Office Use Only: PP#

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

Institution Submitting Proposal	Capitol Technology University

Each action below requires a separate proposal and cover sheet.

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

Payment Submitted:	(●) Yes ( ) No	Payment Type:	( ) R*STARS # 99206 (●) Check # 99206	Payment Amount:	Date Submitted: 11/15/202

Department Proposing Program	Engineering	
Degree Level and Degree Type	Bachelor of Science (B.S.)	
Title of Proposed Program	Bachelor of Science in Mechanical Engineering	
Total Number of Credits	120	
Suggested Codes	HEGIS: 0910	CIP: 14.1901
Program Modality	(●) On-campus ( ) Distance Education (fully online) ( ) Both	
Program Resources	(●) Using Existing Resources ( ) Requiring New Resources	
Projected Implementation Date (must be 60 days from proposal submisison as per COMAR 13B.02.03.03)	( ) Fall (●) Spring ( ) Summer	Year: 2026
Provide Link to Most Recent Academic Catalog	URL: http://catalog.captechu.edu	
Preferred Contact for this Proposal	Name: Dr. Mohamed Shehata	
	Title: Dean of Academics	
	Phone: (340) 965-2473	
	Email: mshehata@captechu.edu	
President/Chief Executive	Type Name: Bradford Sims	
	Signature: [signature]	Date: 11-15-25
	Date of Approval/Endorsement by Governing Board: NOV. 15, 2025	

Revised 1/2021

CAPITOL
Technology University

November 15, 2025

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

Dear Dr. Rai,

Capitol Technology University is requesting approval to offer a Bachelor of Science (B.S.) in Mechanical Engineering. 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 engineers with skills in mechanical systems design, thermal-fluid sciences, materials engineering, automation, and manufacturing.

The B.S. in Mechanical Engineering aligns with Capitol Technology University's mission to provide a hands-on, career-focused education in science, technology, engineering, and mathematics. The program prepares students for immediate entry into professional roles in sectors such as aerospace, energy, robotics, advanced manufacturing, and transportation. 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 industrial and technological needs.

Mechanical engineering remains one of the most versatile and in-demand engineering disciplines, and this program will help expand access to high-quality STEM education for students throughout the region. It is also structured to support transfer pathways, workforce development initiatives, and potential ABET accreditation.

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

Respectfully,

Bradford L. Sims, PhD

President

CAPITOL
Technology University

November 15, 2025

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

Dear Dr. Rai,

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

Respectfully,

Bradford L. Sims, PhD

President

99206 VENDOR NO. 17911 DATE 11/12/2025 CHECK NO. 99206

CAPITOL TECHNOLOGY UNIVERSITY

INVOICE NUMBER	INVOICE DATE	DESCRIPTION	GROSS AMOUNT	DISCOUNT/ADJUSTMENTS	PAYMENT AMOUNT
BTSP Program-3	11/11/2025	MHEC BS Fees in Mechanical Engineering	850.00	0.00	850.00
			850.00	0.00	850.00

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

CAPITOL Technology University

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

FIRST NATIONAL BANK
60-1809/433

99206

DATE 11/12/2025

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

PAY EIGHT HUNDRED FIFTY AND NO/100 DOLLARS

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

CAPITOL TECHNOLOGY UNIVERSITY

⑈099206⑈ ⑆043318092⑆ 030111266⑈

PROPOSAL FOR:

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

CAPITOL Technology University

Institution Submitting Proposal

Fall 2026
Projected Implementation Date

Bachelor of Science
Award to be Offered

Bachelor of Science in Mechanical Engineering
Title of Proposed Program

0910
Suggested HEGIS Code

14.1901
Suggested CIP Code

Engineering
Department of Proposed Program

Dr. Mohamed Shehata
Name of Department Head

Dr. Mohamed Shehata
Dean of Academic

mshehata@captechu.edu
Contact E-Mail Address

(240) 965-2473
Contact Phone Number

11/15/25
Signature and Date

President/Chief Executive Approval

NOV. 15, 2025
Date

Date Endorsed/Approved by Governing Board

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

Capitol Technology University
Laurel, Maryland

A. Centrality to Mission and Planning Priorities

1. Program Description and Alignment with Institutional Mission

The Bachelor of Science in Mechanical Engineering is a 120-credit undergraduate degree designed to prepare students for professional careers in mechanical systems design, analysis, and manufacturing. The program integrates core principles of mechanical, materials, and thermal sciences with computational modeling, design, and experimental practice to develop engineers capable of addressing complex engineering challenges across industries such as aerospace, automotive, energy, robotics, and advanced manufacturing.

The curriculum emphasizes applied learning and hands-on design, supported by coursework in mechanics, materials, thermodynamics, heat transfer, fluid systems, controls, and mechanical design. Students use industry-standard tools and laboratory facilities to engage in simulation, prototyping, and testing. The program culminates in a two-semester capstone design sequence, where students work in teams to conceive, design, and deliver functional prototypes under realistic engineering constraints.

In addition to technical courses, the curriculum includes a strong foundation in mathematics and science (30 credits), general education and ethics (21 credits), and computer programming (6 credits) to ensure graduates possess analytical thinking, communication, and professional responsibility skills. Students also complete technical electives in specialized areas such as renewable energy systems, robotics, mechatronics, and finite element analysis to align with personal 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 fulfills this mission by preparing technically competent, innovative, and ethically grounded professionals ready to meet workforce needs in mechanical design, manufacturing, and automation.

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

- Delivering STEM-focused, hands-on education that meets the evolving needs of the engineering workforce.
- Fostering interdisciplinary collaboration across mechanical, electrical, and computer engineering.
- Expanding curricular offerings that strengthen Capitol's position as a leader in applied engineering education.
- Contributing to enrollment growth through a program that attracts both traditional students and transfer students from community colleges and technical institutions.

2. Institutional Strategic Goals and Priority Alignment

The proposed Bachelor of Science in Mechanical Engineering directly supports Capitol Technology University's strategic plan for academic expansion, student success, and workforce alignment. It has been designed to address both the growing demand for mechanical engineers and the university's goal of maximizing existing academic and laboratory resources.

The program supports Goal I: Expand Educational Offerings and Increase Program Completion by introducing a core engineering degree grounded in mechanical systems, materials, and design. Its strong analytical foundation and hands-on projects appeal to students seeking a career in applied engineering, robotics, or energy systems. The inclusion of technical electives provides flexibility for future specialization and graduate study.

It supports Goal II: Increase Enrollment and Institutional Awareness by attracting students interested in a traditional yet highly employable engineering discipline. The mechanical engineering degree complements Capitol's existing programs in aerospace, mechatronics, and electrical engineering, creating natural pathways for cross-disciplinary learning and dual-enrollment opportunities.

The program aligns with Goal III: Improve Utilization of University Resources through its reliance on existing courses, laboratories, and faculty within the School of Engineering. Courses in mechanics, materials, controls, and robotics already exist within other accredited programs, allowing for efficient implementation and cross-instructional support.

It also advances Goal IV: Expand Partnerships and Industry Collaboration, enabling new relationships with companies in manufacturing, defense, energy, and automation sectors. Mechanical engineering is a cornerstone discipline that supports broad collaboration with regional industries, offering opportunities for student internships, applied research, and sponsored projects.

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 the strategic initiative to broaden Capitol's engineering portfolio.
b) The concept was reviewed and supported during academic planning retreats and Undergraduate Academic Council meetings, where it was prioritized due to its employment relevance and alignment with existing institutional strengths.
c) The curriculum leverages current faculty expertise and laboratory infrastructure in mechanics, materials, and control systems, ensuring high-quality delivery with minimal additional investment.
d) The program contributes to strategic enrollment growth goals by attracting students seeking careers in traditional engineering fields reinforced by hands-on technology integration.
e) The development of the program supports the university's long-term commitment to providing applied, practice-based engineering education that directly serves Maryland's workforce and industry sectors.

3. Program Funding and Resource Commitment

The Bachelor of Science in Mechanical Engineering 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 draws from current courses in mechanical, electrical, and mechatronics engineering, it can be implemented without significant new investment in course development or facilities.

Existing laboratories—including the mechanics, circuits, and mechatronics labs—are fully equipped to support instruction in materials testing, fluid systems, and thermal sciences. Additional small-scale equipment and instructional materials will be acquired as enrollment grows and have been included in the university's annual budgeting plan.

Instructional staffing will rely primarily on existing full-time faculty and experienced adjunct instructors who already teach related subjects. The projected student-to-faculty ratio will remain consistent with other engineering programs, ensuring small class sizes and individualized mentorship.
The program is expected to be self-sustaining within three years, with tuition revenue supporting faculty compensation, laboratory operations, and materials costs.

The financial plan, reviewed by the Office of Academic Affairs and the Division of Business and Finance, confirms that the program can operate efficiently using shared courses and resources while maintaining the high academic standards expected of Capitol's ABET-accredited programs.
Additional details regarding financial projections are provided in Section L.

4. Institutional Commitment

Capitol Technology University is fully committed to the success and longevity of the Bachelor of Science in Mechanical Engineering program.

a) Ongoing administrative, financial, and technical support
The program will be administered by the School of Engineering under the supervision of the Dean of Engineering. Administrative support, financial oversight, and scheduling will be coordinated through the Office of Academic Affairs. Technical resources—such as laboratories, computing equipment, and fabrication tools—are already available and will continue to be maintained and upgraded as needed to support student learning and research.

b) Program continuity for enrolled students
Capitol Technology University guarantees program continuity to all students admitted into the Mechanical Engineering program. In the unlikely event of program modification or restructuring, the university will implement a formal teach-out plan to ensure that all students can complete their degrees without academic disruption. The university's longstanding accreditation and commitment to student success ensure the stable delivery of this program through full implementation and beyond.

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 advances the development of engineering knowledge by preparing students to apply mechanical and thermal principles to the design, analysis, and manufacture of modern systems. Mechanical engineering is among the broadest and most fundamental engineering disciplines, forming the basis for innovation in fields such as aerospace, energy, robotics, manufacturing, and transportation.

The program integrates traditional areas of study—mechanics, materials, thermodynamics, and fluid systems—with emerging technologies including automation, mechatronics, and renewable energy systems. Students are trained to use advanced simulation, design, and manufacturing tools, ensuring they graduate with skills directly relevant to Maryland's evolving technology and industrial sectors. By combining theoretical understanding with hands-on application, the program contributes to the State's capacity to produce engineers who can lead advancements in sustainable infrastructure, advanced manufacturing, and energy efficiency.

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

The program is structured to broaden participation in engineering and to increase access 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 community-college transfer students. The B.S. in Mechanical Engineering builds on this tradition by offering an affordable, practice-oriented pathway into a high-demand STEM field.

Small class sizes, faculty mentorship, and project-based instruction promote retention and success among students who might otherwise be underrepresented in traditional engineering programs. Transfer pathways from Maryland community colleges, flexible course scheduling, and strong academic support services further expand access. The result is a program that not only prepares highly skilled professionals but also strengthens equity and diversity within Maryland's engineering workforce.

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 collaborates with Maryland's HBIs through articulation agreements, joint outreach, and research initiatives. The Mechanical Engineering program supports statewide efforts to expand STEM capacity and may serve as a partner framework for future dual-degree or transfer pathways with HBIs. By leveraging its applied, hands-on approach, the program complements the missions of Maryland's HBIs and contributes to the shared objective of increasing participation of underrepresented populations in high-impact engineering disciplines.

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

The Maryland State Plan for Postsecondary Education identifies three overarching goals—Student Access, Student Success, and Innovation—all of which are addressed through this program.

Goal 1: Student Access

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

The B.S. in Mechanical Engineering expands access to high-quality engineering education by serving a broad range of Maryland learners, including recent high-school graduates, community-college transfers, working professionals, and military personnel. Capitol Technology University maintains articulation agreements with regional community colleges and actively recruits through high-school outreach, dual-enrollment programs, and transfer partnerships.

The program provides multiple entry points and financial support mechanisms—including institutional scholarships, need-based aid, and veterans' benefits—to make STEM education attainable. Its applied, hands-on structure particularly appeals to students seeking practical skills for immediate employment. These efforts align with the State Plan's Priority 1 (Affordability), Priority 2 (Financial Literacy and Planning), and Priority 4 (Access for Underserved Populations) by reducing financial and academic barriers to participation in engineering education.

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 from fundamental to advanced mechanical topics. Students engage in laboratory work, simulation projects, and design challenges that integrate theory with real-world application.

Comprehensive advising, tutoring, and mentoring systems are in place to support academic progress and on-time degree completion. The senior design capstone sequence reinforces critical thinking, teamwork, and communication through complex, multidisciplinary projects often developed in collaboration with industry partners. Internship opportunities and partnerships with Maryland's manufacturing and energy sectors enhance employability upon graduation. These strategies directly support the State Plan's Priority 5 (Commitment to Quality Education), Priority 6 (Timely Program Completion), and Priority 7 (Lifelong Learning and Career Readiness).

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 embodies innovation in both content and delivery. The curriculum integrates digital design, computer-aided engineering, and emerging technologies such as automation, renewable energy systems, and mechatronics—reflecting current and future industry trends. The use of existing laboratories and simulation platforms enables resource-efficient delivery while maintaining high academic standards.

Students participate in multidisciplinary projects that blend mechanical, electrical, and computer engineering concepts, preparing them for the increasingly integrated nature of modern engineering practice. These features are consistent with the Maryland State Plan's Priority 8 (Innovative Pedagogy), Priority 9 (Expansion of Innovative Academic Practices), and Priority 10 (Work-Based Learning and Applied Experience).

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 will be prepared for a broad range of careers in Maryland's dynamic engineering, energy, manufacturing, and transportation sectors. Mechanical engineering is one of the most versatile disciplines, providing the analytical and design

foundation for numerous technology areas including aerospace, automotive, robotics, power generation, HVAC and building systems, advanced manufacturing, and renewable energy.

Students completing the program will qualify for positions such as Mechanical Engineer, Design Engineer, Manufacturing Engineer, Energy Systems Engineer, HVAC Engineer, Project Engineer, Quality Engineer, and Test Engineer. Many graduates will begin their careers in entry-level design or analysis roles and progress to supervisory or project-management positions with experience or graduate study.

The curriculum's strong emphasis on applied design, computer-aided modeling, thermofluids, and materials equips students to contribute immediately to multidisciplinary engineering teams. Graduates will enter the workforce with both technical depth and practical experience gained through laboratory courses and the two-semester senior design capstone.

2. Market Demand and Employment Outlook

According to the U.S. Bureau of Labor Statistics (BLS, 2024), employment of mechanical engineers is projected to grow 11 percent from 2023 to 2033, faster than the average for all occupations. The BLS projects approximately 19,200 openings each year due to growth and replacement needs. The median annual wage for mechanical engineers in 2024 was $102,320, reflecting strong national demand for engineering talent with expertise in design, analysis, and energy systems.

In Maryland, mechanical engineers are employed heavily in the defense, aerospace, manufacturing, and energy sectors, including at facilities such as NASA Goddard Space Flight Center, Northrop Grumman, Lockheed Martin, Bechtel, BGE, and the Aberdeen Proving Ground. Data from the Maryland Department of Labor (2024) indicate an anticipated 8.4 percent increase in employment across architecture and engineering occupations between 2022 and 2032, representing approximately 6,000 new jobs statewide.

Regional growth areas include:

- Aerospace and defense systems requiring mechanical and thermal design.
- Renewable and clean-energy technologies such as wind turbines and solar thermal systems.
- Advanced manufacturing and automation, including robotics and additive manufacturing.
- Transportation infrastructure and HVAC modernization supporting sustainable building systems.

Given this strong and diversified demand, graduates of the B.S. in Mechanical Engineering program will be well-positioned for immediate employment and long-term career growth.

3. Market Surveys and Labor-Force Projections

Labor-market analyses and state workforce plans demonstrate sustained demand for mechanical-engineering expertise.

- The Maryland Department of Labor's Occupational Projections (2022–2032) anticipate growth across mechanical and industrial engineering categories, with mechanical engineers specifically projected to experience steady annual demand exceeding 400 openings statewide.
- The Georgetown University Center on Education and the Workforce (2023) reports that 69 percent of Maryland jobs will require postsecondary education or training by 2031, and identifies engineering and manufacturing among the highest-growth occupational clusters.

- The Maryland Statewide Workforce Development Plan (2024–2028) highlights urgent needs in advanced manufacturing, energy, infrastructure modernization, and defense systems—all of which rely heavily on mechanical-engineering professionals.
- Real-time postings from Lightcast (2024) and LinkedIn Jobs show consistent openings in Maryland for *Mechanical Engineer*, *Manufacturing Engineer*, *Energy Systems Engineer*, and *HVAC Designer*, particularly in the Baltimore-Washington corridor.

These data confirm the strong and enduring need for graduates with mechanical-engineering credentials capable of applying modern computational tools and sustainable design principles.

4. Current and Projected Supply of Graduates

The supply of mechanical-engineering graduates in Maryland remains modest relative to demand. According to the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS, 2022), Maryland institutions collectively awarded approximately 385 bachelor's degrees in mechanical engineering in the most recent reporting year. However, statewide employment data show more than 6,000 mechanical-engineering positions and hundreds of annual openings, indicating a persistent workforce gap.

Existing programs are primarily located at large research universities and often emphasize theoretical study over applied, hands-on design. The proposed Capitol Technology University program distinguishes itself by integrating laboratory practice, simulation, and industry-based projects throughout the curriculum, aligning more directly with employer expectations for job-ready engineers.

Enrollment projections for the Mechanical Engineering 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 will help meet Maryland's workforce needs in aerospace, energy, manufacturing, robotics, and transportation systems, sectors that consistently report challenges in recruiting engineers with strong mechanical-design and analytical capabilities.

D. Reasonableness of Program Duplication

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

Several institutions in Maryland offer bachelor's degrees in traditional engineering disciplines, including mechanical engineering. However, the proposed Bachelor of Science in Mechanical Engineering at Capitol Technology University is distinguished by its applied, hands-on learning model and integration of mechanical design, materials, and control systems within a practical, project-based framework.

Under CIP Code 14.1901 – Mechanical Engineering, the following Maryland institutions offer related programs:

• University of Maryland, College Park – B.S. in Mechanical Engineering
• University of Maryland, Baltimore County – B.S. in Mechanical Engineering
• University of Maryland Eastern Shore – B.S. in Mechanical Engineering
• Johns Hopkins University – B.S. in Mechanical Engineering
• Loyola University Maryland – B.S. in Engineering (Mechanical Concentration)
• Morgan State University – B.S. in Mechanical Engineering
• Frostburg State University (in collaboration with Cecil College) – B.S. in Engineering (Mechanical Concentration)
• United States Naval Academy – B.S. in Mechanical Engineering

Most existing programs emphasize theoretical and research-based instruction, preparing graduates for advanced study or design-oriented positions in large-scale engineering firms. In contrast, Capitol Technology University's program offers a practice-based approach emphasizing applied mechanics, thermofluids, manufacturing processes, and computer-aided design. Students gain direct experience in laboratories and capstone projects focused on real-world applications such as energy systems, automation, and robotics.

The Capitol Tech program further differentiates itself through its integration with interdisciplinary fields such as electronics and mechatronics, a feature made possible by the university's established engineering and computer science infrastructure. The curriculum also leverages existing laboratories and instructional resources, providing students with a hands-on learning experience that complements traditional mechanical theory.

In summary, while other Maryland institutions offer mechanical engineering programs, the Capitol Technology University program stands apart due to its career-oriented design, smaller class sizes, project-based curriculum, and close alignment with regional industry needs in aerospace, defense, and advanced manufacturing.

2. Provide justification for the proposed program.

The B.S. in Mechanical Engineering at Capitol Technology University fills a distinct and necessary niche in Maryland's higher education landscape. Although mechanical engineering is offered at several state institutions, most existing programs are research-focused, theory-intensive, and often located within large public universities. Capitol's program provides a practical, industry-aligned alternative for students seeking a more direct path into the engineering workforce.

a) Workforce Demand:
Maryland's economy is heavily supported by aerospace, defense, energy, and manufacturing industries, all of which rely on a steady pipeline of mechanical engineers with strong applied skills. Employers increasingly require graduates proficient in design software, computational modeling, and hands-on prototyping—capabilities emphasized throughout Capitol's program.

b) Academic Need:
The proposed program complements, rather than duplicates, existing offerings by focusing on applied engineering practice supported by robust laboratory and project experiences. Its inclusion of courses in manufacturing processes, control systems, and robotics addresses emerging areas not fully covered in traditional programs.

c) Accessibility and Flexibility:
Capitol Technology University serves a unique student population that includes working professionals, transfer students, and adult learners. The program's modular structure, evening scheduling, and use of existing facilities make it accessible and cost-effective, providing an alternative pathway for students unable to attend large public institutions.

d) Institutional Alignment:
The program is fully aligned with Capitol Technology University's mission to provide career-focused, hands-on STEM education that meets regional workforce demands. It supports Maryland's strategic goals of expanding access to STEM education, promoting innovation, and strengthening partnerships with industry and defense sectors.

In conclusion, the Bachelor of Science in Mechanical Engineering at Capitol Technology University is justified by strong workforce demand, student accessibility needs, and alignment with institutional and state priorities. It offers a distinctive, practice-oriented education that complements existing programs in Maryland while contributing to the state's goal of producing highly skilled engineers ready to support technological and industrial growth.

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

1. **Discuss the program's potential impact on the implementation or maintenance of high-demand programs at HBIs.**
2. The proposed Bachelor of Science in Mechanical Engineering 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 have long-standing, well-established mechanical and civil engineering programs that serve as critical pathways for underrepresented students pursuing STEM education and careers.
3. These HBI programs are vital to Maryland's efforts to expand participation in engineering, strengthen workforce diversity, and support the state's economic development goals. The Capitol Technology University program differs in both structure and intended student population. It emphasizes applied, hands-on learning and industry-aligned design experiences, appealing to a broader range of learners—including community college transfers, working professionals, and adult learners—who may prefer a smaller, practice-based educational environment.
4. The program is not expected to draw students away from HBI engineering programs but to enhance statewide capacity for mechanical-engineering education and workforce readiness. Potential areas of collaboration and mutual benefit include:
5. • Establishing transfer and articulation pathways for students completing pre-engineering or associate-level programs at HBIs who seek a more applied mechanical-engineering degree.
   • Creating opportunities for joint capstone projects or applied research in areas such as energy systems, manufacturing, or robotics, allowing students from multiple institutions to engage in collaborative problem-solving.
   • Supporting statewide workforce initiatives that increase the number of mechanical engineers available to Maryland industries while maintaining strong representation of underrepresented groups in engineering.
6. The Bachelor of Science in Mechanical Engineering at Capitol Technology University complements rather than duplicates HBI offerings by focusing on practical design, fabrication, and

systems integration, supported by existing laboratory infrastructure and faculty expertise. Its introduction will not reduce enrollment or undermine HBI programs; instead, it contributes to Maryland's collective effort to expand STEM capacity, increase access to engineering education, and strengthen diversity across the statewide talent pipeline.

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

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

The proposed Bachelor of Science in Mechanical Engineering 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 effort to expand access to high-quality, workforce-aligned STEM education and to increase representation 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, have longstanding missions centered on educational equity, leadership development, and community advancement. These institutions play a vital role in preparing African American students for professional success in science, engineering, and technology disciplines.

The proposed Mechanical Engineering program differs from HBI offerings in both focus and delivery. It emphasizes applied, hands-on learning, smaller class environments, and direct pathways for community college transfers, working professionals, and adult learners. The program is structured to meet EAC-ABET accreditation standards and prepare graduates for professional licensure, ensuring rigorous academic quality while maintaining accessibility for nontraditional students.

The program does not duplicate the academic missions or program strengths of HBIs but instead fills a complementary role in Maryland's higher education landscape. Opportunities for collaboration include shared workforce initiatives, articulation agreements, joint applied research projects, and cooperative senior design experiences. These partnerships would strengthen the collective capacity of Maryland's higher education institutions to address statewide workforce needs in engineering and manufacturing.

By expanding the number of students who can access mechanical-engineering education in Maryland, the program aligns with the shared objectives of HBIs and Capitol Technology University to promote diversity, equity, and inclusion in STEM. It supports the state's broader mission of ensuring that underrepresented students have multiple, flexible pathways to professional engineering careers while maintaining the unique contributions and institutional identities of Maryland's HBIs.

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

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

The Bachelor of Science in Mechanical Engineering was developed through collaboration among faculty from Capitol Technology University's School of Engineering, the Office of Academic Affairs, and members of the university's Industry Advisory Board. The program was designed in response to increasing workforce demand for graduates with strong analytical, design, and applied mechanical-engineering skills.

The curriculum builds upon the university's existing strengths in mechanical systems, electronics, and applied design. It integrates established courses from mechanical, electrical, and mechatronics engineering programs and aligns with current EAC-ABET accreditation standards. Core knowledge areas include statics, dynamics, thermodynamics, fluid mechanics, materials, heat transfer, manufacturing processes, and control systems.

The program will be overseen by full-time faculty members within the School of Engineering who hold doctoral degrees in mechanical, aerospace, or materials engineering. These faculty bring a combination of academic experience and professional practice in design, energy systems, and manufacturing. Adjunct instructors with specialized expertise in thermal systems, robotics, and advanced manufacturing will support selected courses and senior design supervision as enrollment expands.

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

The program will be delivered primarily in an on-campus, face-to-face format, with select courses available in hybrid or online delivery to accommodate working professionals and transfer students. Laboratory components will be central to the curriculum, reinforcing theory through experimentation, measurement, and design application.

Educational Objectives: Graduates of the Mechanical Engineering program will:

1. Be prepared for entry-level engineering positions in areas such as design, manufacturing, energy systems, and robotics.
2. Apply mechanical-engineering principles to the design, analysis, and improvement of thermal and mechanical systems.
3. Demonstrate professional ethics, teamwork, and effective communication in engineering practice.
4. Pursue lifelong learning, professional licensure, or advanced study in related fields.

Learning Outcomes:
Upon graduation, students will be able to:

1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. Communicate effectively with a range of audiences.
4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments that consider the global, economic, environmental, and societal impacts of engineering solutions.
5. Function effectively on teams that provide leadership, create collaborative environments, establish goals, plan tasks, and meet objectives.

6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Acquire and apply new knowledge as needed, using appropriate learning strategies.

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

3. Explain how the institution will:

a) Provide for assessment of student achievement of learning outcomes in the program.
Student learning outcomes will be assessed through direct and indirect measures, including examinations, design projects, laboratory exercises, and written and oral presentations. Each course will include defined learning outcomes mapped to the overall program outcomes. Faculty will collect assessment data each semester, which will be analyzed during annual program reviews.

The two-semester senior design capstone will serve as a comprehensive assessment of student achievement, evaluating the integration of mechanical-engineering principles, teamwork, communication, and design constraints. Annual assessment reports will be reviewed by the School of Engineering Assessment Committee and submitted to the Office of Academic Affairs for institutional analysis and continuous improvement. Advisory board members will provide feedback to ensure program outcomes remain aligned with industry standards.

b) Document student achievement of learning outcomes in the program.
Capitol Technology University maintains a centralized electronic system for documenting course and program assessment data. Course portfolios will include representative samples of student work, rubrics, and data analyses for each learning outcome. Trends in outcome attainment will be tracked over time, and summary reports will be prepared annually to document student performance and curricular adjustments. These data will be used in periodic self-studies for internal review and future EAC-ABET accreditation.

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

The Bachelor of Science in Mechanical Engineering is a 120-credit undergraduate degree designed to prepare students for professional practice, graduate study, and lifelong learning in mechanical engineering. The curriculum emphasizes applied learning, hands-on experimentation, and the use of modern engineering tools. Students gain broad experience through coursework in mechanics, materials, thermofluids, design, manufacturing, and control systems, culminating in a two-semester senior design project.

Program requirements are distributed as follows:

Category	Description	Credits
Mathematics and Science	Courses provide analytical and problem-solving foundations through mathematics, physics, and chemistry.	30
Engineering Core	Courses develop expertise in mechanical analysis, design, and manufacturing, supported by laboratory and computational work.	51
Computer Science	Programming courses in Python and C introduce computational modeling and simulation tools used in engineering analysis.	6

Capstone Design	Two-semester senior project sequence integrating design, fabrication, and testing.	6
General Education	Courses in English, ethics, business, arts, and social sciences strengthen communication and professional skills.	21
Technical Electives	Students select one elective to pursue specialization in energy systems, robotics, or advanced design.	6
Total		120

Bachelor of Science in Mechanical Engineering – Curriculum

Total Credit Hours: 120

I. Mathematics and Science (30 Credits)

This block provides the analytical and scientific foundation necessary for advanced engineering problem-solving.

Course Number	Course Title	Credits
MA 114	Algebra and Trigonometry	4
MA 128	Introduction to Statistics	3
MA 261	Calculus I	4
MA 262	Calculus II	4
MA 330	Linear Algebra	3
MA 340	Differential Equations	3
PH 201	General Physics I	3
PH 202	General Physics II	3
CH 120	Chemistry	3

II. Engineering Core (51 Credits)

This sequence develops the foundational engineering knowledge, design methodology, and technical competency essential for mechanical systems analysis and design.

Course Number	Course Title	Credits
MEC 210	Engineering Mechanics – Statics	3
MEC 255	Mechanics of Materials and Materials Science	3
MEC 310	Engineering Mechanics – Dynamics	3
MEC 330	Fluid Mechanics	3
MEC 215	Introduction to Engineering Design (CAD)	3
MEC 320	Applied Thermodynamics	3
MEC 340	Heat Transfer	3
MEC 350	Manufacturing Processes	3
MEC 360	Machine Design	3
MEC 375	Engineering Safety	3
EL 100	Introduction to DC/AC Circuits	3

EE 453	Control I	3
ROB 100	Introduction to Robotics	3

Subtotal: 51 Credits

III. Capstone Design Sequence (6 Credits)

These two courses synthesize the theoretical and practical elements of the program through a team-based project that emphasizes design, analysis, and implementation.

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

IV. Computer Science (6 Credits)

Students gain essential programming and computational modeling skills applicable to engineering analysis and design.

Course Number	Course Title	Credits
CS 120	Introduction to Programming Using Python	3
CS 150	Programming in C	3

V. General Education (21 Credits)

This component develops communication, ethical reasoning, and cultural awareness necessary for professional and societal engagement.

Course Number	Course Title	Credits
EN 101	English Communications I	3
EN 102	English Communications II	3
HU 331	Arts and Ideas	3
SS 351	Ethics	3
BUS 174	Introduction to Business and Management	3
BUS 301	Project Management	3
SS XXX	Social Science Elective	3

VI. Technical Electives (6 Credits)

Students select two upper-level mechanical engineering electives to pursue specialized interests and professional goals.

Course Number	Course Title	Credits
MEC 410	HVAC Systems	3
MEC 420	Renewable Energy Systems	3
MEC 430	Finite Element Analysis	3
MEC 440	Mechatronics Applications	3

Courses Descriptions

Mathematics and Science (30 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

MA 330 – Linear Algebra (3 credits): This course introduces the fundamental concepts of linear algebra with an emphasis on applications in engineering and science. Topics include systems of linear equations, matrices and matrix operations, determinants, vector spaces, basis and dimension, eigenvalues and eigenvectors, linear transformations, and orthogonality. Real-world applications are explored throughout to demonstrate the practical utility of linear algebra in solving engineering problems. **Prerequisite(s):** MA 261.

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

PH 201 – General Physics I (3 credits): This 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.

Engineering Core (51 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 261.

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 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 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 340 – Heat Transfer (3 credits): This course covers the fundamental principles and applications of heat transfer in engineering systems. Topics include steady-state and transient conduction, convection, radiation, and phase-change processes. Analytical and numerical methods are introduced for solving one- and two-dimensional heat transfer problems. Students analyze heat exchangers, extended surfaces, and thermal systems, emphasizing practical applications in mechanical and thermal design.
Prerequisite(s): MEC 320 and MEC 330.

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 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.

EL 100 – Introduction to DC/AC Circuits (3 credits): Introduces basic electrical concepts and laboratory techniques. Topics include current, voltage, resistance, and power; Ohm's Law; series and parallel resistive circuits; and Kirchhoff's voltage and current laws. Covers capacitors and inductors, charging and discharging, RC and RL time constants, and an introduction to AC signals including sinusoidal waveforms, phasors, reactance, and admittance. Laboratory work emphasizes the use of meters, testing equipment, and circuit breadboarding. MATLAB Part I introduces variables, functions, data types, programming, and basic plotting. Corequisite(s): MA 112.

EL 150 – DC/AC Circuits and Analysis (3 credits): Applies Kirchhoff's laws to multi-source and complex series-parallel circuits. Topics include determinants and matrices, mesh and nodal analysis, and network theorems such as Thevenin, Norton, superposition, and maximum power transfer. Reviews complex number manipulation and applies concepts to capacitive and inductive circuits, impedance, and RLC network analysis. Covers frequency response of RL and RC circuits and introduces Bode plots. Laboratory work emphasizes the use of standard test equipment to verify theoretical analysis. MATLAB Part II includes data import, conditional statements, loops, arrays, and array functions. Prerequisite(s): EL 100. Corequisite(s): MA 114 or equivalent placement; MA 261 or equivalent placement.

EL 200 – Electronic Devices & Circuits (3 credits): Introduces the principles, characteristics, and applications of semiconductor devices including diodes, Zener diodes, bipolar junction transistors (BJTs),

field-effect transistors (FETs), and operational amplifiers. Topics include biasing techniques, operating points, DC and AC load lines, and amplifier configurations with analysis of input/output impedances, voltage gain, and current gain. Prerequisite(s): EL 150.

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

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

EE 453 – Control I (3 credits): This course provides a comprehensive introduction to feedback control systems, focusing on the analysis and design of dynamic systems. Key topics include mathematical modeling of physical systems, transfer functions, system response for first- and second-order systems, and stability analysis using Routh-Hurwitz criterion. Students will study steady-state error, system performance metrics, and compensator design methods such as lead and lag compensators. Frequency-domain analysis is emphasized with Bode plots, gain and phase margins, and crossover frequencies. Practical applications are integrated through laboratory exercises and industry-standard computer-aided design tools (e.g., MATLAB/Simulink), equipping students with skills to design and analyze control systems for mechatronics and robotics applications. This course emphasizes both theoretical foundations and hands-on implementation to bridge the gap between theory and practice. **Prerequisite(s):** MA 340.

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.
Prerequisite(s): None.

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.

Computer Science (6 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.

General Education (18 Credits)

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

EN-102 – English Communications II (3 credits): This sequel to EN-101 involves more sophisticated reading, writing, speaking, and research assignments. Students must demonstrate competence in writing mechanics, as well as advanced research skills, the ability to handle complex information, and effective team skills. Students write research papers: an information paper, a cause-and-effect paper, an argument paper, and a final research paper. Course includes group work. Presentations are required. Prerequisite(s): EN 101**2.**

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.

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

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

The Bachelor of Science in Mechanical Engineering fully satisfies the general education requirements as defined by the Maryland Higher Education Commission (MHEC) and the standards outlined in COMAR 13B.02.03. General education is integrated throughout the curriculum to ensure students receive a broad-based education that promotes critical thinking, effective communication, ethical awareness, and social responsibility.

The program includes 21 credits of general education coursework distributed across key knowledge areas. English composition requirements are met through EN 101 and EN 102. The arts and humanities requirement is fulfilled by HU 331 (Arts and Ideas). Social and behavioral sciences requirements are satisfied by BUS 174 (Introduction to Business and Management) and SS 351 (Ethics), with an additional elective in the humanities or social sciences.

Quantitative reasoning and natural science competencies are addressed through the required courses in calculus, differential equations, physics, and chemistry, which collectively exceed MHEC's expectations for analytical and scientific literacy. This structure ensures that graduates possess the intellectual, ethical, and communication skills necessary for responsible and effective professional practice as engineers and as engaged global citizens.

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

As with other engineering programs at Capitol Technology University, the proposed Bachelor of Science in Mechanical Engineering will seek accreditation through the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

The curriculum has been designed in full alignment with ABET's "Criteria for Accrediting Engineering Programs," specifically Criterion 5: Curriculum, which requires:

- At least one year of college-level mathematics and basic sciences appropriate to the discipline, including experimental experience.
- At least one and one-half years of engineering topics consisting of engineering sciences and design, emphasizing both analysis and synthesis appropriate to mechanical engineering practice.

The program includes:

- Mathematics through differential equations and statistics (MA 261, MA 262, MA 340, MA 128) • Basic sciences including chemistry and a full sequence of calculus-based physics (CH 120, PH 201, PH 202)
- Over 45 credits of engineering topics, including statics, dynamics, thermodynamics, heat transfer, materials, manufacturing, and control systems
- A two-semester capstone design sequence (SDE 457 and SDE 458) requiring the integration of mechanical-engineering principles and the application of design constraints, professional ethics, and project management skills

The program structure satisfies all EAC-ABET curricular and outcome requirements. Following standard procedures, Capitol Technology University will apply for ABET accreditation review after the first cohort of students graduates. Once accredited, graduates will be eligible to pursue Professional Engineer (PE) licensure in Maryland and other states that recognize EAC-ABET-accredited degrees.

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

This program does not involve any contractual agreements with other institutions or non-collegiate organizations. All instruction, academic oversight, and student services for the Bachelor of Science in Mechanical Engineering will be delivered directly by Capitol Technology University using its existing faculty, laboratories, and administrative resources.

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

Capitol Technology University affirms that students enrolled in the Bachelor of Science in Mechanical Engineering program will receive complete and timely information regarding all aspects of the curriculum, academic expectations, and institutional resources. Information will be available through the following mechanisms:

- The complete curriculum, course descriptions, and degree requirements will be published in the university's academic catalog and on the official program webpage. These materials are reviewed annually by the Office of Academic Affairs to ensure accuracy and compliance with accreditation standards.

- Each student will be assigned a faculty advisor upon enrollment. Advisors provide personalized degree planning, course sequencing guidance, and ongoing academic support through to graduation.
- Course syllabi will outline expectations for attendance, participation, assignments, grading, and communication, including details on faculty availability through office hours and electronic correspondence.
- Students will be informed of required software, laboratory equipment, and technology skills during program orientation and through course syllabi. Minimum laptop and software specifications are maintained on the university website and supported by the Office of Information Technology.
- The university's official learning management system, Canvas, will be used to deliver course materials, facilitate assignments, and manage communication between students and faculty. Training and technical support are provided during new-student orientation and throughout the semester.
- Academic support services—including tutoring, library access, writing assistance, and career advising—are available to all students. These are described in the academic catalog, student handbook, and university website.
- The Financial Aid and Business Offices provide clear, detailed information regarding tuition, fees, billing procedures, payment plans, scholarships, military and veteran benefits, and institutional aid.

These measures ensure that all students are fully informed, supported, and equipped to succeed academically and professionally.

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

Capitol Technology University ensures that all advertising, recruitment, and admissions materials for the Bachelor of Science in Mechanical Engineering will accurately reflect the program's curriculum, structure, learning outcomes, and available student resources.

The Office of Marketing and Communications works collaboratively with the Office of Admissions and the School of Engineering to ensure that all promotional content is:

- Factually correct, transparent, and aligned with approved curricular documents;
- Consistent with the university's mission and accreditation standards;
- Regularly reviewed and updated to reflect any academic or policy changes.

Information provided in print, digital, and online formats—including brochures, the university website, social media, and outreach presentations—will clearly communicate:

- Degree requirements, credit hours, and course structure;
- Program objectives, learning outcomes, and areas of focus;
- Technology and laboratory expectations;
- Accreditation status and pathways to licensure;
- Faculty advising and career support services;
- Tuition, fees, and available financial aid.

Admissions staff and faculty advisors will receive program-specific training to ensure consistent and accurate representation of the program during recruitment events, community college visits, and information sessions.

H. Adequacy of Articulation

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

The Bachelor of Science in Mechanical Engineering at Capitol Technology University is designed to support transfer and articulation with a range of regional and statewide institutions. The program aligns closely with existing community-college curricula in engineering and pre-engineering disciplines, ensuring that students can efficiently transfer lower-division credits and progress toward degree completion.

Capitol Technology University currently maintains articulation agreements with institutions such as Cecil College, Howard Community College, Anne Arundel Community College, and Montgomery College. Additional partnerships exist with institutions outside Maryland, including the Community College of Rhode Island (CCRI) and Columbia Southern University. These partnerships provide structured transfer pathways for students completing associate degrees in mechanical engineering technology, applied physics, or general engineering.

The curriculum has been developed to maximize transfer credit while maintaining compliance with EAC-ABET standards in mathematics, science, and engineering topics. Lower-division courses in calculus, physics, chemistry, and introductory engineering are aligned with offerings at Maryland community colleges to ensure curricular consistency and facilitate student mobility.

The university also supports articulation initiatives with high schools through Project Lead The Way (PLTW) and serves on the Prince George's County Public Schools (PGCPS) PLTW Engineering Program Advisory Committee. These collaborations promote early exposure to STEM fields and strengthen the engineering education pipeline in Maryland.

Capitol Technology University will continue to expand articulation and transfer partnerships to include additional Maryland community colleges and technical institutions offering pre-engineering programs. Formal articulation and transfer pathway documents specific to the Mechanical Engineering program will be developed and submitted as supporting materials following MHEC approval.

I. Adequacy of Faculty Resources

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

The Bachelor of Science in Mechanical Engineering will be supported by a highly qualified and experienced faculty team composed of full-time professors, professors of practice, and adjunct instructors. Together, these faculty members bring expertise in mechanical, electrical, and systems engineering, as well as applied computing and project management. Their combined experience ensures that students receive both rigorous academic instruction and practical, industry-oriented training.

Faculty teaching in the program hold terminal degrees in engineering, computer science, and related disciplines, and have extensive experience in applied research, curriculum development, and industry collaboration. Two new full-time faculty members specializing in mechanical engineering have been appointed and will begin teaching in Fall 2025, expanding the department's expertise in mechanical systems, thermodynamics, and materials.

Full-Time Faculty

Dr. Mohamed Shehata, Dean of Academics and Chair of the Engineering Department, holds a Ph.D. in Engineering from Purdue University. His doctoral research focused on power electronics and electric drive systems. He oversees curriculum planning and teaches courses in engineering design, control systems, mechatronics, and energy systems.

Dr. Charles D. Conner earned a Ph.D. in Electrical Engineering from The Catholic University of America. He brings decades of teaching experience and industry engagement, offering courses in analog and digital systems, communications, and signal processing.

Dr. Andrew Mehri holds a Ph.D. in Computer Science and degrees in information architecture and electronics engineering. He has served in academic leadership roles and teaches courses in electronics, digital systems, and technical systems design.

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

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

Dr. Gregory P. Behrmann, Professor of Mechanical Engineering, earned a Ph.D. in Mechanical Engineering from The Catholic University of America. His background includes applied research in micro-manufacturing, K–12 STEM outreach, and engineering education. He teaches courses in statics, dynamics, materials, thermodynamics, and senior design.

Ms. Amelia Wear, Instructor of Mechanical Engineering, holds a B.S. in Mechanical Engineering and an M.S. in Software Engineering. She is a Lead Systems Engineer at Wabtec, bringing experience in control systems, integration, and agile design. She teaches courses in mechatronics, systems design, and applied modeling.

Dr. Nisma M. Omar, Adjunct Professor, earned a Ph.D. in Analytical Chemistry and an M.S. in Physical Chemistry. She teaches foundational science and mathematics courses, contributing to laboratory instruction and academic preparation for engineering students.

Adjunct Faculty

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

Ms. Megan Miskovish, Adjunct Professor of English, holds a B.A. in English from Lynchburg College and an M.S. in Education from Walden University. She teaches composition and technical writing courses supporting communication skills in engineering education.

Together, this faculty team provides the expertise necessary to deliver a high-quality, ABET-aligned mechanical engineering curriculum that integrates theory, experimentation, and applied design.

Table 1. Faculty Teaching Assignments

Faculty Member	**Courses Taught**
Dr. Nisma Omar	MA 114, CH 120
Dr. Andrew Mehri	MA 128, MA 330, EL 200, SDE 457
Dr. Charles Conner	MA 261, MA 262, MA 340, PH 202
Dr. Mohamed Shehata	PH 201, EL 150, EE 453
Dr. Mohamed Abaza	MEC 210, MEC 310, MEC 320, MEC 340, MEC 360
Dr. Gregory P. Behrmann	MEC 255, MEC 330, MEC 350, ROB 100, SDE 458
Dr. Amelia Wear	MEC 215, EL 100, EL 204, EL 262
Dr. Jeff Chi	MEC 375, BUS 174, BUS 301
Dr. Najam Hassan	CS 120, CS 150
Ms. Megan Miskovish	EN 101, EN 102, HU 331, SS 351

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

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

as the central resource for faculty training and instructional support. CITL offers workshops, seminars, and one-on-one consultations that emphasize teaching excellence, innovation, and continuous improvement.

a) Pedagogy that meets the needs of the students
Faculty receive regular training in student-centered pedagogy designed to address the diverse learning styles and needs of Capitol's student population, including traditional undergraduates, transfer students, adult learners, and underrepresented groups in STEM. Professional development sessions emphasize inclusive teaching, formative assessment, and classroom strategies that promote engagement, persistence, and retention. Faculty are encouraged to apply active learning techniques, project-based learning, and collaborative problem-solving approaches that reflect the applied nature of Capitol's engineering programs.

b) The learning management system
Capitol Technology University uses Canvas as its official learning management system (LMS). All faculty receive structured onboarding and training on Canvas prior to teaching. Ongoing workshops and resources provide instruction in advanced features such as course modules, integrated rubrics, analytics dashboards, and discussion tools. Faculty are trained to use Canvas to facilitate effective communication, provide timely feedback, and enhance student learning outcomes.

c) Evidence-based best practices for distance education, if distance education is offered
Not applicable.

J. Adequacy of Library Resources

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

Capitol Technology University's Puente Library provides comprehensive academic and research support for the Bachelor of Science in Mechanical Engineering program. The library maintains extensive physical and digital collections designed to meet the needs of students and faculty engaged in mechanical, electrical, and interdisciplinary engineering 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, which collectively provide full-text access to peer-reviewed articles, conference proceedings, and applied research materials in areas such as thermodynamics, materials science, fluid mechanics, mechatronics, and control systems.

In addition to academic journals, the library subscribes to standards and professional databases that include ASME (American Society of Mechanical Engineers), ASTM (American Society for Testing and Materials), and SAE (Society of Automotive Engineers) resources—ensuring students have access to industry standards relevant to design, testing, and manufacturing processes. The library's collection also includes reference materials and textbooks aligned with foundational and advanced coursework in mechanics, thermodynamics, materials, and systems design.

The Puente Library is equipped with modern information systems, online research tools, and access to interlibrary loan networks, enabling students to obtain specialized materials beyond the local collection. Online tutorials, citation management tools, and one-on-one research consultations are available to support students in developing information literacy and research skills essential for engineering 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 annually to review resource usage and identify new acquisitions aligned with evolving program and accreditation requirements.

Measures to ensure continued adequacy of library resources include:
− Conducting annual reviews of library holdings to ensure alignment with program learning objectives and emerging industry trends.
− Procuring new textbooks, case studies, and technical standards as course content evolves.
− Expanding access to specialized engineering and design databases as enrollment grows.
− Providing equitable online access to digital resources for 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 procedures are fully adequate to support the launch, growth, and long-term success of the Bachelor of Science in Mechanical Engineering program.

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

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

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

Laboratories currently used for existing engineering and technology programs will also support the Mechanical Engineering curriculum. These include fully equipped laboratories for:
− Statics, dynamics, and mechanics of materials
− Fluid mechanics and thermodynamics
− Electronics, control systems, and mechatronics
− Engineering design and computer-aided design (CAD)
− Manufacturing processes and materials testing

Each laboratory is equipped with industry-standard instrumentation, prototyping and measurement tools, and specialized software such as MATLAB, SolidWorks, Multisim, and LabVIEW. These facilities enable students to perform experiments, conduct analysis, and complete design projects aligned with ABET expectations for hands-on engineering education.

Faculty and staff offices are available and adequately furnished to support instruction, advising, and research collaboration. Annual space and equipment reviews are conducted to ensure capacity keeps pace with enrollment growth and technological advancements.

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

Capitol Technology University ensures that all students and faculty, including those who participate in hybrid or online courses, have comprehensive access to the digital infrastructure required for effective teaching and learning.

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

b) A learning management system that provides the necessary technological support for distance education
The university uses Canvas as its official learning management system (LMS). Canvas supports both synchronous and asynchronous learning and provides tools for lectures, discussion forums, graded assignments, online quizzes, and collaborative group work. Faculty are trained in online pedagogy and course design using Canvas, while students receive orientation and ongoing technical support to ensure effective participation in online components of their coursework.

Together, Capitol Technology University's facilities, laboratories, and digital infrastructure provide a strong and sustainable foundation for high-quality instruction in the Bachelor of Science in Mechanical Engineering program, whether delivered on campus or through hybrid formats.

L. Adequacy of Financial Resources with Documentation

1. Complete Table 1: Resources and Narrative Rationale. Provide finance data for the first five years of program implementation. Enter figures into each cell and provide a total for each year. Also provide a narrative rationale for each resource category. If resources have been or will be reallocated to support the proposed program, briefly discuss the sources of those funds.

The Bachelor of Science in Mechanical Engineering 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 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 structured to utilize Capitol's existing instructional infrastructure, laboratories, and faculty expertise. No current 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 reaching 40 full-time and 31 part-time students by Year 5. A modest 2.5% annual tuition increase is assumed, consistent with the university's historical trend. Revenue projections are conservative and sufficient to sustain instructional and operational costs.
3. **Grants, Contracts, and External Sources:** While no external funding is budgeted in the initial years, the university will pursue opportunities through workforce development and STEM education grants to enhance program delivery and support student research and internships.
4. **Other Sources:** No additional sources are identified at this time, though philanthropic and industry partnerships may supplement future initiatives.

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

TABLE 2: EXPENDITURES

Expenditure Category	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	$113,468	$155,071	$238,421	$325,843	$417,486
a. # FTE	1.5	2	3	4	5
b. Total Salary	$94,557	$129,226	$198,684	$271,536	$347,905
c. Total Benefits (20%)	$18,911	$25,845	$39,737	$54,307	$69,581
2. 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 (calculated at 20%) for full-time and adjunct faculty teaching mechanical engineering and related courses. Faculty allocation increases from 1.5 FTE in Year 1 to 5 FTE by Year 5, aligned with enrollment growth and course demand.
2. Administrative Staff: Administrative support (0.08 FTE) provides assistance with student advising, scheduling, and program coordination. Salary increases reflect annual inflation adjustments.
3. Support Staff: Includes lab coordinators and technical assistants essential for laboratory setup, equipment maintenance, and student support. Staffing grows from 1 to 3 FTE by Year 5, proportional to program expansion.
4. Technical Support and Equipment: Covers annual maintenance, lab consumables, and software license renewals (MATLAB, SolidWorks, Multisim). Costs increase as enrollment grows.
5. Library: No additional library expenditures are required. Existing engineering and technical resources are sufficient to support the curriculum.
6. New or Renovated Space: No new construction is required. The program will utilize existing engineering laboratories and classrooms.
7. Other Expenses: Includes marketing, accreditation preparation (ABET), faculty professional development, and program evaluation costs. These expenses increase with program growth and accreditation milestones.

M. Adequacy of Provisions for Evaluation of Program

1. Discuss 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.

Courses are evaluated at the end of each semester through standardized student course evaluations that measure instructional quality, course design, engagement, and achievement of learning outcomes. Results are reviewed by the course instructor, department chair, and Dean of Academic Affairs to identify strengths and areas for improvement.

Faculty performance is evaluated through multiple mechanisms, 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 professional development workshops offered through the Center for Innovation in Teaching and Learning (CITL), which supports continuous enhancement of teaching effectiveness.

Student Learning Outcomes (SLOs) are assessed at both the course and program levels. Faculty teaching courses that align with specific ABET-defined program outcomes collect direct evidence of student learning through exams, design projects, lab reports, and presentations. Assessment results are compiled, analyzed, and discussed during departmental meetings each semester. The findings guide curricular

adjustments, instructional refinements, and the integration of new technologies or methodologies to strengthen program quality.

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

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

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

− **Student Retention and Graduation Rates:** The university monitors program-specific retention, progression, and completion rates to evaluate student success. Early alert systems and proactive academic advising are used to improve persistence and reduce attrition.

− **Student and Faculty Satisfaction:** Surveys are administered annually to gather feedback on instructional quality, resource adequacy, advising, and overall program experience. Additional qualitative input is obtained through student focus groups and advisory board meetings.

− **Cost-Effectiveness:** The Business and Finance Division collaborates with Academic Affairs to review the program's cost-benefit performance each year. Analyses include enrollment trends, faculty workload, and resource utilization to ensure the program remains both fiscally efficient and academically robust.

− **Accreditation and Advisory Input:** The Mechanical Engineering program will seek accreditation through the Engineering Accreditation Commission (EAC) of ABET. As part of this process, continuous input will be obtained from the program's external advisory board, which includes industry and academic representatives who review curriculum relevance, student preparedness, and emerging workforce needs.

This integrated assessment framework ensures that the Bachelor of Science in Mechanical Engineering remains aligned with institutional goals, ABET accreditation standards, and the expectations of employers and students alike.

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

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

The Bachelor of Science in Mechanical Engineering aligns closely with Maryland's goals for promoting equitable access, diversity, and success among minority students, as articulated in COMAR 13B.02.03.05 and the Maryland State Plan for Postsecondary Education. Capitol Technology University has a well-established commitment to cultural diversity, inclusion, and educational opportunity for underrepresented populations in STEM disciplines.

The proposed program is designed to expand access to mechanical engineering education for historically underrepresented groups, including African American, Hispanic, female, first-generation, and veteran students. By emphasizing applied learning, mentorship, and community engagement, the program contributes directly to Maryland's statewide goals for minority student achievement and workforce diversity in high-demand technical fields.

To ensure equitable participation and success, the program incorporates the following initiatives:
− **Transfer-Friendly Pathways:** Articulation agreements with Maryland community colleges, which serve diverse student populations, provide streamlined transfer opportunities into the program.
− **Advising and Mentoring Support:** Each student is assigned an academic advisor who provides continuous guidance, while faculty mentoring and early intervention systems promote retention and academic success.
− **Financial Assistance:** The university offers institutional scholarships, need-based financial aid, and access to federal programs aimed at reducing economic barriers for underrepresented and economically disadvantaged students.
− **Inclusive Pedagogy:** Faculty receive training in culturally responsive teaching and Universal Design for Learning (UDL), ensuring that instructional practices accommodate diverse learning styles and backgrounds.
− **Hands-On and Project-Based Learning:** The curriculum emphasizes experiential learning through design projects and laboratory activities, approaches shown to be effective in improving engagement and persistence among minority students in STEM fields.

Beyond the classroom, Capitol Technology University fosters an inclusive campus environment through multicultural programming, student affinity groups, and diversity-focused initiatives that encourage cross-cultural understanding and leadership.

The Bachelor of Science in Mechanical Engineering supports Maryland's 2022 State Plan for Postsecondary Education, specifically:
− **Goal 1: Student Access** – by expanding affordable and flexible educational opportunities for underrepresented students; and
− **Goal 2: Student Success** – by providing the mentorship, financial support, and applied learning experiences necessary for academic persistence and professional achievement.

Through these efforts, the program contributes meaningfully to Maryland's broader mission of advancing diversity, equity, and inclusion within the STEM workforce and higher education landscape.

O. Relationship to Low Productivity Programs Identified by the Commission

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

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

Through internal academic performance reviews, the University has identified opportunities to consolidate instructional and operational resources from programs with lower enrollment or narrower specialization into broader, high-demand disciplines such as mechanical engineering. This approach ensures that faculty expertise, laboratory facilities, and administrative support are more effectively utilized to meet current workforce and student needs.

The proposed program will:
− **Reassign existing faculty** with expertise in mechanical systems, materials, and engineering design from under-enrolled courses into the Mechanical Engineering curriculum, ensuring optimal use of instructional capacity.
− **Leverage shared laboratory infrastructure** already supporting electrical, mechatronics, and applied engineering programs, thereby minimizing new capital investment while maintaining robust, hands-on instruction.
− **Integrate administrative and academic support functions** across related engineering programs to enhance efficiency and sustainability.
− **Stimulate enrollment growth and improve institutional productivity** through increased student interest in mechanical engineering—a foundational and high-demand discipline with strong employment prospects.

In this manner, while not directly replacing a Commission-identified low productivity program, the Bachelor of Science in Mechanical Engineering represents a strategic realignment of institutional resources toward a more interdisciplinary, workforce-relevant, and sustainable academic offering.

P. Adequacy of Distance Education Programs

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

Capitol Technology University is fully authorized by the Maryland Higher Education Commission (MHEC) to offer distance education programs. The University has extensive experience in delivering online and hybrid instruction at both the undergraduate and graduate levels across engineering, technology, and business disciplines. Capitol Technology University is also a recognized participant in the National Council for State Authorization Reciprocity Agreements (NC-SARA), which authorizes it to offer distance education to students residing in other SARA member states.

The University's distance education infrastructure includes a robust learning management system (Canvas), cloud-based academic and administrative systems, and comprehensive faculty training programs that ensure instructional quality and compliance with state and national standards.

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

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

Specific measures include:
− Curriculum quality and learning outcomes are equivalent across on-campus and online delivery formats.
− Regular and substantive faculty-student interaction is achieved through scheduled virtual meetings, online discussions, feedback mechanisms, and active advising.
− Student identity verification is conducted through secure authentication systems and assessment platforms that ensure academic integrity.
− Equal access to student services—including advising, tutoring, library resources, technical support, and career counseling—is guaranteed for online learners.
− The University maintains a reliable and scalable technology infrastructure that supports Canvas, synchronous learning platforms, and online laboratory simulations.
− All faculty members assigned to teach online or hybrid courses complete mandatory training in online pedagogy and learning management system operations.

While the Bachelor of Science in Mechanical Engineering will primarily be delivered in an on-campus format due to its laboratory-intensive curriculum, selected courses—particularly in mathematics, computer science, and general education—may be offered through online or hybrid modalities. All such courses will be designed and delivered in full compliance with MHEC, ABET, and C-RAC standards for quality, accessibility, and academic integrity.