PROPOSAL FOR:

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

CAPITOL Technology University

Institution Submitting Proposal

Fall 2025
Projected Implementation Date

Bachelor of Science
Award to be Offered

Bachelor of Science in Applied Engineering
Title of Proposed Program

0924
Suggested HEGIS Code

14.0101
Suggested CIP Code

Engineering
Department of Proposed Program

Dr. Mohamed Shehata
Name of Department Head

Dr. Mohamed Shehata
Dean of Academic

mshehata@captechu.edu
Contact E-Mail Address

(240) 965-2473
Contact Phone Number

5-15-25
Signature and Date

President/Chief Executive Approval

MAY 15, 2025
Date

Date Endorsed/Approved by Governing Board

CAPITOL
Technology University

May 14, 2025

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

Dear Dr. Rai,

Capitol Technology University is requesting approval to offer a Bachelor of Science in Applied Engineering. This interdisciplinary, practice-oriented degree is designed to prepare graduates for immediate employment and long-term success across Maryland's engineering, technology, and advanced manufacturing sectors. The curriculum will be delivered by existing university faculty, with support from new hires in mechanical and systems engineering.

Capitol Technology University's mission is to deliver career-relevant education in engineering, computer science, information technology, and business—preparing individuals for professional success and lifelong learning. The proposed program reflects this mission by integrating core engineering principles with hands-on technical training, applied computing, and project-based learning, all within a flexible curricular framework that supports both traditional and transfer students.

There is increasing demand for professionals with cross-functional engineering skills who can operate in dynamic, technology-driven environments. The B.S. in Applied Engineering is a direct response to this need, offering students a strong foundation in electrical and mechanical engineering, complemented by coursework in programming, systems integration, and industry-standard tools. The program aligns with institutional planning goals and Maryland's State Plan for Postsecondary Education, including priorities related to workforce development, innovation, and educational access.

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

Thank you for your consideration.

Respectfully,

Bradford L. Sims, PhD
President

CAPITOL
Technology University

March 26, 2025

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

Dear Dr. Rai,

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

Respectfully,

Bradford L. Sims, PhD

President

Office Use Only: PP#

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

Institution Submitting Proposal	Capitol Technology University

Each action below requires a separate proposal and cover sheet.

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

Payment Submitted: (●) Yes ( ) No Payment Type: ( ) R*STARS # (●) Check # 98323 Payment Amount: $850.00 Date Submitted: 05/15/202

Department Proposing Program	Engineering
Degree Level and Degree Type	Bachelor of Science (B.S.)
Title of Proposed Program	Bachelor of Science in Applied Engineering
Total Number of Credits	120
Suggested Codes	HEGIS: 924.00 CIP: 14.0101
Program Modality	(●) On-campus ( ) Distance Education (fully online) ( ) Both
Program Resources	(●) Using Existing Resources ( ) Requiring New Resources
Projected Implementation Date (must be 60 days from proposal submisison as per COMAR 13B.02.03.03)	(●) Fall ( ) Spring ( ) Summer Year: 2025
Provide Link to Most Recent Academic Catalog	URL: https://catalog.captechu.edu//
Preferred Contact for this Proposal	Name: Dr. Mohamed Shehata Title: Dean of Academics Phone: (240) 965-2473 Email: mshehata@captechu.edu
President/Chief Executive	Type Name: Bradford Sims Signature: [signature] Date: 5-15-25
	Date of Approval/Endorsement by Governing Board: MAY 15, 2025

Revised 1/2021

CAPITOL TECHNOLOGY UNIVERSITY

98323 VENDOR NO. 17911 DATE 5/15/2025 CHECK NO. 98323

INVOICE NUMBER	INVOICE DATE	DESCRIPTION	GROSS AMOUNT	DISCOUNT/ADJUSTMENTS	PAYMENT AMOUNT
05152025	05/15/2025	Application New Academic Program	850.00	0.00	850.00
			850.00	0.00	850.00

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

CAPITOL Technology University

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

HOWARD BANK
ELLICOTT CITY, MD 21043
65-343/550

98323

DATE 5/15/2025

CHECK AMOUNT

$ *********850.00

PAY EIGHT HUNDRED FIFTY AND NO/100 DOLLARS

TO THE ORDER OF
Maryland Higher Education Comission
6 N. Liberty St
Baltimore, MD 21201

CAPITOL TECHNOLOGY UNIVERSITY

⑈098323⑈ ⑆055003434⑆ 03011266⑈

Bachelor of Science (B.S.) in Aviation Maintenance and Management

Bachelor of Science (B.S.) in Applied 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 Applied Engineering is a 120-credit interdisciplinary undergraduate program designed to prepare students for immediate employment and lifelong learning in a wide range of engineering and technology sectors. This workforce-oriented degree blends core principles of electrical and mechanical engineering with applied computing, systems integration, and design thinking to address real-world challenges across multiple industries.

The program emphasizes hands-on learning, practical applications, and problem-solving skills grounded in engineering theory and computational tools. Students gain experience in circuit analysis, electronics, mechatronics, programming, automation, and communication systems. Courses in control systems, instrumentation, computer networking, artificial intelligence, and senior design build students' abilities to design and implement applied engineering solutions aligned with industry expectations.

In addition to technical depth, the program includes a robust foundation in mathematics and science (30 credits), humanities and social sciences (21 credits), and general electives (12 credits) that promote ethical reasoning, communication, teamwork, and a broad understanding of societal impact. The program does not formally include areas of concentration at launch but provides flexibility through elective pathways that can support future specializations in fields such as mechatronics, industrial automation, or AI applications.

This program aligns strongly with the mission of Capitol Technology University, which is "to educate individuals for professional opportunities in engineering, computer and information sciences, and business. We provide relevant learning experiences that lead to success in the evolving global community." The BS in Applied Engineering fulfills this mission by preparing graduates with career-focused technical knowledge, practical engineering skills, and interdisciplinary fluency. Students will be equipped to enter high-demand roles or pursue graduate study in engineering and related technical fields.

The program also supports the university's Strategic Vision 2025, particularly in the following areas: delivering STEM-focused, hands-on education that meets modern workforce demands; fostering interdisciplinary and applied learning environments; supporting innovation and curricular expansion; and contributing to enrollment growth by offering a flexible and market-responsive program.

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

The proposed Bachelor of Science in Applied Engineering directly supports Capitol Technology University's strategic goals and vision for institutional growth. The program is intentionally designed to address workforce demand for interdisciplinary, application-focused engineers while making efficient use of existing university resources.

The program contributes to Goal I: Expand Educational Offerings, Increase Program Completion by introducing a new, flexible engineering degree that merges electrical, mechanical, and computing fundamentals. The structure allows for diverse pathways through electives, making it accessible and relevant for a broad student population. Its interdisciplinary nature appeals to students with varying interests and academic backgrounds and provides opportunities for future stackable credentials or concentrations.

It supports Goal II: Increase Enrollment and Institutional Awareness by targeting both traditional students and transfer students from community colleges. The program's focus on real-world skills and industry relevance is designed to attract students seeking immediate workforce preparation, especially in areas such as automation, AI, and systems integration.

The program aligns with Goal III: Improve the Utilization of University Resources and Institutional Effectiveness while Expanding Revenue through its reliance on existing courses, faculty, and lab infrastructure. The curriculum has been developed using Capitol's current strengths in engineering and applied computing, maximizing instructional efficiency without requiring new capital investment during the launch phase.

Finally, the program positions the university to support Goal IV: Increase the Number and Scope of Partnerships by enabling new academic and industry collaborations. The interdisciplinary foundation allows for alignment with companies and agencies interested in workforce development across multiple domains, including smart manufacturing, defense, and technology integration.

Evidence of institutional priority includes the following:

a. The program was developed under the direction of the Office of Academic Affairs and the Dean of Engineering as part of a strategic curriculum expansion plan to better serve regional industry needs and address declining enrollment in traditional engineering majors.
b. The concept for this program has been discussed and supported during academic planning retreats and Undergraduate Academic Council meetings, where it was prioritized due to its potential to improve recruitment, retention, and industry engagement.
c. The curriculum draws from existing faculty expertise and approved courses in electrical engineering, mechatronics, computer science, and applied technology, demonstrating efficient use of current institutional capacity.
d. The program was identified in internal strategic enrollment growth discussions as a mechanism for attracting transfer students, especially those from community colleges with applied technology backgrounds.

e. The applied, interdisciplinary approach of the program aligns with recent academic initiatives to strengthen Capitol's position as a leader in practice-based STEM education.

The Applied Engineering program has been formally advanced through internal academic planning and endorsed by university leadership as a key institutional initiative. It supports Capitol Technology University's long-term goals to diversify and modernize its engineering offerings, increase enrollment through career-focused programs, and reinforce the institution's commitment to delivering applied, industry-responsive STEM education.

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

The Bachelor of Science in Applied Engineering will be funded through a combination of existing institutional resources and strategic reallocation of instructional capacity within the School of Engineering. The university has incorporated this program into its academic planning and budget forecasting to ensure sustainability throughout the first five years of implementation.

Most of the courses in the program already exist and are being offered under other degree programs in electrical engineering, mechatronics, and computer science. As a result, the program can be launched without the need for significant additional investment in course development, facilities, or instructional equipment. Existing laboratories, classrooms, and instructional technologies are sufficient to support the program's technical requirements, including those for electronics, control systems, computing, and systems design.

Instructional staffing for the program will be drawn primarily from existing full-time and adjunct faculty. New adjunct faculty may be hired selectively to teach specialized electives such as artificial intelligence or advanced networking as enrollment scales. These additional hires have been factored into the university's instructional staffing budget and will be implemented incrementally based on course demand.

The program is expected to generate revenue through student tuition and fees, which will support both instructional and administrative costs. Enrollment projections are modest and aligned with Capitol's overall strategic enrollment growth targets. Financial projections demonstrate that the program will be self-sustaining by leveraging shared instructional resources, maintaining efficient faculty-to-student ratios, and targeting growth among transfer students and working professionals.

Capitol Technology University's leadership, including the Office of Academic Affairs and the Business and Finance Division, have reviewed the program budget and confirmed its feasibility. Additional financial detail and multi-year projections are provided in Section L of this proposal.

The Bachelor of Science in Applied Engineering will be adequately funded for at least the first five years through a combination of institutional resources, tuition revenue, existing instructional capacity, and targeted investment in faculty and technical support. Capitol Technology University has developed a financial plan to ensure the program's sustainability while maintaining high academic quality, faculty expertise, and access to hands-on engineering experiences. Funding sources and strategies include:

a. Capitol Technology University has allocated internal funding to support program development, faculty workload adjustments, and the initial integration of applied engineering courses across existing departments.
b. The program leverages existing laboratories, equipment, and instructional technologies that are already in use for electrical engineering, mechatronics, and computer science programs, minimizing the need for new capital investment.
c. The program is expected to become self-sustaining within three to five years, with tuition revenue covering the cost of instruction, adjunct faculty, and course-specific materials as enrollment increases.
d. The university will explore external funding opportunities such as workforce development grants, applied STEM education initiatives, and industry partnership grants to support curriculum development, project-based learning, and student scholarships.
e. The program's interdisciplinary and applied nature makes it attractive for partnership development with regional employers in automation, robotics, and advanced manufacturing, potentially leading to in-kind support, internship sponsorships, and curriculum collaboration.
f. Capitol Technology University will also engage its alumni network, philanthropic supporters, and engineering advisory board to identify donors and establish scholarships or endowment opportunities to support long-term growth of the Applied Engineering program.

This financial model ensures that the BS in Applied Engineering will be both fiscally responsible and academically robust, supporting student success and workforce readiness in alignment with the university's strategic goals. Additional details regarding projected costs and funding sources are provided in Section L.

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

Capitol Technology University is fully committed to the long-term success of the Bachelor of Science in Applied Engineering program. The university has included this program in its strategic academic planning and has secured the necessary resources to ensure its effective implementation, operation, and sustainability.

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

Administrative, financial, and technical support for the program will be provided by the School of Engineering in coordination with the Offices of Academic Affairs, Enrollment Management, and Finance. Administrative oversight will be managed by the Dean of Engineering, who will ensure proper scheduling, staffing, and program evaluation. Financial support for the program will be integrated into the university's operating budget, with instructional costs covered through a combination of reallocated faculty workload, adjunct hiring, and tuition revenue. Technical resources, including laboratory access, instructional equipment, and IT infrastructure, are already available through existing university facilities and will be maintained and updated as needed to support the program's hands-on curriculum.

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

Capitol Technology University is committed to offering the program for a period of time sufficient to allow all enrolled students to complete the degree, even in the event of future restructuring. As an

accredited institution with a longstanding commitment to student success, Capitol will ensure continuity of instruction, appropriate advising, and adequate course availability for all students admitted to the program. Should changes to the program be required at any point, the university will develop and implement a formal teach-out plan to preserve academic integrity and minimize disruption to students' educational progress.

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 Applied Engineering contributes to the advancement and evolution of engineering education by integrating multiple technical domains into a single, practice-oriented curriculum. Traditional engineering programs often separate electrical, mechanical, and computing disciplines, but this program reflects the evolving nature of modern engineering work, where knowledge must be synthesized across areas such as automation, embedded systems, artificial intelligence, and systems integration. The program equips students with knowledge that is responsive to technological innovation, preparing them to contribute to Maryland's growing need for professionals in smart manufacturing, sustainable infrastructure, and digital technologies.

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

The program is designed to be accessible to a wide range of learners, including first-generation college students, working adults, and community college transfer students. By offering a flexible curriculum built on existing courses, the program lowers barriers to entry for students from educationally disadvantaged backgrounds. Capitol Technology University has a strong track record of serving underrepresented populations in STEM fields, and this program will provide additional opportunities for students who may not pursue traditional engineering pathways but are highly motivated to enter the workforce with marketable, applied skills. The university's small class sizes, dedicated advising, and industry-relevant learning environments foster student success across diverse populations.

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

While Capitol Technology University is not itself a historically black institution (HBI), it maintains strong partnerships with HBIs across Maryland and actively seeks to collaborate through articulation agreements, research initiatives, and outreach. The Applied Engineering program has the potential to serve as a model for future partnerships and dual-degree pathways that can expand HBI access to applied, interdisciplinary engineering education. By offering flexible entry points and hands-on learning opportunities, the program aligns with the broader statewide goal of strengthening STEM access and success for underrepresented students, including those served by Maryland's HBIs.

2. Provide evidence that the perceived need is consistent with the maryland state plan for postsecondary education.

The Maryland State Plan for Postsecondary Education articulates three goals for postsecondary education:

1. Student Access
2. Student Success
3. Innovation

Goal 1: Student Access
"Ensure equitable access to affordable and quality postsecondary education for all Maryland residents."

Capitol Technology University is committed to expanding access to high-quality, workforce-relevant engineering education for students throughout Maryland. The Bachelor of Science in Applied Engineering was developed to reach students who may be underserved by traditional engineering programs, including transfer students, adult learners, first-generation college students, military veterans, and underrepresented minorities in STEM. The program creates accessible career pathways through targeted recruitment efforts at Maryland high schools and community colleges, articulation agreements that facilitate seamless transfer from two-year institutions, and the provision of financial aid, institutional scholarships, and military tuition assistance. In addition, flexible scheduling and a curriculum that emphasizes applied, hands-on learning appeal to nontraditional and working students. These strategies reflect Capitol's commitment to removing barriers to entry and increasing representation in high-demand engineering fields. They also align with the State Plan's Priority 1, which calls for a study of affordability; Priority 2, which promotes financial literacy and planning for students and families; and Priority 4, which focuses on evaluating and improving systems that affect access for specific student populations.

Goal 2: Student Success
"Promote and implement practices and policies that will ensure student success."

The Applied Engineering program is intentionally designed to promote student progression, degree completion, and career readiness. It incorporates project-based learning, teamwork, and experiential instruction to help students develop deep technical knowledge and practical problem-solving skills. Students benefit from individualized support through academic advising, faculty mentoring, tutoring services, and early alert systems that allow for timely interventions when needed. The program's connection to the workforce is reinforced through a senior capstone design sequence based on real-world engineering challenges, internship and research opportunities, and ongoing collaboration with employers in Maryland's advanced manufacturing, automation, and systems integration sectors. These components reinforce student engagement, motivation, and preparation for high-skill employment. They also support the State Plan's Priority 5, which promotes a sustained commitment to quality postsecondary education; Priority 6, which seeks to improve systems that prevent timely program completion; and Priority 7, which emphasizes the importance of postsecondary education as a platform for lifelong learning.

Goal 3: Innovation
"Foster innovation in all aspects of Maryland higher education to improve access and student success."

The Bachelor of Science in Applied Engineering represents a forward-thinking approach to engineering education. It blends key elements of electrical and mechanical engineering with programming, control systems, instrumentation, and artificial intelligence. This interdisciplinary, application-focused model reflects emerging industry expectations and prepares students to work across disciplines in modern technical environments. The curriculum was developed through consultation with faculty, industry partners, and academic planners to ensure alignment with Maryland's economic and technological priorities. Program innovations include a modular design that allows for future concentration or certificate options, the use of existing laboratory and simulation resources to minimize startup costs while preserving instructional quality, and industry-driven capstone projects that ensure students graduate with meaningful, applied experience. These innovations are consistent with the Maryland State Plan's Priority 8, which encourages experimentation and development of new pedagogical strategies; Priority 9, which supports the expansion of innovative academic practices; and Priority 10, which emphasizes the integration of work-based learning and apprenticeships into postsecondary programs.

In summary, the Bachelor of Science in Applied Engineering aligns closely with all three goals of the Maryland State Plan for Postsecondary Education. It promotes equitable access for underserved populations, enhances student success through applied learning and academic support, and embodies instructional innovation that responds to Maryland's current and future workforce demands.

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

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

Graduates of the Bachelor of Science in Applied Engineering program will be prepared for a wide range of positions in Maryland's expanding engineering, manufacturing, automation, and technology sectors. The program is designed to support entry-level employment opportunities across several interconnected industries, including advanced manufacturing, systems integration, robotics, embedded systems, renewable energy, smart infrastructure, and aerospace and defense technology. These industries require professionals with practical, cross-disciplinary engineering knowledge and strong hands-on skills, which are central to the applied nature of the program.

Graduates are expected to qualify for job titles such as engineering technologist, systems engineering associate, automation engineer, control systems technician, mechatronics technician, field service engineer, instrumentation engineer, and technical project assistant. Many of these roles are designed for bachelor's-level candidates and emphasize readiness to contribute to real-world design, development, implementation, and maintenance tasks. As the program emphasizes project-based learning, computer programming, circuit design, and technical communication, graduates will be well-equipped for positions that require immediate contribution to multidisciplinary engineering teams.

Graduates will typically enter the workforce at the junior engineer or technologist level but will have the potential to grow into supervisory, systems integration, and technical management roles with experience or advanced education.

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

Graduates of the Bachelor of Science in Applied Engineering program are prepared for technical roles that bridge the gap between theory and application in engineering practice. These roles—while not officially labeled "Applied Engineer" by the U.S. Bureau of Labor Statistics (BLS)—are widely represented in labor market categories such as industrial engineering, mechatronics, automation, control systems, and engineering technology. These fields are projected to see continued growth and strong demand over the coming decade, both nationally and within the state of Maryland.

According to the BLS, employment of **industrial engineers**, a primary occupational proxy for applied engineers, is projected to grow **12 percent from 2023 to 2033**, significantly faster than the average for all occupations. Approximately **25,200 openings** for industrial engineers are expected each year during this period due to industry growth and the need to replace retiring workers or those changing careers. The **2024 median annual wage** for industrial engineers was **$101,140**, reflecting the value placed on professionals with skills in process design, systems integration, and operational efficiency (BLS, Industrial Engineers).

Closely related occupations include **mechanical engineers**, who are projected to see **11 percent growth** through 2033, with **19,200 openings annually**, and **electro-mechanical and mechatronics technologists and technicians**, whose demand is supported by increasing use of automation and robotics in manufacturing and infrastructure. The **2024 median annual wage** for mechanical engineers was **$102,320**, while mechatronics technologists earned an average of **$63,640** annually (BLS, Mechanical Engineers; O*NET OnLine).

In Maryland specifically, the demand for engineers and engineering technologists is robust due to the concentration of industries in defense, aerospace, automation, telecommunications, and advanced manufacturing. The **Maryland Department of Labor** projects an **8.43 percent increase** in engineering and architecture occupations from 2022 to 2032, representing a net increase of approximately **6,000 jobs** statewide. Occupations such as industrial engineering technologists, automation technicians, and systems engineering associates are particularly well-aligned with the skill set provided by the Applied Engineering program.

Additional labor market insights indicate that Maryland ranks among the top states for employment in electrical and electronics engineering technologist roles, employing over **4,500 individuals** in these fields as of the most recent data, with an average annual salary exceeding **$90,000**.

The regional job market for applied engineering skills is further supported by growth in sectors such as: Smart manufacturing and Industry 4.0 initiatives, Renewable energy and sustainability systems, Defense and aerospace innovation hubs (e.g., Patuxent River, Aberdeen Proving Ground), and Intelligent transportation and control infrastructure projects.

Given the interdisciplinary and flexible nature of the Applied Engineering curriculum, graduates will be well-positioned to fill workforce needs across multiple job categories. The combination of technical proficiency, project-based experience, and system-level thinking equips them for immediate contribution in both traditional engineering firms and emerging technology enterprises.

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

The demand for professionals equipped with applied engineering skills is on the rise in Maryland, driven by the state's focus on advanced manufacturing, automation, and infrastructure development. Several market surveys and labor projections underscore the need for educational programs that prepare students for these evolving industries.

According to the Maryland Department of Labor's Occupational Projections for 2022–2032, the state anticipates an 8.43 percent increase in employment in architecture and engineering occupations. This increase represents approximately 6,060 new jobs across Maryland in technical and engineering-related roles. The projections identify strong growth in occupations relevant to applied engineering, including industrial engineering technicians, automation specialists, and systems integration professionals. These positions typically require a bachelor's degree with strong applied technical competencies and are often filled by graduates of interdisciplinary engineering or engineering technology programs.

A report by the Georgetown University Center on Education and the Workforce titled "Projections Through 2031" notes that 69 percent of all jobs in Maryland will require some form of postsecondary education or training. This includes significant demand for degrees that combine engineering principles with practical application, as is typical of applied engineering programs. The report further emphasizes that the largest gaps in Maryland's workforce pipeline are in mid-level and technical occupations, many of which align with the expected career paths of applied engineering graduates.

The Maryland Statewide Workforce Development Plan (2024–2028) also highlights training needs in key industries such as advanced manufacturing, smart infrastructure, aerospace, cybersecurity, and logistics systems. The plan identifies applied technical education and employer-aligned academic programs as essential strategies for closing labor gaps in these sectors. The need for workforce-aligned postsecondary programs with project-based, applied learning is repeatedly emphasized in statewide recommendations for talent development.

Additional market indicators, including real-time job posting analytics from LinkedIn, Indeed, and Lightcast, confirm a steady demand in Maryland for roles such as automation engineer, mechatronics technician, control systems specialist, and industrial technologist. These job titles appear frequently in listings from employers in defense contracting, smart energy, and high-tech manufacturing.

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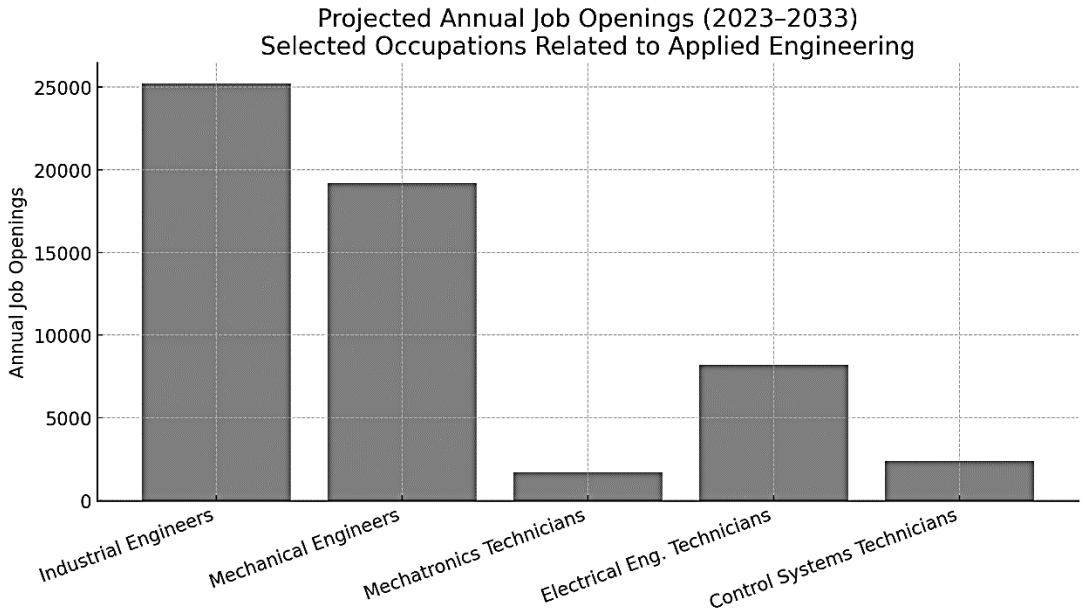

4. Provide data showing the current and projected supply of prospective graduates

The current supply of graduates from programs that closely align with applied engineering is limited in the state of Maryland. Most bachelor's-level engineering programs in the state are traditional in nature, focusing on singular disciplines such as mechanical, electrical, or industrial engineering, and are typically offered at research-focused universities. These programs often do not combine interdisciplinary content with hands-on, systems-level problem-solving in the way the proposed Applied Engineering program does.

According to the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS), Maryland institutions awarded approximately:

- 385 bachelor's degrees in mechanical engineering
- 310 bachelor's degrees in electrical engineering
- 180 bachelor's degrees in industrial and systems engineering

as of the most recent reporting year (2022).

However, few institutions in Maryland offer applied, interdisciplinary engineering programs that integrate electrical, mechanical, and computing disciplines. Programs that do exist are often engineering technology programs—typically accredited under the ETAC of ABET—and emphasize technician-level preparation rather than engineering design and systems integration.

The proposed Bachelor of Science in Applied Engineering will be developed to meet the criteria for EAC-ABET accreditation, which affirms a higher academic rigor in mathematics, science, and engineering fundamentals. This distinction qualifies graduates to pursue licensure as professional engineers and prepares them for advanced technical roles that require not only practical skills but also analytical and design capabilities. The program fills a critical gap in Maryland's higher education

landscape by providing an interdisciplinary, practice-oriented engineering degree with the academic depth and accreditation necessary for long-term career advancement.

Based on institutional planning and projected enrollment:

- The program is expected to enroll 15 to 20 students in its first year
- Enrollment is projected to grow to approximately 60 to 75 students by year five
- The program anticipates graduating 10 to 15 students annually by year five, assuming standard retention and completion rates

These graduates will contribute directly to meeting Maryland's workforce needs in automation, advanced manufacturing, infrastructure, energy systems, and defense technology—sectors where employers consistently report challenges in finding engineers with applied, cross-disciplinary expertise.

D. Reasonableness of Program Duplication

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

While several institutions in Maryland offer engineering and engineering technology programs, there are currently no undergraduate programs that offer the same breadth, interdisciplinary integration, and applied focus as the proposed Bachelor of Science in Applied Engineering.

Under CIP Code 14.0101 – *Engineering, General*, the following Maryland institutions offer programs at various degree levels:

- **Associate Degree / Transfer Programs**
  Anne Arundel Community College, Baltimore City Community College, Carroll Community College, Cecil College, College of Southern Maryland, Community College of Baltimore County, Garrett College, Harford Community College, Hagerstown Community College, Howard Community College, Montgomery College, Prince George's Community College, and Washington Adventist University.
- **Bachelor's Degree Programs**
  Johns Hopkins University (BA in Engineering), Loyola University Maryland, Frostburg State University (in collaboration with Cecil College), University of Maryland Eastern Shore, and University of Maryland Baltimore County.
- **Master's Degree Programs**
  Morgan State University, Loyola University Maryland, University of Maryland Eastern Shore, and University of Maryland College Park.
- **Doctorate / Post-Baccalaureate Certificate Programs**
  University of Maryland Eastern Shore (Ph.D. in Applied Computing and Engineering), Johns Hopkins University, and University of Maryland College Park.

Below is a table summarizing these offerings:

Institution	Program Title	Degree
Washington Adventist University	Engineering	Associate Degree
Univ. of Maryland Eastern Shore	Applied Computing and Engineering (Dual)	Master's Degree
Univ. of Maryland Eastern Shore	Applied Computing and Engineering	Doctorate (Research & Scholarship)
Univ. of Maryland Eastern Shore	Applied Computing and Engineering	Doctorate (Other)
Morgan State University	Engineering	Master's Degree
Johns Hopkins University	Engineering (BA)	Bachelor's Degree
Loyola University Maryland	Engineering	Bachelor's Degree
Johns Hopkins University	Engineering	Doctorate (Professional Practice)
Loyola University Maryland	Engineering Science	Master's Degree
Frostburg State University	Engineering (w/Cecil College)	Bachelor's Degree
University of Maryland, Baltimore County	Engineering	Bachelor's Degree
Univ. of Maryland Eastern Shore	Engineering	Bachelor's Degree
Univ. of Maryland, College Park	Engineering	Master's Degree
Univ. of Maryland, College Park	Engineering	Post-Baccalaureate Certificate
Anne Arundel Community College	Engineering Transfer	Associate Degree
Carroll Community College	Engineering	Associate Degree
Cecil College	Engineering	Associate Degree
College of Southern Maryland	Pre-Engineering	Lower Division Certificate
College of Southern Maryland	Engineering Transfer	Associate Degree
Community College of Baltimore County	Engineering	Associate Degree
Howard Community College	Engineering Transfer	Associate Degree
Montgomery College-All Campuses	Engineering Science	Associate Degree
Prince George's Community College	Engineering	Associate Degree
Baltimore City Community College	Engineering Transfer	Associate Degree
Harford Community College	Engineering Transfer	Associate Degree
Hagerstown Community College	Engineering Science	Associate Degree
Garrett College	Engineering Transfer	Associate Degree

Most existing bachelor's programs in the state emphasize traditional, discipline-specific engineering education (e.g., mechanical, civil, or electrical), theoretical foundations, and ABET-aligned curricula. In contrast, the proposed Applied Engineering, BS program is distinguished by its interdisciplinary structure and strong focus on hands-on, real-world problem-solving. It is not intended as a transfer preparation or pre-graduate track, but rather as a career-focused program preparing students for immediate entry into applied engineering roles across multiple industries.

2. **Provide justification for the proposed program**

The Applied Engineering, BS program at Capitol Technology University is designed to fill a critical gap in Maryland's engineering education offerings. While several institutions offer general engineering programs under CIP 14.0101, most are either highly theoretical, designed for transfer preparation, or focused on advanced graduate studies.

The proposed program emphasizes applied, interdisciplinary learning rooted in hands-on, experiential education. It is tailored for students seeking immediate employment in engineering and technology fields, combining foundational knowledge with practical skills in electronics, systems, robotics, controls, and data-driven technologies.

The program is justified by a combination of workforce demand, academic need, and institutional alignment:

a. Workforce Demand: Maryland faces a growing shortage of professionals with applied engineering skills, particularly in sectors such as automation, robotics, advanced manufacturing, and defense. Employers are seeking graduates who can contribute immediately with hands-on capabilities and systems-level thinking.
b. Academic Need: While traditional engineering programs emphasize theory and design, there is a documented demand for programs that integrate **real-world application** with academic rigor. The proposed program meets this demand by balancing conceptual understanding with skill development and practical problem-solving.
c. Accessibility and Flexibility: The Applied Engineering program is designed to accommodate non-traditional students, community college transfers, and working adults. Its modular structure, reliance on existing campus resources, and practice-based curriculum make it cost-effective, flexible, and scalable.
d. Institutional Alignment: Capitol Technology University's mission is to deliver industry-aligned, career-ready education in engineering, computer science, and technology. This program directly supports that mission and aligns with state-level goals related to STEM access, innovation, and economic development.

By offering a distinctive, applied alternative to Maryland's existing engineering programs, the BS in Applied Engineering contributes to workforce readiness, academic diversity, and broader participation in high-demand technology fields.

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 Applied Engineering is designed to complement, not disrupt, high-demand programs currently offered by Maryland's Historically Black Institutions (HBIs). Institutions such as Morgan State University and the University of Maryland Eastern Shore offer established engineering and engineering technology programs that serve critical roles in preparing

underrepresented students for success in STEM careers. These programs are essential to Maryland's workforce development and educational equity goals and should be preserved and strengthened.

The Applied Engineering program differs in its curricular design and student focus. It emphasizes interdisciplinary, hands-on, and systems-level engineering education that blends electrical, mechanical, and computing components into a single, practice-oriented degree. The program also targets a different demographic—particularly adult learners, community college transfer students, and working professionals—many of whom may not pursue traditional engineering pathways offered at HBIs.

Rather than drawing students away from HBI programs, the Applied Engineering program may support them in several ways:

- By creating additional transfer opportunities for HBI students in general studies or pre-engineering tracks who may prefer an applied, workforce-oriented degree.
- By opening the door to inter-institutional collaboration on design projects, applied research, and workforce initiatives, particularly in automation, smart systems, and manufacturing.
- By expanding Maryland's overall capacity to meet **statewide employer demand** for graduates with applied engineering skills without duplicating the theoretical or discipline-specific focus of HBI engineering programs.

The introduction of this program will not reduce enrollment or diminish support for high-demand HBI programs. Instead, it addresses workforce needs through a complementary model of engineering education that preserves institutional missions while increasing access and responsiveness across the state.

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 Applied Engineering is not expected to negatively impact the uniqueness or institutional missions of Maryland's Historically Black Institutions (HBIs). Rather, it complements the broader statewide commitment to increasing access to high-quality, workforce-aligned STEM education—an objective that aligns with the core missions of HBIs.

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 educating underrepresented students and advancing racial equity in higher education. Their missions emphasize leadership development, community engagement, academic excellence, and increasing the participation of African Americans in high-demand fields such as engineering, technology, and the sciences.

The proposed program differs from HBI offerings in its structure, delivery, and target population. It focuses on interdisciplinary, hands-on engineering education that integrates mechanical, electrical, and computing concepts, and is designed to serve transfer students, adult learners, and working professionals. Furthermore, it is intended to meet EAC-ABET accreditation standards, positioning it as a rigorous yet accessible option for students seeking licensure and workforce entry in applied technical fields.

Rather than duplicating existing HBI programs, the Applied Engineering program fills a gap in the state's educational landscape and creates potential opportunities for collaboration. These may include shared workforce development initiatives, articulation pathways, or jointly sponsored applied research and senior projects. The program also reinforces the state's collective efforts to expand pathways to engineering for historically underrepresented students—an objective shared by HBIs and Capitol Technology University.

In this way, the Applied Engineering program respects the unique identities of HBIs while advancing shared goals related to STEM equity, access, and workforce preparation.

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

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

The Bachelor of Science in Applied Engineering was developed through a collaborative effort involving faculty from Capitol Technology University's School of Engineering, the Office of Academic Affairs, and representatives from industry and advisory boards. The program was designed to address workforce needs for graduates with interdisciplinary, applied engineering skills and to provide an accessible, flexible pathway for transfer students and adult learners.

The program structure builds on existing strengths in electrical engineering, mechatronics, and computer science, and incorporates courses already offered and approved within these departments. It integrates core knowledge areas—such as circuit analysis, control systems, programming, instrumentation, and systems design—into a cohesive, application-oriented curriculum aligned with EAC-ABET expectations.

The program will be overseen by full-time faculty with expertise in electrical engineering, systems engineering, and engineering technology. These faculty hold doctoral degrees and have both academic and industry experience relevant to the program's applied focus. Adjunct faculty with specialized expertise in automation, AI, and control systems may also contribute to course delivery and capstone mentorship.

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

The program is delivered primarily in an on-campus, face-to-face modality, with selected courses available in hybrid or online formats to accommodate working students and transfers. The curriculum emphasizes rigorous, hands-on instruction supported by labs, design projects, and real-world problem-solving.

Educational Objectives:
Graduates of the Applied Engineering program will:

1. Be prepared for entry-level employment in fields such as automation, manufacturing, systems integration, and robotics.
2. Apply interdisciplinary engineering principles to the design, implementation, and improvement of complex technical systems.
3. Demonstrate professional responsibility, ethical decision-making, and effective teamwork in engineering environments.
4. Pursue lifelong learning, professional certification, or graduate study in related technical disciplines.

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 solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. communicate effectively with a range of audiences.
4. recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. function effectively on a team whose members together provide leadership, create a collaborative environment, establish goals, plan tasks, and meet objectives.
6. develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. acquire and apply new knowledge as needed, using appropriate learning strategies.

These outcomes are aligned with **ABET Student Outcomes 1–7** and reflect both academic rigor and practical relevance.

3. Explain how the institution will:

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

Assessment of student learning outcomes will be conducted through both direct and indirect measures. Each course in the program will include clearly defined outcomes mapped to the program's overall learning outcomes. Faculty will assess these through exams, design projects, laboratory assignments, and presentations. In addition, the capstone design sequence will serve as a culminating

experience, assessing the student's ability to integrate knowledge across disciplines and apply it in solving real-world problems.

Annual assessment reports will be prepared by faculty, reviewed by the program chair, and submitted to the Office of Academic Affairs for institutional review. The program's advisory board will also provide feedback on assessment results and recommend curricular improvements.

b) Document student achievement of learning outcomes in the program

The university maintains a centralized system for documenting student learning outcomes and program-level assessment results. Course-level assessments will be archived in course portfolios, and performance on key outcomes will be tracked longitudinally. Faculty will submit sample student work, rubrics, and analysis of outcome attainment at the end of each academic year. These data will be reviewed as part of the continuous improvement process and included in self-study reports for internal review and external accreditation purposes, including ABET.

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

The Bachelor of Science in Applied Engineering is a 120-credit interdisciplinary undergraduate degree that prepares students for immediate employment and lifelong learning in applied technical fields. The program integrates foundational engineering principles from electrical, mechanical, and computing disciplines with a strong emphasis on hands-on learning, systems integration, and real-world problem-solving. Students gain practical experience through laboratories, programming, instrumentation, and a two-semester senior design capstone sequence.

The curriculum includes:

Category	Description	Distribution
Engineering Core Courses	Courses cover circuit analysis, electronics, power systems, digital and control systems, communication circuits, mechatronics, and CAD design. Students complete a senior design project to demonstrate integration of knowledge and skills.	45 credits
Computer Science and Applied Computing	Programming in Python and C, introductory artificial intelligence, and computer networking develop essential computational skills for modern engineering applications.	12 credits
Electives	Students select four technical or general electives to tailor their learning to specific interests or industry pathways.	**12 credits**
Mathematics and Science	Foundational and advanced coursework in algebra, calculus, statistics, differential equations,	30 credits

	physics, and chemistry provides the analytical skills necessary for applied engineering practice.	
Humanities, Social Sciences, and Communication	Courses in English composition, ethics, project management, arts and ideas, and social science support professional communication, ethical reasoning, and contextual understanding of engineering practice.	21 credits

Engineering Core requirement		**45 Credits**
Course Code	**Course Title**	**Credit Hours**
EL 100	Introduction to DC/AC Circuits	3 hrs
EL 150	DC/AC Circuits and Analysis	3 hrs
EL-200	Electronic Devices/Circuits	3 hrs
EL-204	Digital Electronics	3 hrs
EL 261	Introduction to Communication Circuits and Systems	3 hrs
EL-262	Microprocessors/Microassembly	3 hrs
EE 285	Programming Logic Controllers and Networks	3 hrs
EE 353	Power Systems Engineering	3 hrs
EE 453	Control I	3 hrs
MEC 155	Introduction to Materials Science	3 hrs
MEC 215	Introduction to Engineering Design Computer-Aided Design	3 hrs
MEC 220	Principles of Mechatronics	3 hrs
MEC 370	Electronics and Instrumentation	3 hrs
SDE 457	Senior Design I	3 hrs
SDE 458	Senior Design II	3 hrs

Computer Science and Applied Computing		**12 Credits**
Course Code	**Course Title**	**Credit Hours**
CS 120	Introduction to Programming Using Python	3 hrs
CS 150	Programming in C	3 hrs
AIT 201	Introduction to Artificial Intelligence	3 hrs
NT 150	Computer Networking	3 hrs

Electives		**12 Credits**
Course Code	**Course Title**	**Credit Hours**
AE 361	Remote Sensing	3 hrs
AE 250	Ground Systems Engineering	3 hrs
UAS 102	Mechanics of Uncrewed and Autonomous Systems	3 hrs
ROB 100	Introduction to Robotics	3 hrs
MEC 375	Engineering Safety	3 hrs

Mathematics and Science		30 credits
Course Code	**Course Title**	**Credit Hours**
CH 120	Chemistry	3 hrs
MA 112	Intermediate Algebra	3 hrs
MA 114	Algebra and Trigonometry	4 hrs
MA 128	Introduction to Statistics	3 hrs
MA 261	Calculus I	4 hrs
MA 262	Calculus II	4 hrs
MA 340	Ordinary Differential Equations	3 hrs
PH 201	General Physics I	3 hrs
PH 202	General Physics II	3 hrs

Humanities, Social Sciences, and Communication		21 Credits
Course Code	**Course Title**	**Credit Hours**
BUS 174	Introduction to Business and Management	**3** hrs
BUS 301	Project Management	**3** hrs
HU 331	Arts and Ideas	**3** hrs
SS 351	Ethics	**3** hrs
	Humanities or Social Science Electives	**3** hrs
EN-101	English Communications	**3** hrs
EN-102	English Communications II	**3** hrs

Courses Descriptions

Course Descriptions for Engineering Courses (45):

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 150 – DC/AC Circuits and Analysis (3 credits): Applications of Kirchhoff laws to multiple source and complex series-parallel circuits. Determinants and matrices. Mesh and nodal analysis. Network Theorems: Thevenin, Norton, superposition, maximum power transfer. Review of complex number manipulation. Application to capacitive and inductive circuits, impedance. Complex Mesh

analysis. Network theorems applied to complex RLC networks. Frequency response of RL and RC circuits. Plotting frequency response. Bode plots. Laboratory emphasis on the use of standard test equipment to verify theory. MATLAB Part II: input and output statements, importing data from spreadsheets, text files and other formats into MATLAB, conditional statements, loops, arrays, array functions. Prerequisite(s): EL 100. Corequisite(s): Math (MA 114 or MA 114 Placement Test equivalent or MA 261 or MA 261 Placement Test equivalent)..

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): Number systems, including binary, octal and hexadecimal bases. Binary arithmetic. Boolean algebra, Karnaugh map simplification. Design of combinational circuits. Decoders, multiplexers, flip-flops and other multi-vibrator circuits. Logic families including TTL, CMOS, ECL and others. Memory, shift registers and counters. Prerequisite(s): None

EL 261 - Introduction to Communication Circuits and Systems (3 credits): Fundamental concepts in communications. Amplitude and frequency modulation. Waveform and waveform analysis. Spectral content of signal. Circuits used to generate signal. Signal recovery circuits. Introduction to digital modulation and digital waveforms. Students build and test circuits. MATLAB Part IV: using Communications System Toolbox for analysis, design, simulation and verification of communication systems. Offered during spring semester only. Offered during spring semester only. Prerequisite(s): EL 200, Corequisite(s): MA 261

EL-262 – Microprocessors/Microassembly (3 credits): Introduction to microprocessors. Architecture. Fetch and execute cycles. Microprocessor instruction set and assembly language programming. Hardware configuration, pin functions and modes of operation of a typical microprocessor. Basic I/O timing, control and memories. Prerequisite(s): EL 204.

EE 285 - Programming Logic Controllers and Networks (3 credits): Introduces programmable logic controllers (PLCs). Emphasizes ladder diagrams and programming of PLC. Introduces network systems such as DeviceNet, ProfiNet, and ProfiBus. Emphasizes the integration of PLCs in automation systems. Two hours lecture and three hours laboratory. Prerequisite(s): EL 200

EE 353 - Power Systems Engineering (3 credits): Fundamentals of power transmission and electric motors. Single versus three-phase, poly-phase systems, synchronous, asynchronous machines. DC and compound DC motors, induction motors. Equivalent circuit modeling of motors. Start-up conditions. Transformers, Transmission of Electrical Energy, Energy Distribution and Harmonics. Prerequisite(s): EL 150 and MA 261

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 155 - Introduction to Materials Science (3 credits): Origin and behavior of materials. Classifications of materials. Physical metallurgy-mechanical and physical properties, crystalline structure, imperfections in solids, phase diagrams, failure mechanisms in materials, hardening and tempering, isothermal diagrams. Involves hands-on experiences through lab sessions in the use of metallurgical and mechanical testing equipment.

MEC 215 - Introduction to Engineering Design Computer-Aided Design (3 credits): Introduction to computer-aided design (CAD) for product design, modeling, and prototyping. Individual use and team-based environment to design and prototype a functional and manufacturable marketable product. Application to design, manufacturing, and analysis using geometric tolerancing and dimensioning.

MEC 220 - Principles of Mechatronics (3 credits): This course will introduce you to Mechatronics as a multidisciplinary engineering discipline that includes electronics, electrical, mechanical, computer systems engineering, together with information technology. Theory lectures will introduce the core components of mechatronic systems: electrical and electronic components and circuits, sensors and actuators. In laboratory work, you will work on putting theory into practice in the context of a challenging project that is at the core of a national design and build competition. This course significantly develops the generic skills of teamwork, planning, leadership, and communication. Conventional lectures will be given on the theoretical aspects of these graduate capabilities. You will then apply these skills in the completion of specific learning activities such as design project, report, testing and prototyping. The dry run testing of the prototype Mechatronics mechanisms will provide an opportunity for you to receive feedback. Prerequisite(s): EL 150, MEC 215

MEC 370 - Electronics and Instrumentation (3 credits): Introduces use and analysis of electronic circuits and input mechanism of various sensors, design of analog signal conditioning systems based on the system requirement, as well as understanding the theory and the art of modern instrumentation and measurements (I&M) systems. Topics include BJT and MOSFET circuit model and analysis; operational amplifier; instrumentation amplifier; survey of sensor input mechanisms; analog signal conditioning and sensor application; measurement system architecture; errors in measurement; standard used in measurement. Prerequisite(s): EL 200

SDE 457 - Senior Design I (3 credits): Students/teams select a project, develop an understanding of the project scope that includes research and documentation of related work, prepare a feasibility study, develop project requirements (constraints) and engineering, software, and/or security specifications, propose solutions and multiple designs, analyze proposed designs, select a final proposed design, and prepare and present a preliminary design review (PDR). Students are expected to apply proper systems engineering and project management to their work. Additional components may be required in some projects. Students/teams submit a final report at the end of the semester. Prerequisite(s): Senior standing.

SDE 458 - Senior Design II (3 credits): Students/teams build and test their selected designs (completed in SDE 457). Each student team delivers a tested prototype and defends its project in front of a panel of experts. Students/teams submit a final report that includes description of the design, realization, and test processes as well as test results, discussion, and conclusion. Failure to deliver a completed design and a working prototype that meets engineering, software, and/or security specifications by the end of the semester may result in failing the course. Prerequisite(s): SDE 457

Course Description for Computer Science and Applied Computing (12 Credits)

CS 120 - Introduction to Programming Using Python (3 credits): The course will cover basic concepts and elements of computer programming using Python. Topics include variables, constants, operators, expressions, statements, branching, loops, and functions. Additionally, Python specific data structures, built-in functions, library modules and working with external files will be applied in developing working code.

CS 150 - Programming in C (3 credits): This introductory course in programming will enable students to understand how computers translate basic human instructions into machine executable applications. The language of choice for this course is C. The C syntax that will be covered includes functions; variables and memory allocations including pointer notation; conditional statements and looping. Students will also learn binary to hexadecimal and decimal conversions along with basic computer architecture. Memory management, data input output and file manipulations will be among some other topics discussed and applied during this course. Formerly titled Introduction to Programming Using C. Prerequisite(s): MA 111 or MA 112 and CS 120 or placement test.

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

NT 150 - Computer Networking (3 credits): This course is a continuation of NT-100 with major emphasis on local network equipment, network software and addressing schemes. Students build, configure, test and troubleshoot a network in the laboratory. Routers and switches are included. This material can be used as a basis for studying for CISCO's ICND1.

Course Description for Electives (12 Credits)

AE 361 - Remote Sensing (3 credits): This is an introductory remote sensing and sensor course with a focus on methods, instruments and techniques used to obtain satellite imagery. Students will be introduced to physical principles of remote sensing, Earth and other planetary observing systems and sensors, and various digital processing techniques related to satellite sensing imagery. Topics include optics, solar radiation, principles of satellite imaging, image quality analysis, introduction to charged coupled devices (CCDs), and basics of sensor design. Offered Spring semester only. Offered Spring semester only. Prerequisite(s): PH 262 and AE 150

AE 250 - Ground Systems Engineering (3 credits): Provides an introduction to the components that make up a satellite ground system. Included is the design and analysis of ground system components. Provides an introduction into satellite telemetry, command and control subsystems, as well as the software needed to build and run a ground system. Introduction to CCSDS standards and mission planning. Offered spring semester only. Offered spring semester only. Prerequisite(s): AE 150

UAS 102 - Mechanics of Uncrewed and Autonomous Systems (3 credits): This course will provide the student an understanding of the component systems common to most Uncrewed and Autonomous Systems with an emphasis on effective integration and operations. The course focuses on the core technologies and includes examinations of the control systems, power plants (motors), servos/actuators, power sources, and communication technologies utilized in uncrewed systems. NOTE: Students enrolled in this course incur an additional lab fee of $350.

ROB 100 - Introduction to Robotics (3 credits): This introductory course is a hands-on introduction to the key concepts and tools underpinning robotic systems in use and development today. Intended to give students the tools to understand robotic systems, to explore robotics for their own purposes, and to pursue advanced study in the field. The course will cover the fundamentals of manipulators, sensors, actuators, end effectors and product design for automation, kinematics, control, programming of manipulators, along with an introduction to pattern recognition and computer vision.

MEC 375 - Engineering Safety (3 credits): Safety and health in the manufacturing, construction, and utilities industries, including pertinent laws, codes, regulations, standards, and product liability considerations. Organizational and administrative principles and practices for safety management and safety engineering, accident investigation, safety education, and safety enforcement.

Course Description for Mathematics and Science (30 Credits)

CH 120 – Chemistry (3credits): This courses teaches metric system and significant figures, stoichiometry, fundamental concepts of atomic structure and its relationship to the periodic table and electron configuration. Bonds and electronegativity, gases, oxidation states and redox, solutions, acids and bases, changes of state, thermodynamics, and chemical kinetics and equilibrium are also included. Prerequisite(s): MA 112 or MA 114

MA 112 - Intermediate Algebra (3 credits): Designed for students needing mathematical skills and concepts for MA-114 and MA-261. In this course students are introduced to equations and inequalities and learn the language of algebra and related functions, including polynomial, rational, exponential and logarithmic functions. Other topics include solving equations, inequalities and systems of linear equations; performing operations with real numbers, complex numbers and functions; constructing and analyzing graphs of functions; and using mathematical modeling to solve application problems. Prerequisite(s): MA 005 or placement test score.

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

MA 261 - Calculus I (4 credits): This course covers lines, circles, ellipses; functions and limits, differentiation, power rule, higher-order derivatives, product, quotient and chain rules, implicit differentiation, and applications. Regarding integration, it addresses definite integrals; indeterminate forms; exponential, logarithmic, trigonometric and hyperbolic functions; differentiation and integration, and graphing. Prerequisite(s): MA 114

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

MA 340 - Ordinary Differential Equations (3 credits): This course addresses methods for solving first order equations with applications to mechanics and rate problems. It also covers solutions of second order equations by undetermined coefficients and variations of parameters. Applications to circuits are also included as well as an introduction to systems of equations and operational and numerical methods. Prerequisite(s): MA 262

PH 201 - General Physics I (3 credits): This is a non-calculus-based physics course intended for credit in engineering technology courses. PH-261 is to be used for electrical, computer, and software engineering courses. PH-201 addresses mechanics, focusing on units, conversion factors, vector diagrams, translational equilibrium, friction, torque and rotational equilibrium, uniformly accelerated motion, projectiles, Newton's Law, work energy and power, kinetic and potential energy, conservation of energy, and impulse and momentum. It also addresses heat, focusing on temperature scales, thermal properties of matter, heat and temperature change, heat and change of phase, physics of heat transfer, and applications. Students completing this course may not enroll in PH-261 for additional credit. Prerequisite(s): MA 114

PH 202 - General Physics II (3 credits): Non-calculus based physics intended for credit in engineering technology courses. Use PH-262 for electrical, computer and software engineering courses. Light and sound: wave motion, nature of light, reflection and mirrors, refraction, prisms, dispersion lenses; simple harmonic motion; sound transmission, resonance, interference. Doppler Effect. Electricity and magnetism: Static electricity, electric fields, magnetic fields, electric potential, capacitance; electricity in motion; magnetic induction; electromagnetic relations. Alternating currents. Prerequisite(s): PH 201

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

BUS 174 - Introduction to Business and Management (3 credits): This course presents a survey of the general business and management environment. Topics include an introduction to the various forms of business, organizational structure, and their legal implications. Modern management and supervision concepts, history and development of theory and practice, the roles of managers, and the relationship between manager and employee are examined. This is a seminar course with emphasis on class discussion and collaborative learning.

BUS 301 - Project Management (3 credits): This course is an introduction to project management. It covers the origins, philosophy, methodology, and involves actual applications and use of tools such as MS Project. The System Development Cycle is used as a framework to discuss project management in

a variety of situations. Illustrative cases are used and project leadership and team building are covered as integral aspects of good project management. Prerequisite(s): BUS 101 or BUS 174

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

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

Humanities or Social Science Electives (3 credits): This elective allows students to broaden their educational experience by exploring topics beyond the technical disciplines of engineering. Students may choose from a range of approved courses in areas such as history, philosophy, sociology, psychology, economics, or cultural studies. This flexibility encourages intellectual exploration, enhances critical thinking, and promotes a deeper understanding of human behavior, societal structures, and cultural contexts. Such knowledge supports the development of well-rounded engineering professionals who are capable of making informed, ethical, and socially responsible decisions in their professional practice.

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

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

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

The Bachelor of Science in Applied Engineering fully satisfies the general education requirements as defined by the Maryland Higher Education Commission (MHEC) and the standards outlined in COMAR 13B.02.03. General education is embedded throughout the curriculum to ensure that students receive a well-rounded education that supports critical thinking, effective communication, ethical

reasoning, and civic responsibility. The program includes 21 credits of general education coursework, covering English composition (EN 101 and EN 102), arts and humanities (HU 331), social and behavioral sciences (BUS 174 and SS 351), and general electives in the humanities or social sciences. Additionally, mathematical and scientific reasoning is addressed through required courses in calculus, statistics, physics, and chemistry, which collectively fulfill the quantitative reasoning and natural science components of general education. This structure ensures that all students graduate with the broad intellectual foundation necessary for success as both engineers and informed global citizens.

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

As with other engineering programs at Capitol Technology University, we will seek to have the proposed Bachelor of Science in Applied Engineering accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET). The criteria for accrediting applied and interdisciplinary engineering programs are defined under ABET's published accreditation standards:

a) General Criteria for Baccalaureate-Level Programs – Criterion 5: Curriculum
According to Criterion 5, the curriculum must include:

- At least one year of a combination of college-level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. Basic sciences are defined as biological, chemical, and physical sciences.
- At least one and one-half years of engineering topics, consisting of engineering sciences and engineering design appropriate to the student's field of study. Engineering sciences extend knowledge from mathematics and basic sciences toward creative application. Engineering design is defined as an iterative decision-making process in which mathematics, basic sciences, and engineering sciences are applied to develop systems, components, or processes that meet specified needs.

b) Program Criteria for Applied Engineering Program

As a multidisciplinary degree, the Applied Engineering program will be evaluated under the Program Criteria for General or similarly titled engineering programs. These criteria emphasize preparing graduates to apply broad engineering knowledge, utilize modern tools and techniques, and integrate design and systems thinking across electrical, mechanical, and computing domains.

The program includes:

- Mathematics through differential equations and statistics (MA 261, MA 262, MA 340, MA 128)
- Basic sciences including chemistry and a full sequence of calculus-based physics (CH 120, PH 201, PH 202)
- A minimum of 45 credits in engineering topics, including circuits, electronics, control systems, digital systems, microprocessors, instrumentation, and senior design
- A capstone design sequence (SDE 457 and SDE 458) requiring integration of knowledge across multiple domains and the application of professional practice skills

The curriculum is structured to fully align with ABET expectations. In accordance with ABET procedures, the program will be reviewed for accreditation eligibility after the first cohort of students graduates. Once accredited, graduates of the Applied Engineering program will be eligible to pursue **Professional Engineer (PE)** licensure in Maryland and other states that recognize degrees accredited by the EAC of ABET.

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 another institution or non-collegiate organization. All instruction, curriculum development, academic oversight, and student support services for the Bachelor of Science in Applied Engineering will be provided directly by Capitol Technology University using its existing faculty, facilities, and administrative resources.

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

Capitol Technology University affirms that students enrolled in the Bachelor of Science in Applied Engineering program will be provided with clear, complete, and timely information regarding all aspects of the program. This includes curriculum structure, course and degree requirements, technology expectations, student support services, and financial policies. The university maintains a commitment to transparency and student success through multiple communication channels and official documentation.

Information is made available through the following means:

- The full curriculum, course descriptions, credit requirements, and program outcomes will be published in the university's academic catalog and maintained on the program webpage. Updates are reviewed and approved annually to ensure accuracy and alignment with institutional policies and accreditation standards.
- Upon enrollment, each student is assigned an academic advisor who provides individualized degree planning, guidance on prerequisites and course sequencing, and support in tracking academic progress through to graduation.
- Students receive a syllabus for each course that includes clear expectations for faculty availability, communication, and responsiveness. Regular faculty-student interaction occurs through lectures, labs, advising meetings, office hours, and capstone project mentoring.
- Course syllabi and orientation materials communicate any assumptions regarding computer literacy and software skills. Students are informed of any required technical equipment (e.g., laptops, simulation software) at the start of the program. Minimum hardware and software specifications are published online and provided by the Office of Information Technology.
- Canvas is the university's official learning management system. It is used to deliver course materials, manage assignments, support discussion forums, and facilitate feedback. Students receive LMS training during orientation and have access to technical support throughout their studies.

- The university provides academic advising, tutoring, library resources, writing assistance, and career development support. These services are described in the student handbook, catalog, and on the university website, and are reinforced during orientation.
- Students have access to comprehensive information on tuition, fees, billing procedures, payment plans, and financial aid through the Financial Aid Office and the Business Office. This includes guidance on scholarships, military benefits, FAFSA processes, and institutional aid.

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

Capitol Technology University affirms that all advertising, recruiting, and admissions materials related to the Bachelor of Science in Applied Engineering will clearly and accurately represent the program, its curriculum, intended outcomes, and the student services available.

The Office of Marketing and Communications works in collaboration with the Office of Admissions and the academic department to ensure that all promotional materials are:

- Factually accurate and reflective of approved curriculum content and degree requirements;
- Aligned with the university's mission and commitment to academic integrity;
- Regularly reviewed and updated to reflect any curricular or policy changes.

Printed brochures, digital marketing, social media posts, the university website, and admissions presentations will include consistent and transparent information regarding:

- Program objectives, degree outcomes, and areas of focus;
- Required credit hours, course structure, and learning modalities;
- Technology and equipment expectations;
- Accreditation plans and licensure pathways (where applicable);
- Availability of faculty advising, academic support, and career services;
- Tuition, fees, and financial aid options.

Additionally, admissions counselors and faculty will receive program-specific training to ensure consistent messaging during recruitment events, one-on-one outreach, and community college transfer engagements.

H. Adequacy of Articulation

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

Capitol Technology University maintains several articulation and partnership agreements that support student transfer and program collaboration. These partnerships align with the goals of the proposed Bachelor of Science in Applied Engineering (BSAE) program, which emphasizes

interdisciplinary and applied learning across multiple engineering fields, including electrical, electronics, mechatronics, and computer engineering.

The program is designed to be transfer-friendly and will benefit from existing articulation agreements with institutions such as Cecil College, Notre Dame of Maryland University, Community College of Rhode Island (CCRI), and Columbia Southern University. We plan to formally add the proposed BSAE program to Capitol Tech's current list of articulated programs.

Additionally, we have ongoing collaborations with high schools through Project Lead The Way (PLTW) and participate in the Prince George's County Public Schools (PGCPS) PLTW Engineering Program Advisory Committee, which helps prepare high school students for success in engineering education and careers.

These existing agreements will be leveraged and expanded to create formal articulation pathways that align associate-level coursework in engineering technologies with the core requirements of the Applied Engineering program. Additionally, Capitol Technology University will continue to explore new articulation agreements with Maryland community colleges to enhance transferability and broaden access.

The curriculum has been structured with flexibility to maximize transfer credit while maintaining alignment with **EAC-ABET expectations** for mathematics, science, and engineering topics. General education and lower-division technical courses have been mapped to those commonly offered by two-year and military-affiliated institutions, allowing students to enter the program at the junior level and complete their degree in a timely and efficient manner.

Formal articulation agreements and transfer pathway documents will be included as they are finalized and submitted as supporting materials to this proposal.

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 Applied Engineering is supported by an accomplished faculty team composed of full-time professors, professors of practice, and experienced adjuncts. Additionally, two faculty members in mechanical engineering have been hired and will begin in Fall 2025. Together, the faculty bring interdisciplinary expertise in electrical and mechanical engineering, computer science, mathematics, and business—ensuring that students receive a robust, industry-relevant education grounded in both theory and practical application.

FULL-TIME FACULTY

Dr. Mohamed Shehata, 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. Charles D. Conner earned a Ph.D. in Electrical Engineering from The Catholic University of America. With decades of teaching experience and service at Capitol and research institutions, he offers courses in analog/digital systems and signal processing.

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. Najam Ul Hassan, Department Chair of Computer and Data Science, holds a Ph.D. in Business Analytics and Decision Sciences and multiple advanced degrees in computer science and business. He teaches project management and analytics and supports interdisciplinary integration

Dr. Tashnim Chowdhury, earned a Ph.D. in Information Sciences from UMBC and an M.S. in Electrical Engineering. His expertise includes machine learning, computer vision, and semantic segmentation. He has conducted research with ARL, Comcast, and Intel, and teaches AI, programming, and applied data science in engineering.

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.

Prof. Jeffrey Volosin, Director of the Astronautical Engineering program, has a B.S. in Space Sciences and two decades of senior leadership experience at NASA. He teaches systems engineering and project management courses.

NEW HIRED FULL-TIME FACULTY

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.

Ms. 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.

ADJUNCT FACULTY

Dr. Jason L. White, Adjunct Professor, holds a Ph.D. in Management with a focus on Engineering Management, and advanced degrees in electrical engineering and applied mathematics. He teaches engineering leadership and technical 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. Edwige F. Songong, Adjunct Faculty, holds a Ph.D. in Civil Engineering from the University of Cape Town, along with M.S. degrees in Technology Management, Mathematical Sciences, and Physics. Her research interests include structural dynamics, sustainability, and engineering education. She has taught structural analysis and physics for engineers and contributes to instruction in math, physics, and structural systems within the Applied Engineering program.

Ms. 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.

	Shehata	Conner	Hassan	Mehri	Chowdhury	Behrman	Wear	White	Volosin	Chi
EL 100	X									
EL 150		X								
EL 200				X						
EL 204		X								
EE 285						X				
EE 453						X				
EL 261		X								
EL 262							X			
EE-353	X									
MEC 215							X			
MEC 370				X						
MEC 155						X				
MEC 220							X			
SDE 457								X		
SDE 458								X		
CS 120			X							
CS 150			X							
AIT 201					X					
NT 150				X						
AE 361									X	
AE 250									X	
MEC 375										X
UAS 102									X	
ROB 100						X				

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

Capitol Technology University is committed to supporting faculty through ongoing professional development focused on evidence-based instructional practices and emerging educational technologies. The university's Center for Innovation in Teaching and Learning (CITL) serves as the primary resource for faculty training, offering a range of workshops, seminars, and consultations aligned with pedagogical best practices.

a) Pedagogy that meets the needs of the students

New and continuing faculty participate in regular training sessions that promote student-centered instruction, inclusive teaching strategies, and formative assessment methods. These sessions are tailored to meet the diverse needs of Capitol's student population, including adult learners, transfer students, and underrepresented groups in STEM. Faculty are encouraged to implement active learning, project-based learning, and collaborative techniques that promote student engagement and retention.

b) The learning management system

Capitol Technology University uses Canvas as its learning management system. All faculty are trained on Canvas during onboarding and have continued access to hands-on support and tutorials. Advanced training includes strategies for using Canvas tools such as integrated rubrics, discussion boards, analytics dashboards, and course modules to support effective course design and timely feedback.

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

Not Applicable

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 support for the academic and research needs of students and faculty in the Bachelor of Science in Applied Engineering program. The library offers a wide range of physical and digital resources that are regularly evaluated and updated to ensure alignment with program learning objectives and course content.

Students have access to a growing collection of engineering and technology-focused journals, eBooks, technical manuals, and databases. Key electronic resources include IEEE Xplore, ScienceDirect, SpringerLink, JSTOR, and ProQuest, which provide full-text access to scholarly articles, conference proceedings, and applied research across engineering disciplines, including mechatronics, electrical systems, automation, and software development.

In addition to these resources, the library maintains subscriptions to standards databases and industry publications relevant to engineering design, project management, and applied computing. Reference materials and textbooks for foundational and advanced engineering courses are also available to support curriculum requirements.

To ensure the continued adequacy of resources, the University's academic leadership works closely with library staff to assess new program needs and make targeted acquisitions. Faculty may submit requests for new materials, which are reviewed and prioritized based on course development timelines and accreditation expectations. As the Applied Engineering program grows, library collections will expand to include additional resources in interdisciplinary technologies and emerging engineering applications.

Library services also include online research assistance, interlibrary loan, citation support, and personalized instruction on information literacy—ensuring students are prepared to access, evaluate, and apply scholarly information effectively throughout their academic careers.

Capitol Technology University affirms that the library infrastructure and acquisition process are fully adequate to support the launch and sustained success of the Applied Engineering program

Measures to Ensure Adequate Support:

- The university will conduct annual reviews of library holdings to ensure resources remain current and aligned with industry advancements.
- Additional textbooks, case studies, and technical manuals related to aviation maintenance management, aircraft systems, and safety protocols will be procured as needed.
- Library staff will collaborate with aviation faculty to identify key academic and industry resources that enhance student learning and research.
- The university will expand access to online aviation and management databases, ensuring remote learners and on-campus students have equal access to critical materials.

K. Adequacy of Physical Facilities, Infrastructure and Instructional Equipment

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

Capitol Technology University affirms that it has the necessary physical facilities, infrastructure, and instructional equipment to effectively launch and support the Bachelor of Science in Applied Engineering program. The university maintains modern classrooms equipped with multimedia projection systems, wireless internet, and interactive instructional tools that support lecture-based and collaborative learning.

Laboratory facilities already in use for existing programs in electrical engineering, mechatronics, computer science, and applied technology will be utilized for this interdisciplinary program. These labs include resources for: Circuit analysis and electronics, Digital systems and microcontrollers, Control systems and automation, Embedded systems and roboticsm and Engineering design and CAD

All labs are equipped with industry-standard instrumentation, prototyping tools, software (e.g., MATLAB, LabVIEW, Multisim), and safety equipment. Lab spaces will accommodate the project-based and hands-on components of the curriculum without requiring significant new capital investment.

Faculty and staff offices are available and adequately equipped to support advising, mentoring, and research collaboration. Additional space planning is reviewed annually to accommodate program growth and new hires.

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

Capitol Technology University ensures that all students and faculty, including those participating in distance education, have robust access to the digital infrastructure required for successful learning and instruction.

a) An institutional electronic mailing system,

All enrolled students and faculty are provided with official university email accounts through Microsoft Office 365. These accounts are used for all academic communication, announcements, assignment submissions, and notifications, ensuring a reliable and secure communication platform.

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

The university uses **Canvas** as its learning management system (LMS), which supports both synchronous and asynchronous course delivery. Canvas provides tools for discussion forums, content delivery, quizzes, grading, group collaboration, and multimedia integration. Faculty receive training in online pedagogy and LMS features, while students are provided with orientation and ongoing technical support to navigate online learning successfully.

Together, Capitol's facilities and digital infrastructure provide a strong foundation for both in-person and distance instruction in the Applied Engineering program.

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. Enter figures into each cell and provide a total for each year. Also provide a narrative rationale for each resource category. If resources have been or will be reallocated to support the proposed program, briefly discuss the sources of those funds.**

The B.S. in Applied Engineering program will be implemented using the existing physical facilities, infrastructure, and instructional equipment available at Capitol Technology University. The University is well-equipped to support the program with classroom spaces, dedicated faculty offices, laboratories, and specialized equipment required for aviation maintenance education.

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	$1851644
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 x b)	$222,464	$465,048	$701,184	$958,272	$122,7800
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 Hour	12	12	12	12	12
g. Total P/T Revenue (d x e x f)	$127,596	$242,892	$363,888	$490,800	$623,844
3. Grants, Contracts and Other External Sources	0	0	0	0	0
4. Other Sources	0	0	0	0	0
TOTAL (Add 1 - 4)	$350,060	$707,940	$1,065,072	$1,449,072	$1,851,644

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

TABLE 2: EXPENDITURES

Expenditure Category	Year 1	Year 2	Year 3	Year 4	Year 5
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	$9,980	$15,346	$20,973	$26,872	$33,052
4. Technical Support and Equipment	$840	$1,425	$2,320	$3,145	$4,140
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7. Other Expenses	$5,850	$14,210	$25,370	$39,330	$56,090
TOTAL (ADD 1â€“7)	$185,985	$268,873	$398,192	$535,948	$682,588

Narrative Rationale for Table 1: Program Resources

1. Reallocated Funds: There are no reallocated funds anticipated for this program. The Bachelor of Science in Applied Engineering program is designed to utilize existing instructional and administrative infrastructure. As such, no current programs will be downsized or eliminated to fund this initiative.

2. Tuition and Fee Revenue: Tuition and fee revenue is based on projected enrollment of new full-time and part-time students. The projections assume a modest increase in enrollment each year, beginning with 8 full-time and 7 part-time students in Year 1 and reaching 40 full-time and 31 part-time students by Year 5.

The annual tuition/fee rate is based on Capitol Technology University's published tuition rates and assumes a 2.5% annual increase.

Part-time revenue is based on a 12-credit load per year, with annual increases in the per-credit tuition rate also assumed at approximately 2.5%. These projections are conservative and aligned with Capitol's strategic enrollment goals for applied and workforce-oriented engineering programs. The revenue will directly support faculty salaries, support staff, and program operation costs.

3. Grants, Contracts, and Other External Sources: While no specific external grants or contracts are budgeted at this stage, Capitol Technology University may pursue workforce development grants, applied STEM education grants, and industry partnerships to support future program enhancement, internships, and student scholarships.

4. Other Sources: No additional sources are identified at this time. However, opportunities such as philanthropic contributions, endowment funds, or state-sponsored innovation initiatives may be explored in future years.

Narrative Rationale for Table 2: Program Expenditures

1. Faculty: Faculty expenditures include salaries and benefits (calculated at 20% of salary) for instructional staff teaching courses in engineering, computing, and applied technology.

- The program starts with 1.5 FTE in Year 1, increasing to 5 FTE by Year 5.
- This includes a mix of full-time faculty and adjunct instructors. Faculty expansion is aligned with expected student growth and course demand.

2. Administrative Staff: A fractional administrative staff member (0.08 FTE) is allocated to support student services, advising, scheduling, and data reporting functions associated with the program. Salary and benefits reflect current administrative support rates at the university and are increased slightly each year to account for inflation.

3. Support Staff: Support staff include lab coordinators, technical assistants, and instructional support personnel essential for running engineering labs and hands-on components.

- Staffing grows from 1 FTE in Year 1 to 3 FTE by Year 5.
- Benefits are calculated at 20% of salary. This growth supports lab operations, equipment oversight, and technical assistance for students and faculty.

4. **Technical Support and Equipment:** These modest expenditures cover software licenses, equipment maintenance, and lab consumables. Budget increases reflect anticipated growth in enrollment and the need for expanded lab use.

5. **Library:** No new library expenditures are required at this time. The program will rely on existing digital and physical library resources in engineering, computer science, and applied technologies.

6. **New or Renovated Space:** No capital construction or renovations are needed. Existing classrooms and laboratories will accommodate the program's instructional needs.

7. **Other Expenses:** This includes marketing, accreditation support, faculty development, and miscellaneous programmatic costs. As enrollment grows, these expenses scale proportionally to cover outreach, instructional resources, and continuous improvement initiatives.

8. **Total Expenditures:** Expenditures are expected to grow from $185,985 in Year 1 to $682,588 in Year 5. The program is designed to become self-sustaining by leveraging tuition revenue while maintaining high academic quality and instructional efficiency.

M. Adequacy of Provisions for Evaluation of Program

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

Capitol Technology University has established institutional processes for evaluating the quality and effectiveness of all academic programs, including the new Bachelor of Science in Applied Engineering. Courses will be evaluated at the end of each semester through standardized student course evaluations that assess instructional quality, course content delivery, and perceived learning outcomes. Faculty performance is reviewed through multiple mechanisms, including peer observations, student feedback, and annual performance evaluations conducted by the department chair and Dean of Academic Affairs.

Student learning outcomes (SLOs) are assessed at the course and program levels. Faculty teaching courses that map to specific program outcomes will collect assessment data from assignments, projects, exams, and labs using established rubrics. These results are compiled and analyzed during regular department meetings to ensure alignment with ABET expectations and continuous improvement of instructional methods and course materials.

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

The educational effectiveness of the Applied Engineering program will be evaluated using both quantitative and qualitative measures aligned with Capitol Technology University's broader institutional assessment framework. The evaluation strategy includes:

- **Assessment of Student Learning Outcomes:**
  The program will maintain a systematic process for mapping, measuring, and reviewing outcomes related to technical proficiency, problem-solving, teamwork, communication, and

lifelong learning. Data from capstone projects, lab assignments, and embedded course assessments will be collected each semester and reviewed annually.

- **Student Retention and Graduation Rates:**
  The university will monitor program-specific retention and completion rates to ensure that students are progressing successfully through the curriculum. Early alert systems and proactive advising will support student persistence.
- **Student and Faculty Satisfaction:**
  Surveys will be administered to students and faculty each year to gather feedback on course delivery, resource adequacy, academic advising, and instructional quality. Focus groups and advisory board feedback will complement these surveys to identify actionable improvements.
- **Cost-Effectiveness:**
  The Business and Finance Division will collaborate with Academic Affairs to conduct cost-benefit reviews of the program each year. These reviews will examine resource utilization, enrollment growth, and instructional efficiency to ensure that the program remains fiscally sustainable.
- **Accreditation and Advisory Input:**
  The Applied Engineering program will pursue ABET accreditation under the EAC (Engineering Accreditation Commission) pathway. As part of this process, regular input from the program's industry advisory board will ensure relevance to employer needs and alignment with workforce trends.

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

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

The Bachelor of Science in Applied Engineering aligns strongly with Maryland's goals to promote minority student access, success, and overall educational equity, as outlined in COMAR 13B.02.03.05 and the Maryland State Plan for Postsecondary Education. Capitol Technology University has a longstanding commitment to cultural diversity, inclusive excellence, and serving underrepresented student populations, especially in STEM fields where minority participation remains disproportionately low.

This proposed program is designed to expand access to engineering education by targeting historically underrepresented groups, including African American, Hispanic, female, first-generation, and veteran students. The curriculum's applied and interdisciplinary structure makes it particularly attractive to students from community colleges and non-traditional backgrounds who may not otherwise pursue a traditional engineering degree.

To support minority student access and success, the program includes:

- Transfer-friendly pathways with articulation agreements and advising support for students from Maryland's community colleges, many of which serve diverse populations.
- Robust academic advising and mentoring services, with early alerts and intervention systems to support retention and progression.

- Scholarships and financial aid opportunities, including institutional aid and federal programs designed to reduce financial barriers for economically disadvantaged and minority students.
- Project-based, hands-on learning, which research has shown is especially effective in retaining students from diverse backgrounds in STEM majors.
- Inclusive teaching strategies and faculty development, including training in culturally responsive pedagogy and Universal Design for Learning (UDL).

Additionally, Capitol Technology University's institutional diversity initiatives—such as hosting multicultural events, supporting student affinity groups, and embedding equity into strategic planning—create an inclusive learning environment that promotes minority student success.

The Applied Engineering program supports the goals of Maryland's 2022 State Plan, particularly Goal 1 (Student Access) and Goal 2 (Student Success), by providing a relevant, accessible, and supportive academic pathway into high-demand technical careers for minority and underrepresented students.

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

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

The proposed Bachelor of Science in Applied Engineering is not a direct continuation or restructuring of a specific low-productivity program currently identified by the Maryland Higher Education Commission. However, it has been strategically developed in response to internal reviews of program performance and enrollment trends within traditional engineering programs, particularly those that have experienced declining enrollment and graduation rates over recent years.

Capitol Technology University is proactively addressing these challenges by redirecting instructional and administrative resources from underperforming or narrowly specialized engineering programs toward the Applied Engineering program. This includes reallocating existing faculty, classroom space, laboratory infrastructure, and academic support services to better serve a broader, interdisciplinary curriculum that aligns with market demand and student interest.

The new program will:

- Leverage faculty expertise across multiple engineering disciplines who are currently underutilized in low-enrollment programs.
- Utilize shared laboratory and instructional equipment to reduce operational costs while maintaining hands-on learning quality.
- Promote enrollment growth through transfer pathways and workforce alignment, improving overall program productivity and resource utilization.

In this way, while not officially replacing a designated low-productivity program, the BS in Applied Engineering represents an intentional reallocation of academic resources to maximize institutional effectiveness and better meet regional workforce needs.

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 extensive experience delivering online and hybrid instruction across undergraduate and graduate levels in engineering, technology, and business disciplines. Capitol is also a participant in the National Council for State Authorization Reciprocity Agreements (NC-SARA), which allows it to offer distance education to students in other SARA member states.

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 that it complies with the Council of Regional Accrediting Commissions (C-RAC) guidelines for the evaluation of distance education. The university ensures the following:

- Curriculum quality and rigor are consistent across on-campus and distance-delivered formats.
- Regular and substantive faculty-student interaction is maintained through scheduled virtual class sessions, discussion boards, and timely feedback on assignments.
- Verification of student identity is conducted through secure login protocols and assessment systems that protect academic integrity.
- Accessible student services (including advising, tutoring, library access, and career counseling) are provided to all online students, equal to those offered to campus-based students.
- Technology infrastructure and support are in place to ensure reliable access to the learning management system (Canvas), online communication tools, and technical assistance.
- Faculty training in online pedagogy and LMS use is required for instructors delivering online or hybrid courses.

While the BS in Applied Engineering will be delivered primarily in an on-campus format due to its hands-on and lab-intensive nature, select courses—particularly in general education, computing, and technical electives—may be offered through online or hybrid delivery. All such offerings will adhere strictly to institutional and accreditation standards for distance education.