



Cover Sheet for In-State Institutions

New Program or Substantial Modification to Existing Program

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

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

Payment <input checked="" type="radio"/> Yes	Payment <input type="radio"/> R*STARS # 99983	Payment	Date
Submitted: <input type="radio"/> No	Type: <input checked="" type="radio"/> Check # 99983	Amount: 850.00	Submitted: 4/1/2026

Department Proposing Program	Engineering		
Degree Level and Degree Type	Bachelor of Science (B.S.)		
Title of Proposed Program	Bachelor of Science in Mechanical Engineering Technology		
Total Number of Credits	120		
Suggested Codes	HEGIS: 0910.00	CIP: 15.0805	
Program Modality	<input type="radio"/> On-campus <input type="radio"/> Distance Education (fully online) <input checked="" type="radio"/> Both		
Program Resources	<input checked="" type="radio"/> Using Existing Resources <input type="radio"/> Requiring New Resources		
Projected Implementation Date <small>(must be 60 days from proposal submission as per COMAR 13B.02.03.03)</small>	<input checked="" type="radio"/> Fall <input type="radio"/> Spring <input type="radio"/> Summer Year: 2026		
Provide Link to Most Recent Academic Catalog	URL: http://catalog.capttechu.edu		
Preferred Contact for this Proposal	Name: Dr. Mohamed Ghazy		
	Title: Dean of Academics		
	Phone: (340) 965-2473		
	Email: mshehata@capttechu.edu		
President/Chief Executive	Type Name: Dr. Bradford Sims		
	Signature:	Date: 4-1-26	
	Date of Approval/Endorsement by Governing Board: APRIL 1, 2026		

Revised 1/2021



April 1, 2026

Dr. Elena Quiroz-Livanis
Deputy Secretary of Maryland Higher Education
Maryland Higher Education Commission
217 E. Redwood Street, Suite 2100
Baltimore, MD 21202

Dear Dr. Quiroz-Livanis,

Capitol Technology University is requesting approval to offer a Bachelor of Science (B.S.) in Mechanical Engineering Technology. This new degree program will be delivered by experienced faculty and supported by the University's existing instructional and laboratory infrastructure. It is designed to meet the growing workforce demand for professionals with expertise in mechanical systems, manufacturing processes, thermal and fluid systems, materials, and applied mechanical design.

The B.S. in Mechanical Engineering Technology aligns with Capitol Technology University's mission to provide a hands-on, career-focused education in science, technology, engineering, and mathematics. The program prepares students for immediate entry into professional roles in sectors such as manufacturing, mechanical systems design, HVAC systems, energy systems, and industrial operations. Students will gain practical experience through project-based learning, laboratory courses, and a senior design capstone sequence, ensuring readiness to contribute to Maryland's evolving engineering and technology workforce.

Mechanical engineering technology is a foundational and high-demand field that supports a wide range of industries, including manufacturing, energy, infrastructure, and transportation. This program expands access to high-quality STEM education for students throughout the region and is structured to support transfer pathways, workforce development initiatives, and potential accreditation through the ABET Engineering Technology Accreditation Commission (ETAC).

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

Respectfully,

A handwritten signature in blue ink, appearing to read 'BLS', is written over a blue ink stamp that reads 'Bradford L. Sims, PhD'.

Bradford L. Sims, PhD

President



April 1, 2026

Dr. Elena Quiroz-Livanis
Deputy Secretary of Maryland Higher Education
Maryland Higher Education Commission
217 E. Redwood Street, Suite 2100
Baltimore, MD 21202

Dear Dr. Quiroz-Livanis,

This letter is in response to the need for confirmation of the adequacy of the library of Capitol Technology University to support the proposed Bachelor of Science in Mechanical Engineering Technology. As President of the University, I confirm that the library resources, including support staff, are more than adequate to support the B.S. in Mechanical Engineering Technology. 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,

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

Bradford L. Sims, PhD

President

PROPOSAL FOR:

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



Institution Submitting Proposal

Fall 2026

Projected Implementation Date

Bachelor of Science
Award to be Offered

**Bachelor of Science in Mechanical
Engineering Technology**
Title of Proposed Program

0910.00

Suggested HEGIS Code

15.0805

Suggested CIP Code

Engineering
Department of Proposed Program

Dr. Mohamed Ghazy
Name of Department Head

Dr. Mohamed Ghazy
Dean of Academic

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(240) 965-2473
Contact Phone Number

B. Shehata 4-1-26
Signature and Date

President/Chief Executive Approval

APRIL 1, 2026
Date

Date Endorsed/Approved by Governing Board

Bachelor of Science (B.S.)

In

Mechanical Engineering Technology (MET)

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 Mechanical Engineering Technology is a 120-credit undergraduate degree designed to prepare students for professional careers in the application, analysis, and implementation of mechanical systems across a wide range of industries. The program emphasizes principles of mechanical systems, manufacturing processes, thermal and fluid systems, materials, and applied mechanical design to develop graduates capable of supporting modern engineering and industrial operations.

The curriculum emphasizes applied, hands-on learning through courses in statics, dynamics, mechanics of materials, thermodynamics, fluid mechanics, manufacturing processes, computer-aided design (CAD), and mechanical systems design. Students gain experience using industry-standard tools and laboratory equipment to analyze, design, and test mechanical systems and components. The program culminates in a two-semester capstone design sequence, where students work in teams to develop and implement practical mechanical engineering technology solutions under realistic engineering constraints.

In addition to technical coursework, the curriculum includes a strong foundation in mathematics and science (27 credits), general education and ethics (21 credits), and programming and engineering support courses (9 credits) to ensure graduates possess problem-solving ability, communication skills, and professional responsibility. Students also complete technical electives in areas such as manufacturing, HVAC systems, energy systems, and advanced materials to align with individual career interests.

This program aligns 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 B.S. in Mechanical Engineering Technology fulfills this mission by preparing technically skilled, application-oriented, and ethically grounded professionals ready to meet workforce needs in mechanical systems, manufacturing, and applied engineering technology.

The program supports Capitol’s Strategic Vision 2025, particularly through the following goals:

- Delivering STEM-focused, hands-on education aligned with mechanical and manufacturing technologies.
- Supporting applied learning in mechanical systems, thermal sciences, and design.

- Expanding academic offerings in high-demand engineering technology fields.
- Contributing to enrollment growth by attracting both traditional students and transfer students from community colleges and technical programs.

2. Institutional Strategic Goals and Priority Alignment

The proposed Bachelor of Science in Mechanical Engineering Technology directly supports Capitol Technology University's strategic plan for academic expansion, student success, and workforce alignment. The program has been designed to address increasing demand for technologists skilled in mechanical systems, manufacturing, energy systems, and applied engineering, while maximizing the use of existing institutional resources.

The program supports Goal I: Expand Educational Offerings and Increase Program Completion by introducing an applied engineering technology degree focused on mechanical systems and manufacturing. Its hands-on structure and industry relevance appeal to students pursuing careers in manufacturing, mechanical design, HVAC systems, and energy systems. The inclusion of technical electives allows for flexibility and specialization in emerging areas.

It supports Goal II: Increase Enrollment and Institutional Awareness by attracting students interested in a practical and career-oriented engineering technology discipline. The program complements Capitol's existing offerings in engineering and technology and creates pathways for interdisciplinary collaboration and student mobility across programs.

The program aligns with Goal III: Improve Utilization of University Resources through its reliance on existing courses, laboratories, and faculty expertise in mechanical systems, materials, manufacturing, and applied design. Many of the required courses are already offered within current programs, enabling efficient implementation and shared instructional resources.

It also advances Goal IV: Expand Partnerships and Industry Collaboration by supporting engagement with industries in manufacturing, energy, infrastructure, and industrial systems. The applied nature of mechanical engineering technology enables strong alignment with regional workforce needs and supports internships, applied projects, and industry-sponsored initiatives.

Evidence of institutional priority includes:

- a) The program was developed under the direction of the Office of Academic Affairs and the Dean of Engineering as part of a strategic initiative to expand applied engineering technology offerings.
- b) The program concept was reviewed and supported through academic planning discussions and institutional prioritization processes due to its strong workforce relevance and alignment with institutional strengths.
- c) The curriculum leverages existing faculty expertise and laboratory infrastructure in mechanical systems, materials, manufacturing, and design, ensuring efficient and high-quality program delivery.
- d) The program contributes to enrollment growth by attracting students seeking applied, career-focused engineering technology education.
- e) The program supports the university's long-term commitment to delivering practice-oriented, industry-relevant education aligned with regional and national workforce demands.

3. Program Funding and Resource Commitment

The Bachelor of Science in Mechanical Engineering Technology will be funded through a combination of existing institutional resources, tuition revenue, and reallocation of instructional capacity within the School of Engineering.

Because the program builds upon existing courses in mechanical systems, manufacturing, engineering technology, and computer programming, it can be implemented without significant new investment in course development or facilities.

Existing laboratories—including mechanical systems, thermal/fluid systems, manufacturing, and CAD labs—are equipped to support instruction in mechanics, materials, thermodynamics, and design. Additional instructional equipment and software tools will be acquired incrementally as enrollment grows and are included in the university's annual budgeting process.

Instruction will be delivered primarily by existing full-time faculty and qualified adjunct instructors with expertise in mechanical systems, manufacturing, and applied engineering technology. Class sizes and student-to-faculty ratios will remain consistent with other engineering technology programs to ensure effective instruction and mentoring.

The program is expected to be self-sustaining within three years, with tuition revenue supporting instructional costs, laboratory upgrades, and program operations.

The financial plan, reviewed by the Office of Academic Affairs and the Division of Business and Finance, confirms that the program can be delivered efficiently using shared institutional resources while maintaining high academic quality consistent with Capitol's engineering and technology programs.

Additional details regarding financial projections are provided in Section L.

4. Institutional Commitment

Capitol Technology University is fully committed to the success and long-term sustainability of the Bachelor of Science in Mechanical Engineering Technology program.

a) Ongoing administrative, financial, and technical support

The program will be administered within the School of Engineering under the supervision of the Dean of Engineering. Administrative support, scheduling, and financial oversight will be coordinated through the Office of Academic Affairs. Existing laboratory facilities, computing infrastructure, and instructional equipment will continue to be maintained and upgraded to support evolving technologies in mechanical systems, manufacturing, and energy systems.

b) Program continuity for enrolled students

Capitol Technology University guarantees program continuity for all students enrolled in the Mechanical Engineering Technology program. In the event of program modification or discontinuation, the university will implement a formal teach-out plan to ensure that all students can complete their degrees without disruption. The institution's accreditation and commitment to student success ensure stable and continuous program delivery.

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 Mechanical Engineering Technology advances the development of applied engineering knowledge by preparing students to analyze, implement, and support modern mechanical systems used across a wide range of industries. Mechanical engineering technology provides a strong applied foundation in mechanical systems, materials, manufacturing processes, and thermal and fluid systems, which are essential to modern engineering practice and industrial operations.

The program integrates core areas—mechanics, thermodynamics, fluid systems, materials, manufacturing processes, and computer-aided design (CAD)—with modern engineering tools and technologies used in industry. Students are trained to use industry-relevant tools such as CAD and simulation software, testing and measurement systems, and manufacturing technologies, ensuring they graduate with skills aligned with Maryland’s evolving industrial and technological landscape.

By emphasizing hands-on application and practical problem-solving, the program contributes to the State’s capacity to develop a workforce capable of supporting advancements in manufacturing, energy systems, infrastructure, and mechanical system design. Graduates are prepared to contribute to innovation, system efficiency, and operational effectiveness across Maryland’s engineering and industrial sectors.

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 broaden participation in engineering technology and expand access to high-demand STEM careers for students from diverse and educationally disadvantaged backgrounds. Capitol Technology University has a strong record of serving first-generation college students, underrepresented minorities, military veterans, and transfer students from community colleges.

The B.S. in Mechanical Engineering Technology builds on this mission by offering a practical, application-oriented pathway into careers in manufacturing, mechanical systems, HVAC systems, and energy systems. The program’s hands-on learning approach, combined with small class sizes and faculty mentorship, supports student engagement, retention, and academic success.

Flexible scheduling, transfer pathways, and academic support services further enhance accessibility. These elements directly support statewide efforts to increase equity in STEM education and workforce participation, particularly among underserved populations.

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

Although Capitol Technology University is not a Historically Black Institution (HBI), it supports statewide efforts to expand access to high-quality STEM education through collaboration with Maryland’s HBIs. These collaborations may include articulation agreements, joint outreach initiatives, and transfer pathways.

The Mechanical Engineering Technology program complements offerings at HBIs by providing an applied, hands-on curriculum focused on mechanical systems, manufacturing, and energy systems. This

creates opportunities for future partnerships that enhance access and participation of underrepresented populations in engineering technology fields.

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

The Maryland State Plan for Postsecondary Education (2022–2031) identifies three overarching goals—Student Access, Student Success, and Innovation—each supported by specific statewide priorities. The proposed program aligns with these goals and priorities as follows:

Goal 1: Student Access

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

The B.S. in Mechanical Engineering Technology expands access to high-quality, career-oriented engineering technology education by serving a diverse population, including recent high school graduates, community college transfers, working professionals, and military personnel.

Capitol Technology University supports multiple entry pathways through articulation agreements, outreach initiatives, and transfer partnerships. Financial support options—including institutional scholarships, need-based aid, and veterans’ benefits—help reduce barriers to participation.

The program directly aligns with the following State Plan priorities:

- **Priority 1: Affordability** – By leveraging existing courses and resources, the program minimizes cost increases while maintaining quality.
- **Priority 2: Financial Literacy and Student Supports** – Students benefit from advising, financial aid counseling, and structured academic pathways.
- **Priority 4: Access for Underserved Populations** – The program’s applied, hands-on format and transfer-friendly structure expand participation among underrepresented and nontraditional students.

Goal 2: Student Success

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

The program promotes student success through experiential learning, project-based instruction, and a structured progression of courses from foundational knowledge to advanced application.

Students engage in laboratory work, design projects, and applied mechanical system analysis. The capstone sequence requires students to design and implement practical mechanical systems or processes, reinforcing technical, analytical, and communication skills.

The program aligns with the following State Plan priorities:

- **Priority 5: Commitment to High-Quality Education** – The curriculum integrates applied learning, industry-relevant tools, and practical engineering technology content.
- **Priority 6: Timely Degree Completion** – Clear course sequencing, advising, and support services promote on-time graduation.

- **Priority 7: Workforce Preparation and Career Readiness** – Hands-on projects, laboratory work, and industry-aligned coursework prepare graduates for immediate employment.

Goal 3: Innovation

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

The Bachelor of Science in Mechanical Engineering Technology reflects innovation in curriculum design and instructional delivery by emphasizing applied learning, modern manufacturing techniques, and real-world problem-solving.

The program incorporates contemporary topics such as advanced manufacturing, energy systems, and modern design practices. Laboratory-based instruction and project-based learning provide innovative, applied educational experiences.

The program aligns with the following State Plan priorities:

- **Priority 8: Innovative Pedagogy** – Emphasis on hands-on, project-based, and experiential learning.
- **Priority 9: Expansion of Innovative Academic Programs** – Introduction of an applied engineering technology program focused on mechanical systems and manufacturing.
- **Priority 10: Work-Based Learning and Applied Experience** – Integration of internships, laboratory work, and capstone projects tied to real-world applications.

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

1. Potential Industries, Employment Opportunities, and Expected Level of Entry

Graduates of the Bachelor of Science in Mechanical Engineering Technology will be prepared for a wide range of careers in Maryland’s evolving industrial and technology-driven economy, particularly in sectors that rely on mechanical systems, manufacturing processes, and thermal and fluid systems. Mechanical engineering technology supports industries such as advanced manufacturing, aerospace and defense, energy systems, transportation, construction, and infrastructure.

Students completing the program will qualify for positions such as Mechanical Engineering Technologist, Manufacturing Engineer, Mechanical Systems Technician, HVAC Systems Specialist, Quality Assurance Engineer, Process Engineer, Maintenance Engineer, and Field Service Engineer. These roles emphasize the application, operation, testing, and optimization of mechanical systems and processes.

Graduates are expected to enter the workforce in entry-level positions focused on system operation, testing, maintenance, and applied design, with opportunities to advance into supervisory, engineering support, or project management roles with experience. The program’s emphasis on hands-on learning, laboratory experience, and applied mechanical systems ensures that graduates are prepared to contribute immediately to multidisciplinary teams in industrial and engineering environments.

2. Market Demand and Employment Outlook

According to the U.S. Bureau of Labor Statistics (BLS, 2024), employment in fields closely aligned with mechanical engineering technology—such as mechanical engineering technologists, industrial engineering technologists, and industrial machinery mechanics—is projected to grow steadily over the next decade. Occupations related to industrial machinery, manufacturing systems, and maintenance are expected to grow approximately 6–10 percent from 2023 to 2033, with thousands of annual openings driven by both growth and workforce replacement.

The median annual wages for these roles are strong and competitive. For example, mechanical engineering technologists and technicians earn a median annual wage of approximately \$60,000–\$75,000 nationally, while more advanced roles in manufacturing engineering and systems operations can exceed \$85,000 depending on experience and specialization.

In Maryland, demand for professionals with skills in mechanical systems, manufacturing, and energy systems is particularly strong in sectors such as defense, aerospace, advanced manufacturing, and infrastructure development. Major employers include organizations such as NASA Goddard Space Flight Center, Northrop Grumman, Lockheed Martin, BAE Systems, Bechtel, and regional manufacturing and engineering firms.

Data from the Maryland Department of Labor (2024) indicate continued growth in architecture, engineering, and technical occupations, with increasing demand for workers who possess applied mechanical and manufacturing skills. Regional growth areas include:

- Advanced manufacturing and production systems
- Energy systems and HVAC technologies
- Infrastructure and construction engineering support
- Defense and aerospace mechanical systems
- Transportation and logistics systems

These trends demonstrate a strong and sustained need for graduates with applied skills in mechanical engineering technology.

3. Market Surveys and Labor-Force Projections

Multiple labor-market analyses confirm sustained and growing demand for professionals with mechanical and manufacturing-related skills:

- The Maryland Department of Labor’s Occupational Projections (2022–2032) highlight continued growth in engineering technology, industrial maintenance, and manufacturing-related occupations, with consistent annual demand across the state.
- The Georgetown University Center on Education and the Workforce (2023) projects that approximately 69 percent of jobs in Maryland will require postsecondary education or training by 2031, with strong demand in engineering, manufacturing, and technical fields.
- The Maryland Statewide Workforce Development Plan (2024–2028) identifies advanced manufacturing, infrastructure modernization, and energy systems as priority sectors—all of which rely heavily on mechanical systems and engineering technology expertise.

- Real-time labor market data from Lightcast (2024) and LinkedIn Jobs indicate consistent job postings in Maryland for roles such as Mechanical Engineering Technologist, Manufacturing Engineer, HVAC Specialist, and Mechanical Systems Technician, particularly in the Baltimore–Washington corridor.

These data confirm the growing importance of application-oriented engineering technology programs that prepare graduates to support modern industrial systems and infrastructure.

4. Current and Projected Supply of Graduates

The supply of graduates specifically trained in mechanical engineering technology remains limited relative to employer demand. While Maryland institutions produce graduates in mechanical engineering and related disciplines, fewer programs focus specifically on applied mechanical engineering technology with a strong hands-on orientation.

According to the U.S. Department of Education’s Integrated Postsecondary Education Data System (IPEDS, 2022), Maryland institutions awarded a limited number of degrees in engineering technology fields aligned with mechanical systems and manufacturing, indicating a gap in programs focused on applied mechanical implementation and industrial applications.

At the same time, statewide employment data show thousands of positions requiring skills in mechanical systems, manufacturing processes, maintenance, and energy systems, suggesting a persistent workforce gap between supply and demand.

The proposed program at Capitol Technology University addresses this gap by providing a hands-on, application-oriented curriculum focused on mechanical systems, manufacturing, and applied engineering practice.

Enrollment projections for the Mechanical Engineering Technology program are as follows:

- Year 1: 15–20 students
- Year 3: 40–50 students
- Year 5: 60–75 students
- Graduates by Year 5: 10–15 annually

Graduates of the program will directly contribute to Maryland’s workforce needs in manufacturing, energy, infrastructure, and mechanical systems—sectors that continue to report difficulty in recruiting professionals with applied technical skills.

D. Reasonableness of Program Duplication

1. Identification of Similar Programs in the State and/or Same Geographical Area and Discussion of Similarities and Differences Between the Proposed Program and Others in the Same Degree to be Awarded

Several institutions in Maryland offer programs related to mechanical engineering, mechanical engineering technology, and general engineering technology. These programs share certain foundational elements with the proposed Bachelor of Science in Mechanical Engineering Technology at Capitol

Technology University; however, they differ significantly in academic level, instructional approach, and intended career outcomes.

a) Mechanical Engineering Programs (CIP 14.1901 – Engineering)

Maryland institutions offering Bachelor of Science degrees in Mechanical Engineering or closely related disciplines include:

- University of Maryland, College Park
- University of Maryland, Baltimore County
- University of Maryland Eastern Shore
- Johns Hopkins University
- Morgan State University
- United States Naval Academy
- Loyola University Maryland
- Frostburg State University

Similarities

- All programs provide instruction in core engineering areas such as mechanics, thermodynamics, and materials.
- All include design experiences and capstone projects.
- All prepare students for careers in engineering and related technical fields.

Differences

- Mechanical Engineering programs emphasize theoretical analysis, mathematical modeling, and research-oriented design.
- The proposed Mechanical Engineering Technology program emphasizes **application, implementation, testing, and operation of mechanical systems**.
- Mechanical Engineering programs are classified under **CIP 14.xxxx (Engineering)**, while the proposed program is classified under **CIP 15.0805 (Engineering Technology)**.
- Graduates of Mechanical Engineering programs typically pursue design and analysis roles, while graduates of the proposed program are prepared for **engineering technologist roles in manufacturing, mechanical systems, HVAC, and industrial operations**.

b) Mechanical Engineering Technology Programs (CIP 15.0805 – Engineering Technology)

Mechanical Engineering Technology (MET) programs represent the closest comparison in terms of degree type and applied orientation.

Similar Programs Identified

- Hagerstown Community College – Mechanical Engineering Technology (Associate Degree)

Similarities

- Emphasis on applied engineering principles and hands-on, laboratory-based learning.
- Preparation for industry-oriented roles in mechanical and manufacturing environments.
- Coursework in mechanical systems, manufacturing processes, and applied design.

Differences

- Existing programs in Maryland are primarily offered at the **associate degree level**, while the proposed program is a **bachelor's degree**.
- Associate-level programs focus on technician-level skills such as equipment operation and maintenance.
- The proposed program provides:
 - Advanced applied analysis and system-level understanding
 - Broader foundation in thermodynamics, fluid mechanics, and materials
 - Preparation for higher-level technical, supervisory, and engineering technology roles
- The proposed program includes a **two-semester capstone design sequence**, expanded laboratory experience, and advanced coursework not typically found in associate-level programs.

c) Related Engineering Technology and Applied Technology Programs

Maryland institutions offering related technology programs include:

- University of Maryland Eastern Shore – Engineering Technology (Bachelor's Degree)
- University of Maryland Global Campus – Applied Technology (Bachelor's Degree)
- Capitol Technology University – Engineering Technology (Bachelor's Degree)
- Bowie State University – Technology (Bachelor's Degree)
- Capitol Technology University – Applied Technology (Bachelor's Degree)

Similarities

- All programs emphasize applied learning and technical skill development.
- All prepare students for careers in engineering-related or technical fields.

Differences

- These programs are **broad and multidisciplinary**, rather than focused specifically on mechanical engineering technology.
- The proposed program provides **discipline-specific depth** in:
 - Mechanics (statics and dynamics)
 - Thermodynamics and fluid systems

- Materials and manufacturing
- Mechanical systems design
- The proposed program includes structured laboratory and design experiences specifically aligned with mechanical engineering technology applications.

2. Justification for the Proposed Program

The Bachelor of Science in Mechanical Engineering Technology at Capitol Technology University fills a distinct and necessary niche in Maryland's higher education landscape. The program complements existing offerings rather than duplicating them by addressing a clear gap between technician-level training and traditional engineering education.

a) Workforce Demand

Maryland's economy is driven by industries that rely on mechanical systems, manufacturing, and energy systems, including advanced manufacturing, aerospace and defense, infrastructure, and industrial operations. Employers in these sectors require professionals who can implement, operate, troubleshoot, and optimize mechanical systems and processes.

While existing programs prepare either technicians (associate level) or design engineers (engineering programs), there is a growing need for graduates with applied, hands-on skills in mechanical engineering technology. The proposed program directly addresses this demand by preparing students for roles in manufacturing, mechanical systems, and applied engineering environments.

b) Academic Need

The proposed program complements existing programs by offering a curriculum focused on mechanical systems, manufacturing, and applied engineering practice. Traditional engineering programs emphasize theory and analysis, while community college programs focus on technical skills.

The proposed program bridges these domains by emphasizing:

- Applied design
- System implementation
- Mechanical analysis in real-world environments

The inclusion of coursework in thermodynamics, fluid mechanics, materials, manufacturing processes, and mechanical systems design distinguishes the program from existing offerings and aligns it with industry needs.

c) Accessibility and Transfer Pathways

Capitol Technology University serves a diverse population that includes transfer students, working professionals, and nontraditional learners. The proposed program provides a natural pathway for students completing associate degrees in mechanical engineering technology or related fields to continue their education at the bachelor's level.

This pathway supports upward mobility, enabling students to transition from technician roles to engineering technology and supervisory positions. The program's structure and use of existing institutional resources enhance accessibility and affordability.

d) Institutional Alignment

The program is fully aligned with Capitol Technology University's mission to provide career-focused, hands-on STEM education. It builds upon existing strengths in engineering and technology and leverages established faculty expertise and laboratory infrastructure.

The program also supports Maryland's strategic priorities by:

- Expanding access to applied STEM education
- Promoting workforce readiness
- Strengthening partnerships with industries such as manufacturing, energy, and infrastructure

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

1. Impact on the Implementation or Maintenance of High-Demand Programs at HBIs

The proposed Bachelor of Science in Mechanical Engineering Technology at Capitol Technology University is designed to complement, rather than compete with, existing high-demand engineering programs offered at Maryland's Historically Black Institutions (HBIs). Institutions such as Morgan State University and the University of Maryland Eastern Shore offer well-established engineering programs, including mechanical, electrical, and civil engineering, which serve as critical pathways for underrepresented students pursuing STEM education and careers.

These HBI programs play a vital role in advancing Maryland's goals of increasing diversity in engineering, strengthening workforce development, and expanding access to high-quality STEM education. The proposed program differs in both academic focus and instructional approach. While HBI engineering programs emphasize theoretical foundations, analytical modeling, and traditional engineering design, the Mechanical Engineering Technology program emphasizes applied learning, hands-on laboratory experience, and the implementation and operation of mechanical systems.

The program is structured to serve a complementary student population, including community college transfer students, working professionals, and adult learners who seek a practice-oriented, application-driven educational experience. Its focus on mechanical systems, manufacturing processes, thermal and fluid systems, and applied design aligns with workforce needs while offering an alternative pathway within the broader engineering education ecosystem.

The proposed program is not expected to negatively impact enrollment at HBIs. Instead, it enhances the overall capacity of the state to produce graduates with diverse skill sets across the engineering and engineering technology spectrum.

2. Opportunities for Collaboration and Mutual Benefit

The Bachelor of Science in Mechanical Engineering Technology provides several opportunities for collaboration with HBIs and supports the continued strength of their high-demand programs:

- **Transfer and Articulation Pathways:**
The program can serve as a transfer destination for students completing pre-engineering or associate-level coursework at HBIs who wish to pursue a more applied, hands-on engineering technology degree focused on mechanical systems and manufacturing.

- **Collaborative Projects and Capstone Experiences:**

Opportunities may be developed for joint capstone projects or applied research initiatives in areas such as manufacturing systems, energy systems, HVAC technologies, and infrastructure applications. These collaborations would allow students from multiple institutions to work together on real-world engineering challenges.

- **Workforce Development Initiatives:**

The program supports statewide efforts to increase the number of graduates with skills in mechanical systems, manufacturing, and energy systems. By complementing traditional engineering programs at HBIs, the proposed program helps broaden the talent pipeline while maintaining strong participation of underrepresented groups in STEM fields.

- **Industry and Partnership Engagement:**

Collaborative engagement with industry partners may include internships, joint training initiatives, and workforce development programs that benefit students across institutions, including HBIs.

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

1. Impact on the Uniqueness, Institutional Identity, and Mission of HBIs

The proposed Bachelor of Science in Mechanical Engineering Technology is not expected to negatively impact the uniqueness, institutional identity, or mission of Maryland's Historically Black Institutions (HBIs). Rather, it complements the state's collective efforts to expand access to high-quality, workforce-aligned STEM education and to increase participation of underrepresented populations in engineering and technology fields.

Maryland's HBIs, including Morgan State University, Bowie State University, Coppin State University, and the University of Maryland Eastern Shore, maintain longstanding missions centered on educational equity, leadership development, and community advancement. These institutions play a critical role in preparing students—particularly African American students—for professional success in engineering, science, and technology disciplines through strong, theory-based academic programs and research opportunities.

The proposed Mechanical Engineering Technology program differs from HBI offerings in both focus and instructional approach. While HBI engineering programs emphasize theoretical foundations, analytical modeling, and traditional engineering design, the proposed program emphasizes applied, hands-on learning and the implementation of mechanical systems. The curriculum is designed to prepare graduates for roles in manufacturing, mechanical systems, HVAC, energy systems, and industrial operations, with a strong emphasis on system operation, testing, and optimization.

The program is also structured to serve a complementary student population, including community college transfer students, working professionals, and adult learners who seek a more practice-oriented and flexible educational pathway. Its smaller class sizes, laboratory-intensive instruction, and industry-aligned curriculum provide an alternative learning environment that does not replicate the mission or structure of HBI programs.

The proposed program does not duplicate the academic strengths of HBIs but instead fills a complementary role within Maryland's higher education ecosystem. It expands the range of educational pathways available to students while preserving the distinct identities and missions of HBI institutions.

Opportunities for Collaboration

- **Articulation and Transfer Agreements:**
Creating pathways for students from HBIs who wish to pursue an applied engineering technology degree with a focus on mechanical systems, manufacturing, and energy systems.
- **Joint Capstone and Applied Projects:**
Collaborating on multidisciplinary projects in areas such as manufacturing systems, energy systems, HVAC technologies, and infrastructure-related applications.
- **Workforce Development Partnerships:**
Supporting statewide initiatives that increase the number of graduates prepared for careers in manufacturing, energy, and infrastructure sectors while maintaining strong representation of underrepresented populations.
- **Industry Engagement:**
Partnering with employers to provide internships, cooperative education experiences, and applied training opportunities that benefit students across institutions.

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

1. Program Development and Faculty Oversight

The Bachelor of Science in Mechanical Engineering Technology was developed through collaboration among faculty within Capitol Technology University's School of Engineering, the Office of Academic Affairs, and members of the university's Industry Advisory Board. The program was established in response to increasing workforce demand for graduates with applied skills in mechanical systems, manufacturing processes, thermal and fluid systems, and engineering technology applications.

The curriculum builds upon the university's existing strengths in mechanical systems, manufacturing, energy systems, and applied design. It integrates courses across mechanical engineering technology, electrical engineering technology, and computer science to provide a comprehensive, application-oriented education aligned with industry needs.

Core knowledge areas include statics, dynamics, mechanics of materials, thermodynamics, fluid mechanics, manufacturing processes, computer-aided design (CAD), CNC machining, HVAC systems, and mechanical systems design. Supporting topics include electrical circuits, electronics, and programmable logic controllers (PLCs) to ensure that graduates can work effectively in modern industrial and manufacturing environments.

The curriculum emphasizes hands-on learning, laboratory experimentation, and applied problem-solving using modern engineering tools and technologies. Students gain practical experience through laboratory exercises, design projects, and real-world applications that reflect current industry practices.

The program will be overseen by full-time faculty within the School of Engineering who hold advanced degrees in engineering and engineering technology disciplines. Faculty bring a combination of academic expertise and industry experience in areas such as manufacturing, mechanical systems, energy systems, and applied engineering practice. Adjunct faculty with specialized expertise in HVAC systems, advanced manufacturing, and industrial systems will support program delivery as needed.

2. Educational Objectives and Learning Outcomes

The program will be delivered primarily in a face-to-face format, with selected courses offered in hybrid or online modalities to support transfer students, working professionals, and nontraditional learners. Laboratory and project-based components are integral to the curriculum and reinforce applied learning and practical system implementation.

Educational Objectives

Graduates of the Mechanical Engineering Technology program will:

1. Be prepared for entry-level positions in manufacturing, mechanical systems, HVAC systems, energy systems, and industrial operations.
2. Apply principles of mechanical systems, materials, thermodynamics, and manufacturing processes to the implementation, operation, and improvement of engineering systems.
3. Demonstrate professional ethics, teamwork, and effective communication in engineering technology practice.
4. Engage in lifelong learning, professional development, and continuous skill enhancement in response to evolving industry needs.

Student Learning Outcomes

Upon graduation, students will be able to:

1. Apply knowledge, techniques, skills, and modern tools of engineering technology to solve broadly-defined engineering problems.
2. Design systems, components, or processes to meet desired needs within realistic constraints, with emphasis on functionality and implementation.
3. Conduct standard tests, measurements, and experiments; analyze and interpret data; and apply results to improve systems and processes.
4. Communicate effectively in written, oral, and graphical forms within technical and professional contexts.
5. Function effectively as a member or leader on technical teams.
6. Identify, analyze, and solve applied engineering problems involving mechanical systems, manufacturing processes, and thermal/fluid systems.
7. Recognize professional, ethical, and societal responsibilities and apply them in engineering technology practice.

These outcomes are aligned with **ABET Engineering Technology Accreditation Commission (ETAC)** student outcomes and reflect the applied, practice-oriented nature of the program.

3. Assessment and Documentation of Student Learning Outcomes

a) Assessment of Student Achievement

Student learning outcomes will be assessed using a combination of direct and indirect measures, including examinations, laboratory assignments, design projects, technical reports, and oral presentations. Each course includes clearly defined learning outcomes mapped to program-level outcomes, ensuring systematic evaluation of student achievement.

The two-semester senior design sequence (SDE 457 and SDE 458) serves as a comprehensive assessment of student performance. In this sequence, students work in teams to design, develop, and implement a mechanical system or engineering solution that integrates knowledge from across the curriculum. Projects require application of engineering principles, project management, teamwork, and communication skills.

Faculty will collect and analyze assessment data each semester. Results will be reviewed during scheduled program assessment meetings to identify trends, evaluate student performance, and implement continuous improvements. Feedback from the Industry Advisory Board will also be incorporated to ensure alignment with current workforce expectations.

b) Documentation of Student Achievement

Capitol Technology University maintains a centralized system for documenting assessment data. Course portfolios include representative samples of student work, grading rubrics, and assessment results mapped to program outcomes.

Annual program assessment reports are generated to track student performance, evaluate outcome achievement, and document continuous improvement efforts. These reports support institutional review processes and future accreditation under ABET ETAC standards.

4. Curriculum and Program Requirements

The Bachelor of Science in Mechanical Engineering Technology is a 120-credit undergraduate program designed to prepare students for careers in mechanical systems, manufacturing, and applied engineering technology. The curriculum emphasizes practical application, laboratory experience, and system-level understanding.

Students gain comprehensive experience through coursework in mechanics, thermodynamics, fluid systems, materials, manufacturing processes, programming, and engineering economics. The program culminates in a two-semester senior design project in which students develop and implement practical engineering solutions.

Program requirements are distributed as follows:

Category	Description	Credits
General Education	Courses in communication, humanities, ethics, and business to develop professional, ethical, and societal competencies	21

Mathematics and Science	Foundational courses in mathematics, physics, and chemistry supporting applied engineering technology analysis and problem-solving	27
Mechanical Engineering Technology Core	Applied mechanical systems including statics, dynamics, thermodynamics, fluids, manufacturing, HVAC, CNC, and mechanical design	33
Electrical, Automation, and Robotics Core	Courses in circuits, electronics, PLCs, robotics, and industrial automation systems	15
Computer Science and Engineering Support	Programming and engineering economics supporting computational and decision-making skills	9
Capstone Design	Two-course senior design sequence focused on integrated engineering technology systems and applied project development	6
Technical Electives	Upper-level specialized courses in areas such as manufacturing, automation, robotics, HVAC, or energy systems	9

Bachelor of Science (B.S.) in Mechanical Engineering Technology (MET)

Total Credits: 120

I. General Education (21 Credits)

Course Number	Course Title	Credits	Prerequisites
EN 101	English Communications I	3	Placement or EN 099
EN 102	English Communications II	3	EN 101
HU 331	Arts and Ideas	3	EN 102
SS 351	Ethics	3	EN 102
BUS 174	Introduction to Business and Management	3	None
BUS 301	Project Management	3	EN 101, BUS 174
HU/SS XXX	Humanities/Social Science Elective	3	—

II. Mathematics and Science (27 Credits)

Course Number	Course Title	Credits	Prerequisites
MA 114	Algebra and Trigonometry	4	MA 112 or placement

MA 128	Introduction to Statistics	3	MA 110, MA 111, or MA 112
MA 261	Calculus I	4	MA 114
MA 262	Calculus II	4	MA 261
PH 201	General Physics I	3	MA 114
PH 202	General Physics II	3	PH 201
CH 120	Chemistry	3	None

III. Mechanical Engineering Technology Core (33 Credits)

Course Number	Course Title	Credits	Prerequisites
MEC 210	Engineering Mechanics – Statics	3	MA 261; Coreq: PH 201
MEC 255	Mechanics of Materials	3	MEC 210
MEC 310	Engineering Mechanics – Dynamics	3	MEC 210, MA 262
MEC 330	Fluid Mechanics	3	PH 202, MA 262
MEC 320	Applied Thermodynamics	3	PH 201
MEC 215	Introduction to Engineering Design (CAD)	3	None
MEC 350	Manufacturing Processes	3	MEC 320
MEC 360	Mechanical Systems Design	3	MEC 255, MEC 215
MEC 342	Applied HVAC Systems	3	MEC 320, MEC 330
MEC 375	Engineering Safety	3	None
MEC 230	CNC Programming and Operation	3	MEC 215

IV. Electrical, Automation, and Robotics Core (15 Credits)

Course Number	Course Title	Credits	Prerequisites
EL 100	Introduction to DC/AC Circuits	3	MA 112
EL 200	Electronic Devices & Circuits	3	EL 150
EE 285	Programming Logic Controllers and Networks	3	EL 200
ROB 100	Introduction to Robotics	3	None
MET 340	Automation & Robotics in Manufacturing	3	EL 204, MEC 210

V. Computer Science and Engineering Support (9 Credits)

Course Number	Course Title	Credits	Prerequisites
CS 120	Introduction to Programming Using Python	3	None
CS 150	Programming in C	3	CS 120
IET 220	Engineering Economics & Cost Analysis	3	MA 128

VI. Capstone Design (6 Credits)

Course Number	Course Title	Credits	Prerequisites
SDE 457	Senior Design I	3	Senior Standing
SDE 458	Senior Design II	3	SDE 457

VII. Technical Electives (9 Credits)

Course Number	Course Title	Credits	Prerequisites
ELEC 1	Technical Elective 1	3	Varies
ELEC 2	Technical Elective 2	3	Varies
ELEC 3	Technical Elective 3	3	Varies

Course Descriptions

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 101.

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

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 introduces the principles and practices of project management, including project planning, scheduling, budgeting, and control. Topics include the origins and philosophy of project management, the use of tools such as Microsoft Project, and the application of the System Development Cycle to various project types. Emphasis is placed on project leadership, team building, and the management of resources and risks through illustrative case studies and practical exercises. Prerequisite(s): EN 101 and BUS 174.

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.

II. Mathematics and Science (27 Credits)

MA 114 – Algebra and Trigonometry (4 credits): Designed for students needing mathematical preparation for Calculus I. Topics include basic operations on real and complex numbers, fractions, exponents, and radicals; determinants; and solutions of linear, fractional, quadratic, and system equations. Trigonometry topics include definitions and identities, angular measurement, solving triangles, vectors, graphs, and logarithmic functions. Prerequisite(s): MA 112 or placement test score.

MA 128 – Introduction to Statistics (3 credits): This course introduces students to fundamental concepts of statistics with practical applications. Topics include descriptive statistics, probability distributions, sampling methods, statistical inference, confidence intervals, hypothesis testing, correlation, and linear regression. Emphasis is placed on interpreting data, understanding variability, and applying statistical reasoning in real-world contexts. 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

PH 201 – General Physics I (3 credits): This non-calculus-based physics course is designed for students in engineering technology programs. It focuses on mechanics, including units and conversion factors, vector diagrams, translational and rotational equilibrium, friction, uniformly accelerated motion, projectile

motion, Newton's laws, work, energy and power, kinetic and potential energy, conservation of energy, and impulse and momentum. The course also introduces heat and thermodynamics, covering temperature scales, thermal properties of matter, heat and temperature change, phase change, and modes of heat transfer with practical applications. Prerequisite(s): MA 114.

PH 202 – General Physics II (3 credits): This non-calculus-based physics course is designed for students in engineering technology programs and serves as a continuation of PH 201. Topics include wave motion, sound, and light, with emphasis on reflection, refraction, dispersion, lenses, mirrors, and the Doppler Effect. The course also covers electricity and magnetism, including static electricity, electric and magnetic fields, electric potential, capacitance, electromagnetic induction, and alternating current behavior. Prerequisite(s): PH 201.

CH 120 – Chemistry (3 credits): Introduces fundamental concepts of chemistry including the metric system, significant figures, and stoichiometry. Covers atomic structure, periodic relationships, and electron configurations; chemical bonding and electronegativity; gases, oxidation-reduction reactions, solutions, acids and bases, states of matter, thermodynamics, and chemical kinetics and equilibrium. Prerequisite(s): MA 112 or MA 114.

III. Mechanical Engineering Technology Core (33 Credits)

MEC 210 – Engineering Mechanics – Statics (3 credits): Introduces static equilibrium principles and their applications in engineering systems. Topics include force and moment analysis, centers of gravity, centroids, and moments of inertia. Uses engineering software tools for modeling and visualization. Prerequisite(s): MA 261. Corequisite(s): PH 201.

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

MEC 310 – Engineering Mechanics – Dynamics (3 credits): Covers motion of particles and rigid bodies, Newton's laws, work-energy and impulse-momentum methods, and vibrations. Applies dynamic analysis to aerospace and mechanical systems using engineering modeling tools.

MEC 330 – Fluid Mechanics (3 credits): Continuum, velocity field, fluid statics, manometers, basic conservation laws for systems and control volumes, dimensional analysis. Euler and Bernoulli equations, viscous flows, boundary layers, flow in channels and around submerged bodies, one-dimensional gas dynamics, turbomachinery. Applications in hydraulic, pneumatic, and fluidics discussed. **Prerequisite(s):** MEC 310, MA 262.

MEC 320 – Applied Thermodynamics (3 credits): This course introduces students to the principles and applications of thermodynamics as used in engineering systems. Topics include properties of pure

substances, work and heat transfer, and the First and Second Laws of Thermodynamics. Students perform energy analysis of closed and open systems, evaluate entropy and efficiency, and study major thermodynamic cycles such as Otto, Diesel, Brayton, Rankine, and vapor-compression. Applications include engines, compressors, turbines, and heat exchangers, with emphasis on real-world energy conversion systems. **Prerequisite(s):** PH 201.

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

MEC 350 – Manufacturing Processes (3 credits):

This course introduces the fundamental concepts, processes, and systems used in modern manufacturing. Topics include material properties and selection, casting, forming, machining, welding, and additive manufacturing. Students learn how design decisions influence manufacturability, cost, and product performance. Computer-aided manufacturing (CAM), process automation, and quality control methods are discussed, emphasizing design-for-manufacturability principles applied to real engineering components. **Prerequisite(s):** MEC 255.

MEC 360 – Machine Design (3 credits):

This course introduces the fundamentals of mechanical component and system design. Topics include stress and deflection analysis, fatigue, failure theories, and the selection of materials for mechanical applications. Students apply design methodologies to shafts, gears, bearings, fasteners, and power transmission elements. Emphasis is placed on safety factors, manufacturability, and economic considerations in the design process. Computer-aided design tools are utilized to model and analyze components as part of integrated mechanical systems. **Prerequisite(s):** MEC 255 and MEC 215.

MEC 342 – Applied HVAC Systems (3 credits): This course introduces the principles and applications of heating, ventilation, and air conditioning (HVAC) systems with emphasis on the practical design, selection, and operation of building environmental control systems. Topics include psychrometrics, heating and cooling load estimation, air distribution systems, refrigeration cycles, and energy efficiency considerations. Students learn to apply industry-standard methods and tools to analyze residential and commercial HVAC systems, perform equipment sizing, and develop basic duct layouts. The course emphasizes hands-on, application-oriented learning through design projects and case studies aligned with current industry practices. **Prerequisite(s):** MEC 320, MEC 330.

MEC 375 – Engineering Safety (3 credits): This course examines the principles and practices of safety and health management in engineering environments, including manufacturing, construction, and utility industries. Topics include applicable laws, codes, regulations, and standards, as well as product liability and risk assessment. Students explore organizational approaches to safety management, accident investigation, safety education, and enforcement procedures to ensure compliance and promote a culture of safety in engineering operations. **Prerequisite(s):** None.

MEC 230 – CNC Programming and Operation (3 Credits): This course introduces the principles and applications of computer numerical control (CNC) machining used in modern manufacturing systems. Topics include CNC machine structure, coordinate systems, tool selection, tool offsets, G-code and M-code programming, machining operations, and part setup. Students learn to develop CNC programs for milling and turning operations and to interpret engineering drawings for manufacturing. Laboratory exercises provide hands-on experience with CNC programming, simulation, and machine operation. Emphasis is placed on safety, accuracy, and efficient production methods. **Prerequisite(s):** MEC 215

IV. Electrical, Automation, and Robotics Core (15 Credits)

EL 100 – Introduction to DC/AC Circuits (3 credits): Basic electrical concepts and laboratory techniques. Current, voltage, resistance and power. Ohm’s law, series and parallel resistive circuits. Kirchhoff’s voltage and current laws. Loading effects on meters and supplies. Capacitors and Inductors. Charging and discharging. RC and RL time constants. Introduction to AC. Sinusoidal waveforms, phasors and use of the J operator. Reactance and admittance. Average values and RMS. Laboratory emphasis is on the proper use of standard meters, testing equipment and circuit breadboarding. MATLAB Part I: Introduction to MATLAB, variables, MATLAB functions, data types, writing a MATLAB program, using basic plotting functions. Corequisite(s): MA 112.

EL-200 – Electronic Devices/Circuits (3 credits): Principles and characteristics of semiconductor devices. Devices covered include diodes, Zener diodes, bipolar junction transistors, field-effect transistors, and operational amplifiers. Includes bias networks, operating points, maximum output and optimum bias, and DC and AC load lines. Input and output impedances, and voltage and current gains for each amplifier configuration. Prerequisite(s): EL 100.

EE 285 - Programming Logic Controllers and Networks (3 credits): This course introduces the principles of programmable logic controllers (PLCs) and their applications in industrial automation and robotics. Students will learn to design, program, and implement PLC systems to control a variety of processes, integrating sensors, actuators, and networked devices. Topics include ladder logic programming, advanced PLC functions, and industrial communication protocols such as Modbus, Profinet, and Ethernet/IP. The course emphasizes the integration of PLCs with Human-Machine Interfaces (HMI) and Supervisory Control and Data Acquisition (SCADA) systems for monitoring and control. Students will explore emerging trends such as IoT integration, Industry 4.0, and cybersecurity in industrial networks. Through hands-on labs, students will gain practical experience in programming PLCs, interfacing with sensors and actuators, and troubleshooting control systems for applications in robotics, manufacturing, and smart systems. **Prerequisite(s):** EL 200

ROB 100 – Introduction to Robotics (3 credits): This course introduces students to the fundamental concepts of robotics, including robot components, basic motion principles, and introductory programming. Students will explore the applications of robotics in various industries while developing hands-on skills through building and programming simple robots. The course emphasizes practical problem-solving, teamwork, and creativity, laying the foundation for advanced robotics courses.

MET 340 – Automation & Robotics in Manufacturing (3 credits): This course introduces the principles and applications of automation and robotics in modern manufacturing environments. Topics include industrial robots, robotic manipulators, sensors and actuators, automated production systems, and basic robot programming. Emphasis is placed on the integration of robotics with manufacturing processes, safety considerations, and the role of automation in improving efficiency, quality, and flexibility in manufacturing systems. **Prerequisites:** EL 204 and MEC 210.

V. Computer Science and Engineering Support (9 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.

IET 220 – Engineering Economics & Cost Analysis (3 credits): This course introduces economic principles and cost analysis techniques used in engineering and industrial decision-making. Topics include cost estimation, time value of money, cash flow analysis, present and annual worth methods, rate of return, break-even analysis, and economic evaluation of alternatives. **Prerequisite(s):** MA 128

VI. Capstone Design (6 Credits)

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

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

VII. Technical Electives (9 Credits)

Course Description: Technical electives provide students with the opportunity to pursue specialized topics in mechanical engineering technology aligned with their career interests and industry needs. Students select upper-level courses that build upon the core curriculum and emphasize applied knowledge in areas such as manufacturing, energy systems, HVAC, materials, or advanced mechanical design. These courses reinforce hands-on skills, system integration, and practical problem-solving, preparing students for diverse roles in modern engineering technology environments.

5. General Education Requirements

The Bachelor of Science in Mechanical Engineering Technology satisfies the general education requirements established by the Maryland Higher Education Commission (MHEC) under COMAR 13B.02.03. The general education component is intentionally integrated into the curriculum to ensure that graduates develop strong communication skills, ethical reasoning, critical thinking, and an understanding of the broader societal context in which engineering technology is practiced.

Courses in written and oral communication (EN 101 and EN 102) provide students with the ability to effectively convey technical information through reports, presentations, and professional correspondence. Humanities and social science courses, including Arts and Ideas (HU 331) and Ethics (SS 351), support the development of ethical decision-making, cultural awareness, and an understanding of the societal impact of engineering solutions.

Business and management coursework, including Introduction to Business and Management (BUS 174) and Project Management (BUS 301), further enhances students' ability to function effectively in organizational settings, manage projects, and understand economic and operational considerations within engineering environments.

The integration of general education throughout the program ensures that graduates are not only technically competent but also well-prepared to engage in professional practice, communicate effectively, and contribute responsibly to society.

6. Specialized Accreditation and Certification Requirements

The proposed Bachelor of Science in Mechanical Engineering Technology is designed to meet the criteria for accreditation by the **Accreditation Board for Engineering and Technology (ABET), Engineering Technology Accreditation Commission (ETAC)**.

The curriculum has been developed in alignment with ETAC standards, which emphasize the application of mathematics, science, and engineering technology principles to solve broadly defined engineering problems. The program incorporates significant laboratory and hands-on learning experiences, ensuring that students develop the practical skills required in engineering technology roles.

The program structure includes:

- A strong foundation in mathematics and science (27 credits), appropriate for engineering technology programs
- Core coursework in mechanical systems, thermodynamics, fluid mechanics, materials, and manufacturing processes
- Integration of modern engineering tools, including CAD, CNC systems, and measurement and testing equipment
- Laboratory-intensive instruction that reinforces theoretical concepts through experimentation and application
- A two-semester capstone design sequence that demonstrates student competency in system design, implementation, and evaluation

The program will initiate the process for ABET ETAC accreditation following the graduation of the first cohort, in accordance with ABET eligibility requirements. Continuous assessment and improvement processes are embedded within the program to ensure long-term compliance with accreditation standards.

7. Contractual Agreements

The proposed program does not rely on or include any contractual agreements with external institutions or organizations for the delivery of instruction or student services. All courses, laboratories, and academic support services will be provided directly by Capitol Technology University.

The University maintains full responsibility for curriculum design, instructional delivery, faculty oversight, and assessment of student learning outcomes. Existing institutional infrastructure, including laboratories, classrooms, and support services, is sufficient to support the program without the need for external instructional partnerships.

8. Student Information and Support

Capitol Technology University provides a comprehensive set of student support services designed to promote academic success, retention, and career readiness. Students enrolled in the Mechanical Engineering Technology program will have access to these services throughout their academic experience.

Each student is assigned a faculty advisor who provides guidance on course selection, academic progression, and career planning. Advisors work closely with students to ensure timely degree completion and to address any academic challenges.

Additional academic support services include tutoring, supplemental instruction, and access to faculty office hours. The Puente Library provides research assistance, technical resources, and access to digital databases relevant to mechanical engineering technology.

Career services support students through resume development, interview preparation, internship placement, and job search assistance. The University maintains relationships with industry partners, providing students with opportunities for internships and experiential learning aligned with their field of study.

The University also utilizes early alert systems and academic monitoring tools to identify students who may require additional support, enabling timely intervention and improved retention outcomes.

9. Advertising, Recruitment, and Admissions

All advertising, recruitment, and admissions materials related to the Mechanical Engineering Technology program will be accurate, transparent, and aligned with institutional policies and MHEC requirements. Program materials will clearly describe curriculum structure, learning outcomes, career pathways, and accreditation status.

Recruitment efforts will target a diverse population of students, including recent high school graduates, community college transfer students, military personnel, and working professionals. Outreach initiatives include partnerships with community colleges, participation in STEM events, and engagement with industry and workforce development organizations.

Admissions requirements will be consistent with institutional standards and appropriate for a technical undergraduate program. The University will ensure that prospective students are adequately prepared for the program through clear communication of prerequisite knowledge and academic expectations.

All program materials will be reviewed regularly by Academic Affairs to ensure accuracy, consistency, and alignment with program objectives and accreditation standards.

H. Adequacy of Articulation

1. Articulation with Partner Institutions

The Bachelor of Science in Mechanical Engineering Technology at Capitol Technology University is designed to support transfer and articulation with regional and statewide institutions, particularly community colleges offering programs in mechanical engineering technology, manufacturing, industrial technology, and related technical fields. The curriculum is structured to facilitate the transfer of lower-division credits and provide a clear and efficient pathway to degree completion.

Capitol Technology University maintains articulation agreements with institutions such as Cecil College, Howard Community College, Anne Arundel Community College, and Montgomery College. Additional partnerships include institutions outside Maryland, such as the Community College of Rhode Island (CCRI) and Columbia Southern University. These agreements support transfer pathways for students completing associate degrees or certificates in areas such as mechanical engineering technology, manufacturing technology, electronics, and general engineering technology.

The program curriculum is intentionally aligned with community college offerings in mathematics, science, and foundational technical coursework. Lower-division courses in algebra, calculus, physics, chemistry, and introductory engineering technology are structured to ensure compatibility with equivalent courses at partner institutions. This alignment supports efficient credit transfer, minimizes duplication of coursework, and promotes timely degree completion.

The proposed program provides a natural continuation pathway for students completing associate-level programs in mechanical engineering technology and related fields offered at Maryland community colleges. These programs typically focus on technician-level skills such as equipment operation, maintenance, and basic system troubleshooting. The bachelor's degree builds upon this foundation by advancing student knowledge in mechanical systems, thermodynamics, fluid mechanics, materials, and manufacturing processes, while emphasizing system-level understanding, analysis, and implementation.

The university also supports articulation initiatives with high schools through Project Lead The Way (PLTW) and participates in the Prince George's County Public Schools (PGCPS) PLTW Engineering Program Advisory Committee. These efforts promote early exposure to STEM disciplines and create pathways for students to transition into engineering technology programs.

Capitol Technology University will continue to expand articulation and transfer partnerships with Maryland community colleges and technical institutions offering programs in mechanical engineering technology, manufacturing, and related applied engineering fields. Formal articulation agreements specific to the Mechanical Engineering Technology program will be developed and submitted as supporting documentation following MHEC approval.

I. Adequacy of Faculty Resources

1. Faculty Qualifications and Teaching Assignments

The Bachelor of Science in Mechanical Engineering Technology will be supported by a highly qualified and experienced faculty team consisting of full-time faculty and adjunct instructors with expertise in mechanical systems, manufacturing, thermal and fluid systems, electrical systems, computer science, and engineering management. This multidisciplinary faculty composition supports the applied and interdisciplinary nature of mechanical engineering technology and ensures that students receive both rigorous academic instruction and practical, industry-relevant training.

Faculty members teaching in the program hold terminal degrees in engineering, computer science, and related fields, including mechanical engineering, computer science, analytical chemistry, and project management. Several faculty members bring significant industry experience in areas such as manufacturing systems, HVAC design, energy systems, infrastructure projects, and applied engineering practice. This combination of academic and professional expertise supports the program's emphasis on hands-on learning, system implementation, and workforce readiness.

The program is administered within the School of Engineering under the leadership of the Dean of Academic Affairs and Chair of the Engineering Department. Faculty are actively engaged in curriculum development, student advising, and continuous program improvement, ensuring alignment with industry needs and future accreditation under ABET ETAC standards.

The following table summarizes faculty teaching assignments for the program:

Faculty Teaching Assignments – B.S. in Mechanical Engineering Technology (MET)

Faculty Name	Appointment Type	Courses Taught
Dr. Andrew Mehri	Full-Time	MA 261, MA 262, PH 201, PH 202, SDE 457
Dr. Gregory P. Behrmann	Full-Time	EE 285, ROB 100, MET 340, MEC 360, SDE 458
Dr. Jeff Chi	Full-Time	BUS 174, BUS 301, MEC 375, IET 220
Dr. Mohamed Ghazy	Full-Time	MEC 210, MEC 310, MEC 320
Dr. Nisma Omar	Full-Time	MA 114, MA 128, CH 120
Dr. Tahani Baabdallah	Full-Time	CS 120, CS 150
Prof. Amelia Wear	Full-Time	MEC 215, EL 100, EL 200
Prof. Mohamed Abaza	Part-Time	MEC 342, MEC 255, MEC 330, MEC 350, MEC 230
Ms. Megan Miskovish	Part-Time	EN 101, EN 102, HU 331, SS 351, HU/SS XXX

Faculty Resources

Full-Time Faculty

Dr. Andrew Mehri holds a Ph.D. in Computer Science, with additional degrees in information architecture and electronics engineering. He has held leadership roles in technical and vocational

education and teaches courses in mathematics, physics, and applied technical design supporting engineering technology programs.

Dr. Gregory P. Behrmann holds a Ph.D. in Mechanical Engineering from The Catholic University of America. His background includes federally funded research, micro-manufacturing innovation, and STEM outreach. He teaches courses in mechanical systems design, manufacturing-related topics, and interdisciplinary project-based learning.

Dr. Jeff Chi holds a Ph.D. in Project Management from the University of Maryland. His professional background includes leadership of large-scale construction, infrastructure, sustainability, and capital management projects. He teaches courses in project management, engineering economics, and professional practice.

Dr. Mohamed Ghazy, Dean of Academic Affairs and Chair of the Engineering Department, holds a Ph.D. in Engineering from Purdue University. His research background includes power electronics and energy systems. He provides academic leadership for engineering programs and teaches courses in statics, dynamics, thermodynamics, and energy-related systems.

Dr. Nisma M. Omar holds a Ph.D. in Analytical Chemistry and an M.S. in Physical Chemistry. She teaches foundational mathematics and science courses and supports laboratory instruction essential to engineering technology education.

Dr. Tahani Baabdullah holds a Ph.D. in Computer Science and has expertise in artificial intelligence, machine learning, and data-driven systems. She teaches programming courses that support computational and analytical skills within the program.

Prof. Amelia Wear is an Instructor and Lead Systems Engineer at Wabtec. She holds a B.S. in Mechanical Engineering and an M.S. in Software Engineering and brings industry expertise in systems integration, controls, and engineering design to courses in CAD, circuits, and applied systems.

Part-Time (Adjunct) Faculty

Prof. Mohamed Abaza, P.E., CEM, LEED AP, CxA, is a mechanical engineer with over 25 years of experience in HVAC design, commissioning, and energy management. He holds graduate and undergraduate degrees in Mechanical Engineering and brings extensive expertise in mechanical systems, manufacturing processes, and sustainable building systems.

Ms. Megan Miskovish holds an M.S. in Education and teaches English composition and humanities courses. Her instruction supports the development of written communication, critical thinking, and professional skills essential for engineering technology graduates.

2. Faculty Development and Pedagogical Training

Capitol Technology University is committed to supporting faculty through ongoing professional development focused on evidence-based instructional practices and the effective use of educational technologies. The university's Center for Innovation in Teaching and Learning (CITL) serves as the primary resource for faculty training, instructional support, and continuous improvement.

CITL provides workshops, seminars, and individualized consultations designed to enhance teaching effectiveness, promote innovation, and support student success.

a) Pedagogy that Meets the Needs of Students

Faculty receive regular training in student-centered pedagogy that addresses the diverse needs of Capitol's student population, including traditional undergraduates, transfer students, adult learners, and underrepresented groups in STEM fields.

Professional development activities emphasize:

- Inclusive and equitable teaching practices
- Active learning and student engagement strategies
- Formative assessment and feedback techniques
- Project-based and experiential learning approaches

Given the applied nature of the Mechanical Engineering Technology program, faculty are encouraged to incorporate laboratory-based instruction, real-world problem-solving, and team-based projects that reflect industry practices in mechanical systems, manufacturing, and energy systems. These approaches support student retention, skill development, and workforce readiness.

b) Learning Management System

Capitol Technology University utilizes Canvas as its official learning management system (LMS). All faculty receive structured onboarding and training prior to teaching.

Ongoing professional development includes:

- Course design using modular structures
- Development and use of grading rubrics
- Use of analytics tools to monitor student progress
- Communication tools for student engagement
- Integration of assignments, discussions, and assessments

Faculty are trained to use Canvas effectively to enhance communication, provide timely feedback, and support student learning outcomes in both face-to-face and hybrid course formats.

c) Evidence-Based Practices for Distance Education

While the Mechanical Engineering Technology program is delivered primarily in a face-to-face format, select courses may be offered in hybrid or online formats to support working professionals and transfer students.

Faculty teaching in these formats receive training in:

- Best practices for online and hybrid instruction
- Student engagement in virtual environments
- Use of multimedia and instructional technologies
- Online assessment and academic integrity

These practices ensure that all instructional modalities maintain the same level of academic quality, rigor, and student support.

J. Adequacy of Library Resources

1. Library Resources and Support for the Program

Capitol Technology University's Puente Library provides comprehensive academic and research support for the Bachelor of Science in Mechanical Engineering Technology program. The library maintains extensive physical and digital collections designed to support students and faculty engaged in mechanical systems, electrical and electronic systems, automation, manufacturing systems, industrial systems, robotics, and interdisciplinary engineering technology studies.

Students have access to a wide range of scholarly and technical resources, including journals, eBooks, technical manuals, and industry standards. Core databases supporting the program include IEEE Xplore, ScienceDirect, SpringerLink, ProQuest, and JSTOR. These resources provide full-text access to peer-reviewed articles, conference proceedings, and applied research materials in areas such as automation, robotics, control systems, manufacturing, thermodynamics, and mechatronics.

In addition to academic databases, the library provides access to industry standards and professional resources, including those from ASME (American Society of Mechanical Engineers), ASTM (American Society for Testing and Materials), and SAE (Society of Automotive Engineers). These resources support coursework and projects related to system design, materials, manufacturing processes, and engineering applications. The library's collection also includes reference materials and textbooks aligned with courses in mechanical systems, electrical circuits, robotics, and automation.

The Puente Library is equipped with modern information systems, online research tools, and access to interlibrary loan networks, allowing students to obtain specialized materials beyond the university's immediate holdings. Students also benefit from online tutorials, citation management tools, and individualized research consultations, which support the development of information literacy and research skills essential for engineering technology practice.

Capitol Technology University maintains a strong commitment to continuous improvement and resource adequacy. The Dean of Academic Affairs, library staff, and program faculty collaborate regularly to review resource usage and identify new acquisitions aligned with evolving curriculum needs and industry trends.

Measures to ensure continued adequacy of library resources include:

- Conducting annual reviews of library holdings to ensure alignment with program learning outcomes and emerging technologies in automation and robotics
- Acquiring updated textbooks, technical manuals, and engineering standards as course content evolves
- Expanding access to specialized databases related to automation, control systems, and smart manufacturing as enrollment increases
- Providing equitable access to digital resources for both on-campus and remote learners

- Offering research instruction and embedded librarian support for senior design and capstone projects

Capitol Technology University affirms that the Puente Library's current resources and acquisition processes are fully adequate to support the implementation, growth, and long-term success of the Bachelor of Science in Mechanical Engineering Technology program.

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

1. Physical Facilities, Laboratories, and Instructional Equipment

Capitol Technology University affirms that it possesses the physical facilities, infrastructure, and instructional equipment required to successfully launch and sustain the Bachelor of Science in Mechanical Engineering Technology program. The university's facilities include modern classrooms equipped with multimedia projection systems, wireless internet, and collaborative teaching technologies that support lecture-based, laboratory-based, and project-based instruction.

Laboratories currently supporting engineering and engineering technology programs will be utilized for the Mechanical Engineering Technology curriculum. These laboratories are designed to support hands-on learning, applied experimentation, and system-level understanding of mechanical and industrial systems. Key laboratory facilities include:

- **Mechanics and Materials Laboratories**
Supporting instruction in statics, dynamics, and mechanics of materials, with equipment for force analysis, stress/strain measurement, materials testing, and structural behavior analysis.
- **Thermal and Fluid Systems Laboratories**
Supporting courses in thermodynamics, fluid mechanics, and HVAC systems, including heat transfer apparatus, fluid flow measurement systems, and thermal system analysis equipment.
- **Electrical and Electronics Laboratories**
Equipped for circuits and electronic devices instruction, supporting understanding of electrical systems that interface with mechanical systems in industrial environments.
- **Engineering Design and CAD Laboratories**
Equipped with industry-standard software such as SolidWorks and MATLAB to support modeling, simulation, and mechanical system design.
- **Manufacturing and CNC Laboratories**
Supporting manufacturing processes, CNC programming, machining, and prototyping, including milling machines, lathes, and materials processing tools.
- **Applied Industrial Systems and Automation Support Laboratories**
Providing exposure to industrial equipment such as sensors, actuators, and programmable logic controllers (PLCs) as supporting tools within manufacturing and mechanical systems environments.

These laboratories are equipped with modern instrumentation, data acquisition systems, and industry-relevant technologies that enable students to conduct experiments, analyze data, and implement

mechanical and manufacturing systems. The facilities support the applied, hands-on learning outcomes consistent with **ABET Engineering Technology Accreditation Commission (ETAC)** expectations.

Faculty and staff offices are available and adequately furnished to support instruction, student advising, and collaboration. The university conducts periodic reviews of space utilization, laboratory capacity, and equipment to ensure alignment with enrollment growth and technological advancements.

2. Access to Technology for Distance and Hybrid Education

Capitol Technology University ensures that all students and faculty, including those participating in hybrid or online course components, have access to the digital infrastructure necessary for effective teaching and learning.

a) Institutional Electronic Communication System

All students and faculty are provided with official university email accounts through Microsoft Office 365. This system serves as the primary platform for academic communication, including course announcements, assignment notifications, and institutional correspondence, ensuring secure and reliable communication across the university community.

b) Learning Management System

The university utilizes Canvas as its official learning management system (LMS). Canvas supports both synchronous and asynchronous learning and provides tools for:

- Course content delivery
- Assignments and assessments
- Discussion forums and collaboration
- Grading and feedback
- Communication between students and faculty

Faculty receive training in effective course design and delivery using Canvas, while students are provided with orientation and ongoing technical support to ensure successful participation in hybrid or online learning environments.

L. Adequacy of Financial Resources with Documentation

1. Program Resources

The Bachelor of Science in Mechanical Engineering Technology program will be implemented using the existing physical facilities, infrastructure, and instructional equipment already available at Capitol Technology University. The university maintains modern classrooms, laboratories, faculty offices, and technical resources sufficient to support the launch and continued growth of the program.

TABLE 1: RESOURCES

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

Narrative Rationale for Table 1: Program Resources**1. Reallocated Funds:**

No reallocated funds are anticipated. The program is designed to leverage Capitol Technology University’s existing laboratories, instructional infrastructure, and faculty expertise in engineering technology, robotics, and automation. No existing programs will be reduced or eliminated.

2. Tuition and Fee Revenue:

Tuition projections are based on incremental enrollment growth, beginning with 8 full-time and 7 part-time students in Year 1 and increasing to 40 full-time and 31 part-time students by Year 5. A modest annual tuition increase of approximately 2.5% is assumed, consistent with institutional trends. Revenue projections are conservative and sufficient to support instructional delivery and program operations.

3. Grants, Contracts, and External Sources:

While no external funding is included in the initial projections, the university will pursue grant opportunities related to workforce development, automation, robotics, and STEM education to enhance program resources, student research opportunities, and industry engagement.

4. Other Sources:

No additional funding sources are projected at this time. However, future support may be obtained through industry partnerships, sponsorships, or philanthropic contributions aligned with advanced manufacturing and automation initiatives.

2. Program Expenditures

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. Administrative Staff (b + c below)	\$5,942	\$6,091	\$6,244	\$6,400	\$6,559
a. # FTE	0.08	0.08	0.08	0.08	0.08
b. Total Salary	\$4,952	\$5,076	\$5,203	\$5,333	\$5,466
c. Total Benefits	\$990	\$1,015	\$1,041	\$1,067	\$1,093
3. Support Staff (b + c below)	\$59,885	\$92,076	\$125,837	\$161,230	\$198,313
a. # FTE	1	1.5	2	2.5	3
b. Total Salary	\$49,905	\$76,730	\$104,864	\$134,358	\$165,261
c. Total Benefits (20%)	\$9,980	\$15,346	\$20,973	\$26,872	\$33,052
4. Technical Support and Equipment	\$840	\$1,425	\$2,320	\$3,145	\$4,140
5. Library	\$0	\$0	\$0	\$0	\$0
6. New or Renovated Space	\$0	\$0	\$0	\$0	\$0
7. Other Expenses	\$5,850	\$14,210	\$25,370	\$39,330	\$56,090
TOTAL (Add 1–7)	\$185,985	\$268,873	\$398,192	\$535,948	\$682,588

Narrative Rationale for Table 2: Program Expenditures

1. Faculty:

Includes salaries and benefits for full-time and adjunct faculty teaching courses in mechanical systems, electrical systems, robotics, automation, and control systems. Faculty allocation increases from 1.5 FTE in Year 1 to 5 FTE by Year 5, consistent with enrollment growth and expanded course offerings.

2. Administrative Staff:

Administrative support (0.08 FTE) assists with scheduling, student advising coordination, and program administration. Costs reflect standard annual adjustments.

3. Support Staff:

Includes laboratory technicians and technical support personnel responsible for maintaining equipment, supporting laboratory instruction, and assisting with student projects. Staffing increases proportionally with program growth.

4. Technical Support and Equipment:

Covers maintenance of laboratory equipment, consumables, and software licenses (e.g., MATLAB, SolidWorks, Multisim). Costs increase with enrollment and laboratory utilization.

5. Library:

No additional expenditures are required. Existing library resources are sufficient to support the program.

6. New or Renovated Space:

No new construction or renovation is required. The program will utilize existing classrooms and laboratory facilities.

7. Other Expenses:

Includes marketing, accreditation preparation (ABET ETAC), faculty development, and program assessment activities. These costs increase as the program grows and progresses toward accreditation.

M. Adequacy of Provisions for Evaluation of Program

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

Capitol Technology University maintains established institutional processes to ensure the quality and continuous improvement of all academic programs, including the Bachelor of Science in Mechanical Engineering Technology.

Courses are evaluated at the end of each semester through standardized student course evaluations that assess instructional quality, course organization, student engagement, and achievement of learning outcomes. Results are reviewed by the course instructor, department chair, and Dean of Academic Affairs to identify strengths and implement improvements where needed.

Faculty performance is evaluated through multiple measures, including classroom observations, peer reviews, student feedback, and annual performance evaluations conducted by the department chair and the Dean. Faculty are encouraged to participate in ongoing professional development through the Center for Innovation in Teaching and Learning (CITL), which supports the adoption of evidence-based teaching practices and continuous instructional improvement.

Student Learning Outcomes (SLOs) are assessed at both the course and program levels. Faculty teaching courses aligned with program outcomes collect direct evidence of student learning through examinations, laboratory exercises, design projects, programming assignments, and presentations. Assessment data are compiled and reviewed regularly during departmental meetings to support continuous improvement of the curriculum, instructional methods, and laboratory experiences. This process ensures alignment with

ABET Engineering Technology Accreditation Commission (ETAC) student outcomes and supports the applied, hands-on nature of the program.

2. Evaluation of Program Educational Effectiveness

The educational effectiveness of the Mechanical Engineering Technology program will be evaluated through a structured, data-driven assessment framework that integrates academic, operational, and financial performance indicators.

- **Assessment of Student Learning Outcomes:**

The program maintains a systematic process for mapping, measuring, and evaluating student outcomes related to applied problem-solving, system design and integration, teamwork, communication, ethics, and lifelong learning. Direct assessment data are collected from capstone projects, laboratory courses, and embedded assignments each semester and reviewed annually to ensure alignment with **ABET ETAC Student Outcomes (1–7)**.

- **Student Retention and Graduation Rates:**

The university monitors retention, progression, and graduation rates at the program level to evaluate student success. Early alert systems, academic advising, and faculty mentoring are used to support student persistence and reduce attrition.

- **Student and Faculty Satisfaction:**

Surveys are administered periodically to gather feedback on instructional quality, laboratory resources, advising, and overall program experience. Additional input is obtained through student focus groups and the program’s Industry Advisory Board.

- **Cost-Effectiveness:**

The Business and Finance Division collaborates with Academic Affairs to evaluate the program’s financial sustainability. Analyses include enrollment trends, faculty workload, and resource utilization to ensure the program remains both cost-effective and academically robust.

- **Accreditation and Advisory Input:**

The program will pursue accreditation through the **ABET Engineering Technology Accreditation Commission (ETAC)**. Continuous input will be obtained from the program’s Industry Advisory Board, which includes representatives from automation, robotics, manufacturing, and related industries. The board provides guidance on curriculum relevance, student preparedness, and emerging workforce needs.

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

1. Minority Student Access, Success, and Institutional Diversity Goals

The Bachelor of Science in Mechanical Engineering Technology aligns closely with Maryland’s goals for promoting equitable access, diversity, and student success, as outlined in COMAR 13B.02.03.05 and the Maryland State Plan for Postsecondary Education (2022). Capitol Technology University maintains a strong institutional commitment to diversity, equity, and inclusion and has established initiatives to support underrepresented populations in STEM education.

The proposed program is designed to expand access to high-demand fields such as mechanical systems, manufacturing, energy systems, and infrastructure-related technologies for historically underrepresented groups, including African American, Hispanic, female, first-generation, and veteran students. The applied, hands-on nature of engineering technology education provides an accessible and engaging pathway for students who may not pursue traditional, theory-intensive engineering programs.

To promote equitable participation and student success, the program incorporates the following initiatives:

- **Transfer-Friendly Pathways:**
Articulation agreements with Maryland community colleges—many of which serve diverse student populations—provide clear and efficient transfer pathways into the program, particularly for students completing associate degrees in mechanical engineering technology, manufacturing technology, and related engineering technology fields.
- **Advising and Mentoring Support:**
Each student is assigned a faculty advisor for continuous academic guidance. Faculty mentoring, combined with early alert and intervention systems, supports student retention, progression, and completion.
- **Financial Assistance:**
The university provides institutional scholarships, need-based financial aid, and access to federal and state programs that reduce financial barriers for underrepresented and economically disadvantaged students.
- **Inclusive Pedagogy:**
Faculty receive training in inclusive teaching practices, culturally responsive pedagogy, and Universal Design for Learning (UDL), ensuring that instruction accommodates diverse learning styles and student backgrounds.
- **Hands-On and Experiential Learning:**
The curriculum emphasizes laboratory work, project-based learning, and real-world problem-solving in areas such as mechanical systems, manufacturing processes, and energy systems. These approaches have been shown to improve engagement, persistence, and success among minority students in STEM.

Beyond the classroom, Capitol Technology University fosters an inclusive campus environment through multicultural programming, student organizations, and diversity-focused initiatives that promote cross-cultural engagement, leadership development, and a sense of belonging.

The Bachelor of Science in Mechanical Engineering Technology supports Maryland's 2022 State Plan for Postsecondary Education, particularly:

- **Goal 1: Student Access** – by expanding flexible, career-oriented educational pathways in high-demand STEM fields for underrepresented populations.
- **Goal 2: Student Success** – by providing advising, mentoring, financial support, and applied learning experiences that promote persistence, completion, and career readiness.

O. Relationship to Low Productivity Programs Identified by the Commission

1. Relationship to Low Productivity Programs and Resource Redistribution

The proposed Bachelor of Science in Mechanical Engineering Technology is not a direct continuation, merger, or redesign of any specific low-productivity program identified by the Maryland Higher Education Commission. However, its development reflects Capitol Technology University's broader strategic initiative to optimize academic resources, enhance program alignment with workforce needs, and improve overall institutional efficiency.

Through internal academic planning and program review processes, the University has identified opportunities to better align faculty expertise, laboratory utilization, and instructional resources with high-demand fields such as mechanical systems, manufacturing, energy systems, and infrastructure-related technologies. The proposed program builds on this strategic direction by leveraging existing strengths across engineering and engineering technology disciplines.

The program will support efficient resource utilization in the following ways:

- **Faculty Optimization:**
Existing faculty with expertise in mechanical systems, thermodynamics, fluid mechanics, manufacturing, and engineering design will be strategically assigned across the Mechanical Engineering Technology curriculum. This approach maximizes instructional capacity while maintaining high-quality, applied instruction.
- **Shared Laboratory Infrastructure:**
The program leverages existing laboratories in mechanics, materials, thermal and fluid systems, manufacturing, and electrical systems. These shared facilities are already in use for related programs and will support the proposed program without requiring significant additional capital investment.
- **Integrated Academic Support:**
Administrative, advising, and academic support services are shared across engineering and engineering technology programs, promoting operational efficiency and consistent student support.
- **Program Alignment and Efficiency:**
The Mechanical Engineering Technology program provides a focused, discipline-specific pathway that integrates coursework in mechanical systems, manufacturing, and applied engineering practice. This structure reduces fragmentation across smaller or under-enrolled course offerings and strengthens overall program coherence and sustainability.
- **Enrollment Growth and Sustainability:**
The program is expected to attract students interested in applied, career-focused education in mechanical systems, manufacturing, and energy systems. By aligning with workforce demand, the program supports increased enrollment, improved retention, and enhanced institutional productivity.

P. Adequacy of Distance Education Programs

1. Eligibility 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 at both the undergraduate and graduate levels across engineering, engineering technology, computer science, and business disciplines.

Capitol Technology University is a participant in the National Council for State Authorization Reciprocity Agreements (NC-SARA), which authorizes the institution to offer distance education to students residing in other SARA member states. This participation ensures compliance with interstate distance education regulations and supports broader student access.

The University's distance education infrastructure includes a robust learning management system (Canvas), cloud-based academic and administrative systems, and comprehensive faculty training programs. These resources support high-quality instruction and ensure consistency with institutional, state, and national standards.

2. Compliance with C-RAC Guidelines

Capitol Technology University affirms full compliance with the Council of Regional Accrediting Commissions (C-RAC) guidelines for the evaluation of distance education. The University ensures that all online and hybrid courses maintain the same level of academic rigor, integrity, and student engagement as on-campus offerings.

Specific measures include:

- **Curriculum Quality and Learning Outcomes:**
Course content, learning outcomes, and assessment methods are equivalent across on-campus, hybrid, and online delivery formats.
- **Regular and Substantive Interaction:**
Faculty provide consistent engagement through virtual meetings, discussion forums, timely feedback, and academic advising.
- **Student Identity Verification:**
Secure authentication systems and assessment tools are used to verify student identity and maintain academic integrity.
- **Access to Student Services:**
Online students have full access to advising, tutoring, library resources, technical support, and career services equivalent to those available on campus.
- **Technology Infrastructure:**
The University maintains a reliable and scalable digital environment that supports Canvas, synchronous learning tools, and instructional technologies.
- **Faculty Training:**
Faculty teaching online or hybrid courses complete required training in online pedagogy, course design, and effective use of the learning management system.

3. Program Delivery Considerations

The Bachelor of Science in Mechanical Engineering Technology is primarily delivered in a face-to-face format due to its laboratory-intensive and hands-on instructional requirements, particularly in areas such as mechanical systems, manufacturing processes, thermodynamics, fluid mechanics, and materials testing.

However, selected courses—particularly in mathematics, computer science, and general education—may be offered in online or hybrid formats to support accessibility for transfer students, working professionals, and nontraditional learners.

All online and hybrid components of the program will be designed and delivered in full compliance with MHEC, ABET Engineering Technology Accreditation Commission (ETAC), and C-RAC standards to ensure academic quality, accessibility, and student success.