty Resources**

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

The Bachelor of Science in Biomedical Systems Engineering will be delivered by a team of full-time engineering faculty supported, as needed, by qualified adjunct instructors with specialized expertise. Faculty members hold terminal degrees in engineering disciplines including electrical engineering, systems engineering, robotics, control systems, and related fields. Collectively, they bring academic, laboratory, and industry experience relevant to biomedical device design, embedded systems development, instrumentation, and engineering systems integration.

The program leverages Capitol Technology University's existing strengths in electrical engineering, electronics, embedded systems, and applied engineering laboratories. Faculty assigned to the program have experience teaching core engineering subjects such as circuits, digital systems, signals and systems, microcontrollers, systems engineering, and senior design. These courses form the backbone of the biomedical systems curriculum.

Biomedical-specific coursework—including Biomedical Instrumentation, Biomedical Signals and Sensor Systems, Medical Imaging, Biomaterials, Biomechanics, and Implantable Medical Devices—will be taught by faculty with appropriate engineering backgrounds and experience in applied systems

integration, signal processing, control systems, and laboratory-based design. Adjunct faculty with professional experience in medical device development or biomedical systems may be engaged to support specialized upper-level instruction as enrollment grows.

The program’s two-semester Senior Design sequence will be supervised by full-time faculty with experience in multidisciplinary engineering design, ensuring that students complete a rigorous, standards-based capstone project incorporating realistic engineering constraints, safety considerations, and systems integration principles.

A summary of faculty assignments, including appointment type, terminal degree, rank, and courses taught in the proposed program, is provided in the faculty resource table included in this section. The existing faculty complement is sufficient to support program launch, and additional hiring will be considered as enrollment expands.

**Below is a Faculty Appointment and Teaching Assignment Summary (Faculty Resources).**

<b>Faculty</b>	<b>Type of Appointment</b>	<b>Courses Taught (Course Numbers Only)</b>
Dr. Andrew Mehri	Full-Time Faculty	MA 261, MA 262, MA 340, MA 345, SE 330
Dr. Gregory P. Behrmann	Full-Time Faculty	PH 261, PH 262, SDE 457, SDE 458
Dr. Jeff Chi	Full-Time Faculty	BUS 174, BUS 301
Dr. Mohamed Abaza	Full-Time Faculty	MEC 210, MEC 255
Dr. Mohamed Ghazy	Full-Time Faculty	EE 406, EE 453, SE 320
Dr. Nisma M. Omar	Full-Time Faculty	MA 114, MA 330, MA 124
Dr. Tahani Baabdullah	Full-Time Faculty	CS 120, AIT 201, DS 101
Prof. Amelia Wear	Full-Time Faculty	EL 100, EL 200, EL 204, EE 362, MEC 215
Prof. Jeff Volosin	Full-Time Faculty	SE 200, EE 340, SE 340, SE 310
Prof. Megan Miskovish	Full-Time Faculty	EN 101, EN 102, HU 331, SS 351

***FULL-TIME FACULTY***

**Dr. Andrew Mehri**, earned his PhD. in Computer Science with degrees in information architecture and electronics engineering. He has held leadership roles in vocational education and teaches electronics, digital logic, and technical systems design.

**Dr. Gregory P. Behrmann**, Professor, holds a Ph.D. in Mechanical Engineering from The Catholic University of America. He currently serves as Clinical Associate Professor and has held roles as Associate Dean and Senior Research Engineer. His background includes NIH- and DoD-funded research, K–12 STEM outreach, and micro-manufacturing innovation. He teaches engineering design, mechanics, and interdisciplinary senior projects.

**Dr. Jeff Chi.** earned a Ph.D. in Project Management from the University of Maryland. he led new construction and capital facility management projects, spearheaded a comprehensive environmental and sustainability program, and played a pivotal role in major mergers and acquisitions of national retailers.

**Dr. Mohamed Ghazy,** Dean of Academics, and the Chair of Engineering Department earned a Ph.D. in Engineering from Purdue University. His Thesis focused on power electronics and its application on electric drive. He leads curriculum planning and teaches courses in engineering design, control systems, Mechatronics and energy systems.

**Dr. Nisma M. Omar,** Adjunct Professor, holds a Ph.D. in Analytical Chemistry and an M.S. in Physical Chemistry. She teaches general education science and mathematics courses. Her experience includes curriculum development, lab instruction, and pharmaceutical testing. She contributes to foundational STEM education and academic success initiatives

**Dr. Tahani Baabdullah** is an artificial intelligence and machine learning expert with research and industry experience in deep learning, cybersecurity, and blockchain-integrated AI systems. She holds a Ph.D. in Computer Science and has developed high-accuracy AI models for fraud detection, healthcare, and anomaly detection using Python, TensorFlow, and PyTorch. Her expertise spans neural networks, generative AI, federated learning, and ethical applications of AI across fintech, healthcare, and secure data environments

**Prof. Amelia Wear,** Instructor, is a Lead Systems Engineer at Wabtec and holds a B.S. in Mechanical Engineering and an M.S. in Software Engineering. She brings industry expertise in controls, integration, and agile development to instruction in systems design and mechatronics.

**Prof. 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*

**Mr. Mohamed Abaza, P.E., CEM, LEED AP, CxA,** is a mechanical engineer with over 25 years of experience in HVAC design, commissioning, and energy management. He holds M.S. and B.S. degrees in Mechanical Engineering from **NYU Tandon School of Engineering** and **New York Institute of Technology**. His expertise spans central plant design, LEED administration, energy auditing, and sustainable building solutions across commercial, residential, and government sectors

**Prof. Megan Miskovish,** Adjunct Professor of English, holds a B.A. in English from Lynchburg College and an M.S. in Education from Walden University. With experience teaching high school and college-level composition, she supports the program's general education component by teaching writing and communication courses essential for technical professionals

**2. Demonstrate how the institution will provide ongoing pedagogy training for faculty in evidence-based best practices**

Capitol Technology University provides structured faculty development through its **Center for Innovation in Teaching and Learning (CITL)**. The Center supports continuous improvement in instructional quality, student engagement, laboratory effectiveness, and technology integration across all academic programs, including engineering and systems engineering disciplines.

#### **a) Pedagogy that meets the needs of students**

Faculty receive ongoing training in evidence-based instructional strategies that support applied, laboratory-centered engineering education. Workshops and development sessions emphasize:

- Project-based learning and design-centered instruction
- Active learning strategies in technical and quantitative courses
- Laboratory best practices and experiential learning models
- Inclusive teaching approaches and Universal Design for Learning (UDL)
- Formative assessment techniques and rubric-based evaluation
- Scaffolding of complex engineering and analytical concepts

Because the **Systems Engineering program** includes rigorous coursework in mathematics, systems modeling, optimization, networks, electronics, and senior design, faculty development emphasizes **hands-on learning, iterative design processes, modeling and simulation activities, and structured team-based problem solving**. These strategies support Capitol's diverse student population, including first-generation college students, transfer students, and adult learners.

#### **b) Training in the learning management system**

**Canvas** is the university's official learning management system (LMS). All faculty complete LMS onboarding and receive access to advanced training sessions focused on:

- Modular content organization
- Assignment submission and rubric integration
- Multimedia and simulation integration
- Online assessment tools
- Analytics for monitoring student engagement and performance

Instructional designers are available to assist faculty in structuring engineering course shells, integrating modeling and simulation tools, and implementing best practices for hybrid content delivery when appropriate.

#### **c) Evidence-based best practices for distance education**

The **Systems Engineering program** is designed to be delivered primarily in a **traditional, on-campus format** to support laboratory activities, collaborative engineering design, and project-based learning experiences. Courses such as circuits, digital electronics, microcontroller systems, and senior design require access to laboratory equipment and in-person supervision.

Although the program is not offered as a fully online degree, faculty receive training in hybrid instructional tools that support supplemental learning activities, modeling and simulation exercises, collaborative project management, and Canvas-based coordination of design projects. These tools enhance instructional effectiveness while preserving the hands-on and collaborative nature of the engineering curriculum.

## J. Adequacy of Library Resources

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

Capitol Technology University's **Puente Library** provides comprehensive academic support for students and faculty through a broad collection of physical and digital resources. For the **Bachelor of Science in Systems Engineering**, the library's holdings and services align with the interdisciplinary nature of the program, which integrates engineering systems design, modeling and simulation, electronics, control systems, artificial intelligence, and data analytics.

Students and faculty have access to major scholarly databases including **IEEE Xplore, ScienceDirect, SpringerLink, ACM Digital Library, ProQuest, and JSTOR**, which provide full-text access to peer-reviewed journals, technical papers, conference proceedings, and industry standards relevant to engineering and systems engineering. These databases support research in areas such as systems engineering methodologies, complex systems analysis, control systems, modeling and simulation, embedded systems, and data-driven decision-making.

Additional specialized resources support research in engineering, computing, and technology systems, including **SAGE Journals and Gale databases**, which provide access to research related to technology policy, engineering management, and emerging technological systems. These resources allow students to access current developments in areas such as complex networks, cyber-physical systems, autonomous systems, and engineering optimization.

Reference materials, engineering standards, and current textbooks used in the program—including those covering systems engineering principles, circuits and electronics, control systems, modeling and simulation, programming, and engineering design—are available in both print and digital formats. Course reserves are maintained to ensure equitable access to frequently used instructional materials.

To ensure that library resources remain aligned with program needs, Capitol Technology University follows a **continuous improvement model**. The Office of Academic Affairs collaborates with library staff and program faculty to regularly review library holdings, identify emerging content areas, and prioritize acquisitions related to new course offerings or accreditation requirements.

#### Measures to Ensure Adequate Support

- Annual collection reviews will be conducted to assess the adequacy and currency of materials relevant to systems engineering and related engineering disciplines.
- Faculty will have the opportunity to recommend journals, eBooks, technical standards, and industry case studies for acquisition, with priority given to materials supporting senior design projects and upper-division engineering courses.
- The library will maintain access to engineering standards, technical handbooks, and professional resources relevant to systems engineering practice.
- Remote access to all online resources will be maintained, ensuring both on-campus and remote users have equal access to research materials.

- Personalized research support, interlibrary loan services, and information literacy instruction will be available to assist students in locating and evaluating scholarly and technical sources for coursework and capstone projects.

Capitol Technology University affirms that the **Puente Library's existing infrastructure, digital collections, and acquisition policies are fully adequate to support the launch and long-term sustainability of the Bachelor of Science in Systems Engineering program.**

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

### **1. Provide an assurance that physical facilities, infrastructure, and instructional equipment are adequate to initiate the program.**

Capitol Technology University affirms that it possesses the physical facilities, infrastructure, and instructional equipment necessary to successfully launch and sustain the **Bachelor of Science in Systems Engineering**. The University's campus in **Laurel, Maryland** includes modern classrooms, specialized engineering laboratories, collaborative design spaces, and faculty offices that fully support engineering education and interdisciplinary systems engineering instruction.

#### **Classroom Facilities**

Instruction will be delivered in technology-enabled classrooms equipped with:

- High-definition projection systems
- Smartboards and multimedia display systems
- Document cameras
- Integrated audio-visual systems
- High-speed wired and wireless internet connectivity

These classrooms support lecture-based instruction, collaborative learning activities, real-time demonstrations of modeling and simulation tools, and the integration of engineering software platforms used in systems engineering analysis.

#### **Engineering Laboratories**

The Systems Engineering program will utilize existing engineering laboratories that currently support electrical engineering, computer engineering, and applied engineering programs. These facilities provide the necessary infrastructure for laboratory exercises, system prototyping, and interdisciplinary engineering design projects.

Laboratory resources include:

##### **Electronics and Circuit Analysis Laboratories**

Equipped with oscilloscopes, function generators, power supplies, multimeters, digital and analog trainers, and electronic components used for circuit analysis and electronic system development.

##### **Digital Systems and Embedded Systems Laboratories**

Featuring Arduino development platforms, microcontroller programming environments, embedded systems development boards, and digital logic trainers used for system control and embedded system integration.

### **Signals, Control, and Systems Analysis Laboratories**

Utilizing software tools such as MATLAB and Simulink to support system modeling, control system analysis, and simulation of complex engineering systems.

### **Engineering Design and Prototyping Facilities**

Supporting engineering design activities including computer-aided design (CAD), materials testing, and system prototyping relevant to multidisciplinary engineering systems.

### **Senior Design and Capstone Project Spaces**

Dedicated collaborative workspaces where interdisciplinary student teams design, prototype, test, and evaluate engineering systems under faculty supervision.

### **Software Infrastructure**

Students enrolled in the Systems Engineering program have access to a variety of professional engineering software tools, including:

- MATLAB and Simulink
- Python development environments
- Data analysis and machine learning libraries
- Circuit simulation software
- Engineering design and modeling tools
- Version control and project management platforms

These tools support coursework in systems modeling, optimization, data analysis, and engineering system design. Software licenses are accessible both on campus and remotely through institutional licensing and secure network access.

### **Faculty Offices and Student Support Spaces**

Full-time faculty members are provided with private offices equipped with computing resources, secure storage, and high-speed internet connectivity to support advising, research, and student mentoring. Meeting rooms and collaborative spaces are available for student advising, capstone project discussions, and interdisciplinary teamwork.

Facilities planning and utilization are reviewed regularly to ensure adequate capacity as program enrollment grows. If enrollment increases significantly, the University will allocate additional laboratory sections and expand equipment inventory as needed.

Capitol Technology University affirms that its existing physical infrastructure and instructional equipment are fully adequate to initiate and support the **Bachelor of Science in Systems Engineering** program.

### **2. Provide assurance that students and faculty in distance education will have adequate access to required systems.**

Although the **Systems Engineering program** is delivered primarily in a traditional on-campus format to support laboratory activities and project-based engineering design, the University maintains robust technological infrastructure to support hybrid and distance-enhanced instruction.

#### **a) Institutional Electronic Mailing System**

All students, faculty, and staff are issued official university email accounts through **Microsoft Office 365**. These accounts support:

- Academic communication between faculty and students
- Course announcements and notifications
- Advising and administrative communication
- Institutional alerts and updates

The system integrates with **Canvas**, **Microsoft Teams**, and university cloud storage platforms to support efficient communication and collaboration.

## b) Learning Management System (LMS)

**Canvas** serves as the University’s official Learning Management System and supports:

- Course content delivery
- Assignment submission and grading
- Discussion boards and collaborative tools
- Integrated quizzes and examinations
- Multimedia and simulation content
- Real-time analytics and student feedback

Canvas integrates with additional technical platforms including **MATLAB Grader**, **GitHub Classroom**, **Turnitin**, and **Microsoft Teams**, supporting engineering coursework and collaborative design projects.

Faculty complete LMS onboarding and advanced training through the **Center for Innovation in Teaching and Learning (CITL)**. Students receive orientation and ongoing technical support through the University’s Information Technology Services.

All LMS services are accessible remotely, ensuring that students and faculty have reliable access to course materials, assignments, and collaborative tools regardless of location.

## L. Adequacy of Financial Resources with Documentation

### 1. Complete Table 1: Resources and Narrative Rationale

Provide finance data for the first five years of program implementation.

**TABLE 1: RESOURCES**

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

4. Other Sources	\$0	\$0	\$0	\$0	\$0
<b>TOTAL (Add 1–4)</b>	<b>\$350,060</b>	<b>\$707,940</b>	<b>\$1,065,072</b>	<b>\$1,449,072</b>	<b>\$1,851,644</b>

## Narrative Rationale for Table 1: Program Resources

### 1. Reallocated Funds

No existing funds will be reallocated. The **Systems Engineering program** will launch using Capitol Technology University’s existing instructional infrastructure, laboratories, and faculty expertise without negatively impacting other academic programs.

### 2. Tuition and Fee Revenue

Revenue estimates are based on projected enrollment beginning with **8 full-time and 7 part-time students in Year 1**, increasing steadily to **40 full-time and 31 part-time students by Year 5**. Tuition rates reflect the University’s published tuition schedule, with an estimated **2.5 percent annual increase**. Full-time students are charged the annual tuition rate, while part-time students are projected to enroll in **12 credit hours per year**.

### 3. Grants, Contracts, and External Sources

Although no external funding is included in the financial projections, the University anticipates pursuing competitive grants and industry partnerships related to **systems engineering, complex systems design, autonomous technologies, and engineering innovation**. Potential funding sources include federal and state workforce development programs, National Science Foundation initiatives, and industry collaborations.

### 4. Other Sources

Additional funding sources such as **industry sponsorships, alumni donations, and external partnerships** may be explored after the program is established. However, these sources are not included in the initial five-year financial projections to maintain conservative revenue estimates.

## 2. Complete Table 2: Program Expenditures and Narrative Rationale

**TABLE 2: EXPENDITURES**

<b>Expenditure Categories</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
1. Faculty (b + c below)	\$113,468	\$155,071	\$238,421	\$325,843	\$417,486
a. #FTE	1.5	2	3	4	5
b. Total Salary	\$94,557	\$129,226	\$198,684	\$271,536	\$347,905
c. Total Benefits (20%)	\$18,911	\$25,845	\$39,737	\$54,307	\$69,581
2. Admin Staff (b + c below)	\$5,942	\$6,091	\$6,244	\$6,400	\$6,559
a. #FTE	0.08	0.08	0.08	0.08	0.08
b. Total Salary	\$4,952	\$5,076	\$5,203	\$5,333	\$5,466
c. Total Benefits	\$990	\$1,015	\$1,041	\$1,067	\$1,093
3. Support Staff (b + c below)	\$59,885	\$92,076	\$125,837	\$161,230	\$198,313
a. #FTE	1	1.5	2	2.5	3
b. Total Salary	\$49,905	\$76,730	\$104,864	\$134,358	\$165,261
c. Total Benefits (20%)	\$9,980	\$15,346	\$20,973	\$26,872	\$33,052
4. Technical Support and Equipment	\$840	\$1,425	\$2,320	\$3,145	\$4,140

5. Library	\$0	\$0	\$0	\$0	\$0
6. New or Renovated Space	\$0	\$0	\$0	\$0	\$0
7. Other Expenses	\$5,850	\$14,210	\$25,370	\$39,330	\$56,090
<b>TOTAL (Add 1–7)</b>	<b>\$185,985</b>	<b>\$268,873</b>	<b>\$398,192</b>	<b>\$535,948</b>	<b>\$682,588</b>

## Narrative Rationale for Table 2: Program Expenditures

### 1. Faculty

Faculty salaries and benefits support instruction across the systems engineering curriculum, including **engineering fundamentals, systems engineering methods, modeling and simulation, networks, optimization, electronics, and senior design supervision**. Faculty FTE increases as enrollment grows and includes a combination of full-time and adjunct instructors. Benefits are estimated at **20 percent of salary**.

### 2. Administrative Staff

A portion of administrative staff time (**0.08 FTE**) is allocated to support program coordination, student advising assistance, enrollment tracking, and administrative operations. Compensation is based on institutional salary structures with modest annual increases.

### 3. Support Staff

Support staff include **laboratory coordinators and technical support personnel** who assist with engineering laboratories, equipment maintenance, software platforms, and student project activities. Staffing levels increase as enrollment grows and laboratory usage expands.

### 4. Technical Support and Equipment

This category includes software licensing and technical tools required for the systems engineering curriculum, including **MATLAB, Simulink, Python development environments, modeling and simulation software, and circuit design tools**. Costs increase gradually with expanded usage and enrollment.

### 5. Library

No additional library expenditures are projected, as existing institutional subscriptions to major engineering and scientific databases provide sufficient coverage for the program's research needs.

### 6. New or Renovated Space

No capital expansion or renovation is required to support the program. Existing classrooms, engineering laboratories, and collaborative design spaces are adequate for the anticipated enrollment levels.

### 7. Other Expenses

Other expenses include **program promotion, instructional materials, guest lectures, faculty professional development, and accreditation preparation activities**. These costs increase modestly as the program grows.

### 8. Total Expenditures

The financial model demonstrates that the **Systems Engineering program is fiscally sustainable**, with projected tuition revenue exceeding program expenditures beginning in the early years of implementation. The program aligns with the University's strategic expansion in engineering education and leverages existing institutional resources to maintain long-term sustainability.

## **M. Adequacy of Provisions for Evaluation of Program**

*(Updated to reflect the approved program name: Bachelor of Science in Systems Engineering and aligned with the University's ABET-focused assessment framework.)*

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

Capitol Technology University maintains established institutional procedures to ensure academic quality, accountability, and continuous improvement across all undergraduate programs. The **Bachelor of Science in Systems Engineering** will be evaluated through the following structured processes:

#### **Course Evaluation**

Each course is evaluated at the conclusion of every academic term using a standardized university-wide student course evaluation instrument. The instrument measures:

- Clarity of learning objectives
- Organization and delivery of course content
- Effectiveness of instructional methods
- Quality of laboratory and instructional resources
- Student engagement and overall course satisfaction

Results are reviewed by the Department Chair and the Vice President for Academic Affairs. Faculty use feedback to refine course structure, laboratory activities, assessment tools, and instructional strategies.

#### **Faculty Evaluation**

Faculty performance is evaluated through a multi-measure approach that includes:

- Student course evaluations
- Peer observation of teaching
- Annual performance review by the Department Chair and Vice President for Academic Affairs

Performance reviews consider instructional quality, student engagement, assessment practices, professional development, scholarship, and service contributions. This review process supports continuous faculty development and instructional excellence.

#### **Student Learning Outcomes Assessment**

Student Learning Outcomes (SLOs) are assessed at both the course and program levels using direct and indirect measures.

##### **Direct measures include:**

- Examination performance
- Laboratory reports and technical assignments
- Engineering design projects

- Technical presentations
- Capstone project evaluations using standardized rubrics

**Indirect measures include:**

- Student surveys
- Alumni feedback
- Employer input

Assessment data are collected each semester and reviewed during departmental assessment meetings. Findings are documented in annual assessment reports and used to guide curriculum updates, laboratory improvements, and instructional refinements. This continuous improvement cycle aligns with **ABET Criterion 4: Continuous Improvement**.

## **2. Evaluation of Program Educational Effectiveness**

The overall effectiveness of the **Bachelor of Science in Systems Engineering** will be evaluated through a comprehensive institutional assessment framework incorporating academic performance, operational indicators, and workforce outcomes.

### **Assessment of Student Learning Outcomes**

The program will implement a formal outcomes-based assessment plan aligned with the **ABET Engineering Accreditation Commission (EAC) Student Outcomes (1–7)**.

The **Senior Design sequence (SDE 457 and SDE 458)** serves as the primary integrative assessment experience where students demonstrate competencies in:

- Engineering design under realistic constraints
- Systems integration and architecture development
- Ethical and professional responsibility
- Teamwork and leadership
- Technical communication
- Experimental analysis and system validation

Capstone reports, presentations, and rubric-based evaluations will be archived and reviewed annually as part of the program assessment process.

### **Retention and Graduation Rates**

Program-level retention and graduation rates will be monitored annually. The university utilizes early-alert systems, academic advising, tutoring, and faculty mentoring to support student success and timely program completion.

Trend analysis will be used to inform improvements in course sequencing, prerequisite structures, and academic support services.

### **Student and Faculty Satisfaction**

Annual surveys will be administered to students and faculty to evaluate:

- Curriculum rigor and coherence
- Adequacy of laboratory resources and instructional facilities

- Effectiveness of academic advising
- Preparation for professional employment or graduate study

Survey findings will be reviewed by program leadership and incorporated into program improvement planning.

### **Cost-Effectiveness**

The Division of Business and Finance, in coordination with Academic Affairs, conducts annual financial reviews examining:

- Enrollment trends
- Instructional expenditures
- Revenue-to-cost ratios
- Long-term financial sustainability

These reviews ensure responsible resource allocation and alignment with the University's strategic growth objectives.

### **Accreditation and Advisory Board Review**

The program intends to pursue accreditation from the **Engineering Accreditation Commission (EAC) of ABET** following graduation of the first cohort.

An external **Industry Advisory Board** composed of professionals in systems engineering, complex systems design, aerospace systems, defense systems, and technology integration will meet regularly to:

- Review curriculum relevance
- Evaluate workforce alignment
- Provide guidance on emerging technologies and engineering practices
- Recommend program improvements

Advisory board recommendations will be formally documented and incorporated into the program's continuous improvement process.

### **Continuous Improvement Commitment**

Capitol Technology University affirms its commitment to maintaining a rigorous, data-driven, and outcomes-based evaluation process for the **Bachelor of Science in Systems Engineering** program.

Through systematic assessment, advisory board engagement, accreditation alignment, and institutional oversight, the program will remain responsive to technological advances, evolving engineering practices, and workforce needs in complex systems engineering.

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

### **1. Addressing Minority Student Access, Success, and Cultural Diversity Goals**

The proposed **Bachelor of Science in Systems Engineering** supports Maryland's minority student achievement goals as articulated in **COMAR 13B.02.03.05** and the **Maryland State Plan for Postsecondary Education**. Capitol Technology University is committed to expanding access, improving

retention, and increasing completion rates for students from historically underrepresented populations in engineering and other STEM disciplines.

The Systems Engineering program is structured to enhance equity in access and student success through several institutional strategies:

- **Development of transfer pathways from Maryland community colleges**, including institutions that serve large numbers of minority and first-generation students. Existing articulation agreements and targeted advising support facilitate seamless transfer and efficient degree completion.
- **Proactive academic advising and early-alert systems** designed to identify students experiencing academic challenges. Faculty mentoring, tutoring services, and structured academic support programs are available to support persistence and successful program completion.
- **Financial assistance opportunities**, including institutional scholarships, need-based financial aid, federal grant programs, and military education benefits. These resources help reduce financial barriers for low-income, first-generation, and underrepresented students.
- **Faculty development in inclusive pedagogy**, culturally responsive teaching, Universal Design for Learning (UDL), and active learning strategies that have been shown to improve student success and retention in engineering education.
- **Emphasis on experiential learning and project-based instruction**, including laboratory activities, systems modeling projects, and team-based engineering design experiences that support diverse learning styles and increase student engagement.

Capitol Technology University also promotes an inclusive campus environment through:

- Student organizations and affinity groups representing diverse cultural and identity-based communities
- Multicultural programming and campus events that promote inclusion and cross-cultural engagement
- Institutional strategic initiatives that integrate diversity, equity, and inclusion goals into recruitment, advising, and academic program development

By expanding access to an interdisciplinary engineering program focused on **complex systems design, modeling, and technology integration**, the **Bachelor of Science in Systems Engineering** contributes to Maryland's statewide goals of increasing minority participation and success in STEM fields. The program supports the development of a diverse engineering workforce prepared to address complex technological challenges in industry, government, and research sectors.

## **O. Relationship to Low Productivity Programs Identified by the Commission**

### **1. If the proposed program is directly related to an identified low productivity program, discuss how fiscal resources may be redistributed to this program.**

The proposed **Bachelor of Science in Systems Engineering** is not a direct continuation, redesign, or formal replacement of a program identified by the Maryland Higher Education Commission as a low productivity program. The proposed degree does not involve the elimination of an existing academic program nor the transfer of dedicated budget allocations from a Commission-designated low-enrollment program.

The program has been developed within the context of the University's ongoing review of enrollment trends, program performance, and workforce demand across engineering disciplines. As part of Capitol Technology University's strategic planning and institutional effectiveness processes, academic leadership routinely evaluates enrollment patterns, retention and graduation rates, and labor market demand to ensure effective allocation of institutional resources.

Within this context, the **Systems Engineering program represents a strategic expansion of existing instructional capacity rather than the creation of a resource-intensive standalone program.** The program leverages existing faculty expertise, laboratory infrastructure, and shared engineering core coursework already offered within the School of Engineering.

Specifically:

- Faculty expertise currently supporting engineering and computing courses will be utilized across the systems engineering curriculum, improving instructional efficiency and course utilization.
- Existing laboratory facilities supporting electronics, digital systems, embedded systems, control systems, and engineering design will be shared across multiple engineering programs, maximizing equipment utilization without requiring significant capital investment.
- Administrative services, academic advising, and student support infrastructure will remain centralized and shared across engineering programs, ensuring operational efficiency while supporting projected enrollment growth.
- Shared foundational engineering courses across programs reduce course duplication and support sustainable scheduling and faculty workload distribution.

Through these measures, the proposed program strengthens institutional productivity and improves utilization of existing academic resources without requiring the redistribution of funds from any Commission-identified low productivity program.

Capitol Technology University affirms that the **Bachelor of Science in Systems Engineering reflects responsible academic planning, effective use of existing institutional resources, and alignment with workforce demand and institutional sustainability goals.**

## **P. Adequacy of Distance Education Programs**

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

Capitol Technology University is fully authorized by the **Maryland Higher Education Commission (MHEC)** to offer distance education programs. The University has an established record of delivering online and hybrid instruction across undergraduate and graduate programs in engineering, computer science, cybersecurity, business, and technology-related disciplines.

Capitol Technology University is a participating institution in the **National Council for State Authorization Reciprocity Agreements (NC-SARA)**. Participation in NC-SARA authorizes the University to offer distance education programs to students residing in other SARA member states in compliance with interstate regulatory requirements.

The University maintains the administrative, academic, and technological infrastructure necessary to support distance learning in accordance with regional accreditation standards and state regulatory requirements.

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

Capitol Technology University affirms compliance with the **Council of Regional Accrediting Commissions (C-RAC) Guidelines for the Evaluation of Distance Education**. Institutional policies and instructional practices ensure that distance education offerings maintain academic quality, integrity, and student support equivalent to traditional on-campus instruction.

The University ensures the following:

- Academic quality and rigor in online and hybrid courses are consistent with those offered in face-to-face formats. Course learning outcomes, assessment standards, and instructional expectations remain identical regardless of instructional modality.
- Regular and substantive faculty–student interaction is maintained through structured online engagement, including virtual meetings, discussion forums, assignment feedback, project supervision, and timely communication.
- Student identity verification procedures are implemented through secure login credentials, institutional authentication systems, and monitored assessment tools to maintain academic integrity.
- Online students have full access to academic advising, tutoring, library resources, career services, technical support, and financial aid counseling equivalent to services available to campus-based students.
- **Canvas** serves as the University’s official learning management system (LMS), providing secure course content delivery, assignment submission, grading, communication tools, and integration with instructional technologies. Technical support is available for both faculty and students.
- Faculty assigned to online or hybrid instruction complete training in online pedagogy, Canvas course design, student engagement strategies, and accessibility standards to ensure high-quality instructional delivery.

The **Bachelor of Science in Systems Engineering** program will be delivered primarily in a **traditional on-campus format** to support laboratory activities, engineering design projects, and hands-on instruction in electronics, embedded systems, and systems engineering laboratories. However, selected **general education, computing, and elective courses may be offered in hybrid or online formats where appropriate**. All such offerings will adhere to institutional policies, **C-RAC guidelines**, and applicable accreditation standards.