June 1, 2023

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

Dear Dr. Raj,

Capitol Technology University is requesting approval to offer a **Doctor of Philosophy (Ph.D.) in Healthcare Technology**. The degree curriculum will be taught using a significant number of existing faculty at our university and will be supplemented by new courses supporting the **Ph.D. in Healthcare Technology**. The mission of Capitol Technology University is to provide practical education in engineering, computer science, information technology, and business that prepares individuals for professional careers and affords the opportunity to thrive in a dynamic world. A central focus of the university's mission is to advance practical working knowledge in areas of interest to students and prospective employers within the context of Capitol's degree programs. The university believes that a Ph.D. in Healthcare Technology is consistent with this mission.

Educational organizations are reporting significant workforce shortages of trained personnel with a masters' degree and experience in leading educational organizations, especially in the domain of healthcare technology. Moreover, the shortage is growing each year with increasing demand in healthcare technology and the annual departure of large numbers of existing data professionals who are reaching retirement age. This program is in response to that need; the Ph.D. in Healthcare Technology degree is for new master's level graduates and non-traditional students (i.e., experienced education, data, and statistical personnel) who desire to advance in their careers by gaining leadership skills in the Healthcare Technology field.

To respond to needs of the business, cyber and security industries, we respectfully submit for approval the Ph.D. in Healthcare Technology. The required proposal is attached as well as the letter from me as university president confirming the adequacy of the university's library to serve the needs of the students in this degree.

Respectfully,

Bradford L. Sim, PhD
President

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June 1, 2023

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

Dear Dr. Raj,

This letter is in response to the need for confirmation of the adequacy of the library of Capitol Technology University to support the proposed **Doctor of Philosophy (Ph.D.) in Healthcare Technology.** As president of the university, I confirm that the library resources, including support staff, are more than adequate to support the **Doctor of Philosophy in Healthcare Technology (Ph.D.).** In addition, the university is dedicated to, and has budgeted for, continuous improvement of its library resources.

Respectfully,

Bradford L. Sim, PhD
President

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

Institution Submitting Proposal	Capitol Technology University

Each __action__ below requires a separate proposal and cover sheet.

- ⦿ New Academic Program
- ◯ New Area of Concentration
- ◯ New Degree Level Approval
- ◯ New Stand-Alone Certificate
- ◯ Off Campus Program

- ◯ Substantial Change to a Degree Program
- ◯ Substantial Change to an Area of Concentration
- ◯ Substantial Change to a Certificate Program
- ◯ Cooperative Degree Program
- ◯ Offer Program at Regional Higher Education Center

Payment Submitted: ◯ Yes ◯ No	Payment Type: OR*STARS # 94891 ⦿ Check # 94891	Payment Amount: $850.00	Date Submitted: 6/1/2023

Department Proposing Program	Department of Doctoral Programs
Degree Level and Degree Type	Doctor of Philosophy (PhD)
Title of Proposed Program	Doctor of Philosophy in Healthcare Technology
Total Number of Credits	60
Suggested Codes	HEGIS: 0701	CIP: 43.0116
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 submission as per COMAR 13B.02.03.03)	⊗ Fall ◯ Spring ◯ Summer Year: 2023
Provide Link to Most Recent Academic Catalog	URL: https://www.captechu.edu/current-students/academic-resources

Preferred Contact for this Proposal	Name:	Mr. Allen Exner
	Title:	Director of Library Services and Information Literacy
	Phone:	(240) 965-2470
	Email:	ahexner@captechu.edu

President/Chief Executive	Type Name: Dr. Bradford Sims
	Signature: Date: 05/31/2023
	Date of Approval/Endorsement by Governing Board: 05/31/2023

Revised 1/2021

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 2023
Projected Implementation Date

Doctor of Philosophy (Ph.D.) Award to be Offered	**Doctor of Philosophy in Healthcare Technology** Title of Proposed Program
0701 Suggested H.E.G.I.S. Code	**43.0116** Suggested C.I.P. Code
Doctoral Programs Department of Proposed Program	**Dr. Ian McAndrew** Name of Department Head

Dr. Eric Motycka Director, Graduate Programs	emotycka@captechu.edu Contact E-Mail Address	301-369-3614 Contact Phone Number

_R̸N̸S̸S̸_ 5/31/23   President/Chief Executive Approval

Signature and Date

MAY 31, 2023   Date Endorsed/Approved by Governing Board

Date

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Proposed Doctor of Philosophy in Healthcare Technology Department
of Doctoral Programs
Capitol Technology University
Laurel, Maryland

A. Centrality to Institutional Mission and Planning Priorities:

1. **Provide a description of the program, including each area of concentration (if applicable), and how it relates to the institution's approved mission.**

   Doctor of Philosophy in Healthcare Technology Program Description:

   The **Doctor of Philosophy (Ph.D.) in Healthcare Technology** degree is a unique program designed to meet the rapidly evolving technological landscape in healthcare organizations worldwide. Technological proliferation continues to expand within healthcare at every level. The **Ph.D. in Healthcare Technology** program provides students with the opportunity to conduct extensive and sustained, original research at the highest level in the field of Healthcare Technology. The **Ph.D. in Healthcare Technology** is designed to meet the demands of the highest-skilled professionals to become leaders who will be involved in the advancement, expansion, and support of Healthcare Technology nationally and internationally. The **Ph.D. in Healthcare Technology** is for current professionals in the field who desire to elevate their skills to the highest level and to contribute to the body of knowledge in Healthcare Technology.

   The proposed **Ph.D. in Healthcare Technology** degree is for current professionals in the field. The degree provides a path for Healthcare Technology personnel to explore new ground in the healthcare technology space. The University is in a unique position to give those students an avenue to pursue a deep proficiency in this area using an interdisciplinary methodology, cutting-edge courses, and dynamic faculty. Graduates will contribute significantly to the Healthcare Technology field through the creation of new knowledge, ideas, and technological applications. The **Ph.D. in Healthcare Technology** program is designed as a doctorate by research where students will quickly become able to engage in leadership, research, and publishing.

   The **Ph.D. in Healthcare Technology** program is structured for experienced professionals in the Healthcare Technology field with an appropriate master's degree and professional experience. It is possible for a student with an appropriate master's degree and no professional experience to enter the program, but it would be less common than experienced professionals. During the program, students will conduct original research in an approved area of Healthcare Technology. Successful completion of the program culminates in the award of the **Doctor of Philosophy (Ph.D.) in Healthcare Technology** degree.

   The completion of the **Ph.D. in Healthcare Technology** program requires the student to produce, present, and defend a doctoral dissertation after receiving the required approvals from the student's Committee and the Ph.D. Review Board.

   There are two options for completion of the **Ph.D. in Healthcare Technology** program. Under the dissertation option, the student will produce, present, and defend a doctoral dissertation after

receiving the required approvals from the student's Committee and the Ph.D. Review Board. Under the publication option, the student will produce, present, and defend their original doctoral research after receiving the required approvals from the student's Committee and the Ph.D. Review Board. The student must also publish three works of original research in a scholarly peer-reviewed journal(s) of high stature. Two of the three published works may be in a peer-reviewed conference proceeding if the conference is international.

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

   Capitol Technology University operates on four strategic goals:

   1. **Expand Educational Offerings, Increase Program Completion:** *Capitol Technology University is an institution that offers career-relevant curricula with quality learning outcomes. The strategy includes continuing to expand educational offerings, increasing program completion, and raising learner qualifications and outcomes.*

   2. **Increase Enrollment and Institutional Awareness:** *Capitol will accelerate its goal pursuit to become more globally renowned and locally active through student, faculty and staff activities. Enrollment will grow to 450 undergraduates, 350 masters' students and 500 doctoral candidates.*

   3. **Improve the Utilization of University Resources and Institutional Effectiveness While Expanding Revenue**: *Capitol will likely continue to be 80% financially dependent on student tuition and fees. We plan to enhance our resources by expanding the range and amount of funding from other streams and aligning costs with strategic initiatives.*

   4. **Increase the Number and Scope of Partnerships**: *Capitol's service to our constituents and sources of financial viability both depend upon participation with continuing and new partner corporations, agencies, and schools.*

   The proposed **Ph.D. in Healthcare Technology** program supports all the University's four strategic goals. The proposed degree builds upon the existing areas of degrees at the undergraduate level: B.S. in Astronautical Engineering, B.S. in Aviation Professional Pilot, B.S. in Computer Engineering, B.S. in Computer Engineering Technology, B.S. in Computer Science, B.S. in Construction Information Technology and Cybersecurity, B.S. in Construction Management and Critical Infrastructure, B.S. in Construction Safety, B.S. in Counterterrorism, B.S. in Cyber Analytics, B.S. in Cybersecurity, B.S. in Data Science, B.S. in Electrical Engineering, B.S. in Electrical Engineering Technology, B.S. in Engineering Technology, B.S. in Facilities Management and Critical Infrastructure, B.S. in Information Technology, B.S in Management of Cyber and Information Technology, B.S. in Mechatronics Engineering, B.S. in Mechatronics and Robotics Engineering Technology, B.S. in Mobile Computing, B.S. in Professional Trades Administration, B.S. in Software Engineering, and B.S. in Technology and Business Management, B.S in Unmanned and Autonomous Systems, and B.S. in Web Development.

   The proposed degree also supports the existing areas of degrees of graduate study, including the Master of Business Administration (M.B.A.), Master of Science (M.S.) in Astronautical Engineering, M.S. in Aviation, M.S. in Aviation Cybersecurity, M.S. in Computer Science, M.S. in Construction Cybersecurity, M.S. in Construction Safety, M.S. in Critical Infrastructure, M.S.

in Cyber Analytics, M.S. in Cybersecurity, M.S. in Information Systems Management, M.S. in Engineering Technology, M.S. in Internet Engineering, M.S. in Product Management, M.S. in Unmanned and Autonomous Systems Policy and Risk Management, Technical Master of Business Administration (T.M.B.A.) in Business Analytics and Data Science, and T.M.B.A. in Cybersecurity, Doctor of Science (D.Sc.) in Cybersecurity, Doctor of Philosophy (Ph.D.) in Artificial Intelligence, Ph.D. in Aviation, Ph.D. in Business Analytics and Data Sciences, Ph.D. in Construction Science, Ph.D. in Counterterrorism, Ph.D. in Critical Infrastructure, Ph.D. in Cybersecurity Leadership, Ph.D. in Emergency and Protective Services, Ph.D. in Human Factors, Ph.D. in Healthcare Cybersecurity, Ph.D. in Manufacturing, Ph.D. in Occupational Health and Safety, Ph.D. in Operational Technology, Ph.D. in Product Management, Ph.D. in Quantum Computing, Ph.D. in Real Estate Management, Ph.D. in Technology, Ph.D. in Technology/M.S. Research Methods Combination Program, and Ph.D. in Unmanned Systems Applications.

The University's programs have prepared professionals for the rapid advances in information technology, intense global competition, and increasingly sophisticated technological environments for decades. The **Ph.D. in Healthcare Technology** follows that tradition.

The proposed **Ph.D. in Healthcare Technology** is fully supported by the University's Vision 2025 and Strategic Plan 2017-2025. Funding to support the **Ph.D. in Healthcare Technology** is already available within the existing budget.

The University has active partnerships in the private and public areas (e.g., Parson Corporation, Leidos, Patton Electronics, Lockheed Martin, Northrup Grumman, Cyber Security Forum Initiative, Internal Revenue Service, and National Cryptologic School). The **Ph.D. in Healthcare Technology** degree will provide new opportunities for partnerships. The increase in alliances and the placement of our graduates in our partner institutions will serve to expand the University's enrollment and reputation. While additional students will increase financial resources, new partnerships, and grants in the Healthcare Technology field will diversify and increase financial resources.

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

Capitol Technology University will support the proposed program through the same process and support level as the University's existing programs. The University has also budgeted funds to support program and course development, online support, office materials, travel, professional development, and initial marketing. There is no substantial impact to the institution due to the advanced budgeting of these funds. If approved, the program will be self-sustaining going forward.

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

   a. **Ongoing administrative, financial, and technical support of the proposed program**

   The proposed degree is an integral part of the University's Strategic Plan for FY 2017-2025 and forward. The institutional and departmental budgets for FY 2021-2022, as well as the forecasted budgets going forward, include funding for the administrative, financial, and technical support of the new degree.

b. **Continuation of the program for a period of time sufficient to allow enrolled students to complete the program.**

Capitol Technology University is fully committed to continuing the proposed **Ph.D. in Healthcare Technology** degree program for a sufficient period to allow enrolled students to complete the program.

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 based on one or more of the following:**

a. **The need for advancement and evolution of knowledge.**

A recent report from the New England Journal of Medicine highlights technology's continuing growth and proliferation in all areas of the healthcare industry.

> Technology will take over some sections of traditional turf. Artificial intelligence, for example, will help radiologists be more efficient and accurate, with a possible outcome of fewer radiologists required. Similar transformation will likely happen in pathology. Over time, with the aid of AI, these specialties might evolve to become a new medical specialty — the medical diagnostician. There is also major redundancy in cancer care — most patients likely will not need to see an oncologist, an oncological surgeon, and a radiation oncologist, as often happens today. Changing reimbursement, AI, and advances in precision medicine will drive efficiency through consolidation and changing professional roles.

> (Source: https://catalyst.nejm.org/doi/full/10.1056/CAT.20.0569)

Continuing this reporting trend, a recent whitepaper by CDW further illustrates the rapid growth of technology in the healthcare industry, from IoT devices to remote care.

> From the bedside to the boardroom, technology continues to transform the way healthcare organizations deliver care and manage operations. In one survey, 97 percent of healthcare executives said that continuous advances in technology are a reliable driver of long-term organizational strategy — even more than economic, political or social trends.

> In recent years, healthcare organizations have widely adopted cloud solutions and Software as a Service (SaaS) applications. Cloud scalability, reliability and ease of management help organizations alleviate IT staffing challenges, increase agility and pursue advanced capabilities such as artificial intelligence. Shifting technology resources away from on-premises data centers allows IT teams to focus on systems and workflows that enhance care, improve the clinician experience and address staffing needs.

> (Source: https://www.cdw.com/content/cdw/en/articles/digitalworkspace/how-it-enables-providers-

)

Despite a short-term drop in the funding of healthcare technology innovation, according to a recent report from Deloitte, investment in healthcare technology innovation is increasing at a rapid pace.

As the dynamics of the 2022 and early 2023 macroeconomic environment swept across the United States, the health tech market felt a cooling effect. The health tech sector's 2022 venture capital funding fell short of 2021, dropping about 30% from US$39.3 billion in 2021 to US$27.5 billion in 2022 (figure 1). However, 2022 investments were still approximately 30% higher than in 2020, and more than doubled from 2019. As the overall venture capital funding continues to trend up, interviewed health tech experts remain optimistic about the opportunities to bring innovation to health care in 2023 and beyond. To keep pace, innovators that have been primarily focused on growth are also finding ways to bridge longer funding cycles.

(Source: https://www2.deloitte.com/us/en/insights/industry/health-care/healthcare-technology-trends.html)

Healthcare Technology also relates to healthcare cybersecurity, and a senior advisor for cybersecurity and risk for the American Hospital Association, John Riggi, recently detailed the cybersecurity threat to healthcare organizations, cost of falling victim to HCTkers and cyber thieves, and the need for healthcare to evolve to meet the threat.

Health care organizations continually face evolving cyberthreats that can put patient safety at risk. That's why I advise hospital C-suite and other senior leaders not to view cybersecurity as a purely technical issue falling solely under the domain of their IT departments. Rather, it's critical to view cybersecurity as a patient safety, enterprise risk and strategic priority and instill it into the hospital's existing enterprise, risk-management, governance and business-continuity framework.

Aligning cybersecurity and patient safety initiatives not only will help your organization protect patient safety and privacy, but will also ensure continuity of effective delivery of high-quality care by mitigating disruptions that can have a negative impact on clinical outcomes.

Why health care gets hit more

Health care organizations are particularly vulnerable and targeted by cyberattacks because they possess so much information of high monetary and intelligence value to cyber thieves and nation-state actors. The targeted data includes patients' protected health information (PHI), financial information like credit card and bank account numbers, personally identifying information (PII) such as Social Security numbers, and intellectual property related to medical research and innovation.

In fact, stolen health records may sell up to 10 times or more than stolen credit card numbers on the dark web. Unfortunately, the bad news does not stop there for health care organizations — the cost to remediate a breach in health care is almost three times that of other industries — averaging $408 per stolen health care record versus $148 per stolen non-health record.[1]

How cyberattacks threaten patient privacy, clinical outcomes and your hospital's

financial resources.

Cyberattacks on electronic health record and other systems also pose a risk to patient privacy because HCTkers access PHI and other sensitive information. By failing to keep patient records private, your organization could face substantial penalties under HIPAA's Privacy and Security Rules, as well as potential harm to its reputation within your community.

Most importantly, patient safety and care delivery may also be jeopardized. Losing access to medical records and lifesaving medical devices, such as when a ransomware virus holds them hostage, will deter your ability to effectively care for your patients. HCTkers' access to private patient data not only opens the door for them to steal the information, but also to either intentionally or unintentionally alter the data, which could lead to serious effects on patient health and outcomes.

Another example: Patient outcomes were threatened when Britain's National Health Service was hit as part of the May 2017 "WannaCry" ransomware attack on computer systems in 150 countries, resulting in ambulances being diverted and surgeries being canceled. Since that time there have been other instances of ambulance diversion orders issued due to ransomware, including here in the U.S. With proper planning and investment, however, it's possible to mitigate this risk. As I told Congress last July, "The impact of Wannacry on American hospitals and health systems was far less serious, which speaks to the tremendous efforts the field has made to improve cybersecurity and build incident-response capabilities."

Take steps to protect your organization

The cyber bad guys spend every waking moment thinking about how to compromise your cybersecurity procedures and controls. The best defense begins with elevating the issue of cyber risk as an enterprise and strategic risk-management issue. If possible, you should also dedicate at least one person full time to lead the information security program, and prioritize that role so that he or she has sufficient authority, status and independence to be effective. Furthermore, you and your team should receive regular updates on your organization's strategic cyber risk profile and whether adequate measures are dynamically being taken to mitigate the constantly evolving cyber risk.

Finally, the most important defense is to instill a patient safety-focused culture of cybersecurity. This enables health care organizations to leverage their existing culture of patient care to impart a complementary culture of cybersecurity. A culture of cybersecurity, where the staff members view themselves as proactive defenders of patients and their data, will have a tremendous impact in mitigating cyber risk to the organization and to patients.

1 "Cost of Healthcare Data Breach is $408 Per Stolen Record, 3x Industry Average Says IBM and Ponemon Institute Report"

(Source: https://www.aha.org/center/cybersecurity-and-risk-advisory-services/importance -cybersecurity-protecting-patient-safety)

A recent study of the mHealth applications on smartphones illuminates just one area of many where the cybersecurity threat in healthcare is growing, not shrinking. The researcher found

that all mHealth applications were vulnerable to Application Programming Interface (API) attacks.

The personally identifiable health information of millions of individuals is being exposed through the Application Programming Interfaces (APIs) used by mobile health (mHealth) applications, according to a recent study published by cybersecurity firm Approov.

Ethical HCTker and researcher Allissa Knight conducted the study to determine how secure popular mHealth apps are and whether it is possible to gain access to users' sensitive health data. One of the provisos of the study was she would not be permitted to name any of the apps if vulnerabilities were identified. She assessed 30 of the leading mHealth apps and discovered all were vulnerable to API attacks which could allow unauthorized individuals to gain access to full patient records, including personally identifiable information (PII) and protected health information (PHI), indicating security issues are systemic.

mHealth apps have proven to be invaluable during the COVID-19 pandemic and are now increasingly relied on by hospitals and healthcare providers. According to Pew Research, mHealth apps are now generating more user activity than other mobile device apps such as online banking. There are currently an estimated 318,000 mHealth apps available for download from the major app stores.

The 30 mHealth apps analyzed for the study are used by an estimated 23 million people, with each app downloaded an average of 772,619 times from app stores. These apps contain a wealth of sensitive data, from vital signs data to pathology reports, test results, X-rays and other medical images and, in some cases, full medical records. The types of information stored in or accessible through the apps carries a high value on darknet marketplaces and is frequently targeted by cybercriminals. The vulnerabilities identified in mHealth apps makes it easy for cybercriminals to gain access to the information.

"Look, let's point the pink elephant out in the room. There will always be vulnerabilities in code so long as humans are writing it. Humans are fallible," said Knight. "But I didn't expect to find every app I tested to have hard-coded keys and tokens and all of the APIs to be vulnerable to broken object level authorization (BOLA) vulnerabilities allowing me to access patient reports, X-rays, pathology reports, and full PHI records in their database."

BOLA vulnerabilities allow a threat actor to substitute the ID of a resource with the ID of another. "When the object ID can be directly called in the URI, it opens the endpoint up to ID enumeration that allows an adversary the ability to read objects that don't belong to them," explained Knight. "These exposed references to internal implementation objects can point to anything, whether it's a file, directory, database record or key." In the case of mHealth apps, that could provide a threat actor with the ability to download entire medical records and personal information that could be used for identity theft.

APIs define how apps can communicate with other apps and systems and are used for sharing information. Out of the 30 mHealth apps tested, 77% had hard-coded API keys which made them vulnerable to attacks that would allow the attacker to intercept information as it is exchanged. In some cases, those keys never expired and 7% of the

API keys belonged to third-party payment processors that strongly advise against hard coding these private keys in plain text, yet usernames and passwords had still been hard coded.

All of the apps lacked certificate pinning, which is used to prevent man-in-the-middle attacks. Exploiting this flaw would allow sensitive health and personal information to be intercepted and manipulated. Half of the tested apps did not authenticate requests with tokens, and 27% did not have code obfuscation protections, which made them vulnerable to reverse engineering.

Knight was able to access highly sensitive information during the study. 50% of records included names, addresses, dates of birth, Social Security numbers, allergies, medications, and other sensitive health data. Knight also found that if access is gained to one patient's records, other patient records can also be accessed indiscriminately. Half of all APIs allowed medical professionals to view pathology, X-ray, and clinical results of other patients and all API endpoints were found to be vulnerable to BOLA attacks, which allowed Knight to view the PHI and PII of patients not assigned to her clinical account. Knight also found replay vulnerabilities that allowed her to replay FaceID unlock requests that were days old and take other users' sessions.

Part of the problem is mHealth apps do not have security measures baked in. Rather than build security into the apps at the design stage, the apps are developed, and security measures are applied afterwards. That can easily result in vulnerabilities not being fully addressed.

"The fact is that leading developers and their corporate and organizational customers consistently fail to recognize that APIs servicing remote clients such as mobile apps need a new and dedicated security paradigm," said David Stewart, founder and CEO of Approov. "Because so few organizations deploy protections for APIs that ensure only genuine mobile app instances can connect to backend servers, these APIs are an open door for threat actors and present a real nightmare for vulnerable organizations and their patients."

(Source: https://www.hipaajournal.com/100-of-tested-mhealth-apps-vulnerable-to-api-attacks/)

The evolution of senior leadership and effective use of advanced technology in Healthcare Technology can only be achieved with a holistic and cutting-edge approach. Those advanced skills and strategies will be covered in this proposed degree.

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

Capitol Technology University is a diverse multiethnic and multiracial institution with a long history of serving minority populations. The University has a 51% minority student population, with 7% undisclosed. The Black/African American population is 34%. The university has a military/veteran population of 22%. The University also has a 22% female population – a significant percentage given its status as a technology institution. If approved, the proposed **Ph.D. in Healthcare Technology** will expand the field of opportunities for minorities and disadvantaged students.

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

While Capitol Technology University is not a historically black institution, the university is a diverse multiethnic and multiracial institution with a long history of serving minority populations. The University has a 51% minority student population, with 7% undisclosed. The Black/African American population is 34%. The University has a military/veteran population of 22%. The university also has a 22% female population – a significant percentage given its status as a technology institution. If approved, the proposed **Ph.D. in Healthcare Technology** will expand the field of opportunities for minorities and disadvantaged students. Given the substantial minority population of Capitol Technology University, it is also reasonable to assert that the **Ph.D. in Healthcare Technology** program will add to the base of minority participation in the Healthcare Technology field.

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

The 2017-2021 Maryland State Plan for Postsecondary Education articulates three goals for postsecondary education:

1. Student Access
2. Student Success
3. Innovation

Goal 1: Student Access

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

Capitol Technology University is committed to ensuring equitable access to affordable post-secondary education for all Maryland residents. The University meets its commitment in this arena through its diverse campus environment, admissions policies, and academic rigor.

- Priority 1: Study the affordability of postsecondary education in Maryland.
- Priority 2: Examine and improve financial literacy programs for students and families to encourage financial planning to pay for postsecondary education.
- Priority 3: Analyze systems that impact how specific student populations access affordable and quality postsecondary education.

The Capitol Technology University community is committed to creating and maintaining a mutually respectful environment that recognizes and celebrates diversity among all students, faculty, and staff. The University values human differences as an asset and works to sustain a culture that reflects the interests, contributions, and perspectives of diverse groups. The University delivers educational programming to meet the needs of diverse audiences. We also seek to instill those values, understanding, and skills to encourage leadership and service in a global multicultural society.

The composition of the University's student body reflects the institution's commitment to diversity. Capitol Technology University has a 51% minority student population, with 7% undisclosed. The Black/African American population is 34%. The University has a

military/veteran population of 22%. The University also has a 22% female population – a significant percentage given its status as a technology university.

Achievement gaps: The University provides leveling courses in support of individuals attempting a career change to a field of study not necessarily consistent with their current skills. There are situations where undergraduate courses best serve student needs in subject areas. The University makes those courses available.

The University engages in diversity training for its institutional population, including students. Diversity and inclusiveness are built into the curriculum allowing graduates to operate effectively in a global environment. The University supports multiple diversity enhancing actions, including team projects and grants across degrees. This has proven effective at supporting numerous aspects of diversity.

Capitol Technology University does not discriminate on the basis of race, color, national origin, sex, age, sexual orientation, or handicap in admission, employment, programs, or activities.

Through its academic programs, Capitol Technology University seeks to prepare all of its graduates to demonstrate four primary characteristics:

- **Employability:** The ability to enter and advance in technical and managerial careers, appropriate to their level and area of study, immediately upon graduation.
- **Communications:** Mastery of traditional and technological techniques of communicating ideas effectively and persuasively.
- **Preparation of the Mind:** The broad intellectual grounding in technical and general subjects required to embrace future technical and managerial opportunities with success.
- **Professionalism:** Commitment to life-long learning, ethical practice, and participation in professions and communities.

The proposed **Ph.D. in Healthcare Technology** program and University Financial Aid will be available to all Maryland residents who qualify academically for admission. The University has successfully managed to support Financial Aid for its students since its founding in 1927.

The **Ph.D. in Healthcare Technology** program, with its academic rigor, will produce highly qualified Healthcare Technology leaders with the highest level of skills and abilities to advance their careers. The University has a proven record of rigorous high-quality education in all its degrees. Four accrediting organizations fully accredit the University. The University receives its regional accreditation from the Middle States Commission on Higher Education (MSCHE). The University also has specialized accreditation from the Accreditation Board for Engineering and Technology (ABET), National Security Agency (NSA), and Department of Homeland Security (DHS). The **Ph.D. in Healthcare Technology** program is consistent with the MSCHE criteria for regional accreditation to deliver high-quality higher education.

Goal 2: Student Success

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

The courses for the **Ph.D. in Healthcare Technology** degree will be offered online using the Canvas Learning Management System and Zoom. The University provides a tuition structure that is competitive with its competitors. The University tuition structure does not differentiate

between in-state students and out-of-state students. The University's Student Services provide advising, tutoring, virtual job fair attendance, and other activities supporting student completion and employment for both on-ground and online students.

Students receive information throughout the admissions process regarding the cost to attend the University. The information is also publicly available on the University website. The University's Admissions Office and Office of Financial Aid identify potential grants and scholarships for each student. The Office of Financial Aid also provides plans for each student to reduce potential student debt. The net cost versus gross costs is identified clearly for the student. Students receive advising from Financial Aid Advisors before enrolling in classes for the first time. Admissions personnel, Student Services Counselors, and Departmental Chairs advise students of the need for academic readiness as well as the degree requirements. Academic Advisors also develop a specific success pathway for each student.

The University's tuition increases have not exceeded 3%. The University also has a tuition guarantee for undergraduates, which means full-time tuition is guaranteed not to increase more than 1% per year above the rate at the time of initial enrollment. The tuition remains at this rate if the student remains enrolled full-time without a break in attendance.

The University provides services and learning tools to guide students to successful degree completion. Programs such as Early Alert give the University's faculty and staff opportunities for early student intervention on the pathway to graduation. This program applies to all students regardless of the mode of course delivery or degree program. Capitol Technology University is also a transfer-friendly institution and participates in multiple programs for government and military credit transfer. Capitol Technology University participates in the Articulation System for Maryland Colleges and Universities (ARTSYS) and has numerous transfer agreements with local institutions at all degree levels.

The University has in place services, tutoring, and other tools to help ensure student graduation and successful job placement. The University hosts a career (job) fair twice a year. The University has an online career center available to all students covering such topics as career exploration, resume writing, job search techniques, social media management, mock interviews, and assistance interpreting job descriptions, offers, and employment packages.

The University also works with its advisory boards, alumni, partners, and faculty to help ensure the degrees offered at the University are compatible with long-term career opportunities supporting the state's knowledge-based economy.

Goal 3: Innovation

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

Capitol Technology University's past, present, and future are inextricably intertwined with innovation. The University has a long tradition of serving as a platform for the use of new and transformative approaches to delivering higher education. New technology and cutting-edge techniques are blended with proven strategies to enable student success in all classroom modalities as well as in a successful career after graduation. As a small institution, Capitol Technology University has the agility to rapidly integrate new technologies into the curriculum to better prepare students for the work environment. The University designs curriculum in alliance

with its accreditation and regulating organizations and agencies.

The University also employs online virtual simulations in a game-like environment to teach the application of knowledge in a practical hands-on manner. The University engages with a partner creating high-level virtual reality environments for use by students pursuing this degree. This use of current technology occurs in parallel with traditional, proven learning strategies. These elements of the University's online learning environment are purposeful and intended to improve the learning environment for both the student and faculty member. The approach is intentionally designed to increase engagement, improve outcomes, and improve retention and graduation rates. The University believes that innovation is the key to successful student and faculty engagement.

Example: The University engages its students in fusion projects that allow students to contribute their skills in interdisciplinary projects such as those in our Astronautical Engineering and Cyber Labs. In those labs, students become designers, builders, and project managers (e.g., to send a CubeSat on a NASA rocket) and data analysts (e.g., to analyze rainforest data for NASA). The University's students recently launched their latest satellite aboard a NASA rocket from a location in Norway at the beginning of the 2020 Fall Semester. The University is also recruiting additional partners for the proposed **Ph.D. in Healthcare Technology** for which real-world projects will provide students integrative learning opportunities in the Healthcare Technology field.

The University also supports prior learning assessment. Portfolio analysis is available. The University accepts professional certifications for credit for specific courses. The University also allows students to take a competency exam for credit for required courses up to the current state limits.

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

1. **Describe potential industry or industries, employment opportunities, and expected level of entry (*ex: mid-level management*) for graduates of the proposed program.**

   Graduates with the **Ph.D. in Healthcare Technology** degree will be expected to fill technical executive and senior-level positions in commercial companies as well as local, state, and federal government with a variety of titles such as:

   - Vice President, Healthcare Technology, Health Maintenance Organization
   - Chief Healthcare Technology Officer
   - Healthcare Technology Consultant
   - Senior Scientist, Healthcare Technology
   - Healthcare Technology Scientist, U.S. Government Agency
   - Healthcare Technology Subject Matter Expert
   - Senior Director, Healthcare Technology, World Health Organization
   - Vice President, Healthcare Technology, International Healthcare Company

   Graduates from the proposed **Ph.D. in Healthcare Technology** will possess the highest knowledge in Healthcare Technology with the ability to serve as top leaders in their field. Graduates will also possess the required knowledge in Healthcare Technology to serve as a subject matter expert and form their own private company.

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

The U.S. Bureau of Labor Statistics (BLS) does not have a category yet for Healthcare Technology. The field is relatively new and growing in the labor market. As a result, there are no concise government statistics for this sector of Healthcare Technology. However, there is virtually no unemployment in the Healthcare field. The proposed doctoral degree is designed to address senior leaders' needs within Healthcare Technology over the next 25 years.

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

The U.S. Bureau of Labor Statistics (BLS) does not have a category yet for Healthcare Technology positions. The field is relatively new and growing in the labor market. As a result, there are no concise government statistics for this sector of the Healthcare field. However, there is virtually no unemployment in the Healthcare field. The proposed doctoral degree is designed to address senior leaders' needs within Healthcare Technology over the next 25 years.

4. **Data showing the current and projected supply of prospective graduates.**

There are no doctoral degrees in Healthcare Technology in Maryland or the rest of the United States. The proposed **Ph.D. in Healthcare Technology** would be the first. As a result, there is no data on the current and projected supply of prospective graduates. However, in the broader healthcare field, there is virtually no unemployment. The current positions in Maryland also earn a mean salary of $120,000 per year (source: indeed.com).

D. **Reasonableness of Program Duplication**

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

There are no doctoral degrees in Healthcare Technology in Maryland or the rest of the United States. The proposed **Ph.D. in Healthcare Technology** would be the first. There are a small number of cybersecurity, information security/studies, and health science informatics degrees at the doctoral level. However, those degrees are much broader in scope and do not focus exclusively on Healthcare Technology. The University of Maryland Baltimore County (UMBC) has a Ph.D. in Information Systems with the choice of adding three courses in health care informatics. The University of Maryland College Park (UMCP) offers a Ph.D. in Information Studies. Johns Hopkins University (JHU) has a Ph.D. in Health Sciences Informatics. Capitol Technology University has a D.Sc. in Cybersecurity and Ph.D. in Cybersecurity Leadership. However, UMBC, UMCP, and JHU do not offer a doctoral degree solely focused on Healthcare Technology. If approved, the proposed **Ph.D. in Healthcare Technology** would be the first such degree in the State of Maryland and the United States.

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

The proposed **Ph.D. in Healthcare Technology** program is strongly aligned with the University's strategic priorities and is supported by adequate resources. The proposed **Ph.D. in**

Healthcare Technology degree will strengthen and expand upon the existing technology, management, and applied engineering degree programs at the University. In addition, the **Ph.D. in Healthcare Technology** program will be an option for all students as the field integrates well with the market needs of the University's other programs. There is a thorough discussion of the need for the program in Sections B and C of this document.

E. Relevance to high-demand programs at Historically Black Institutions (HBIs):

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

The University does not anticipate any impact on the implementation or maintenance of high-demand programs at HBIs. There are no Ph.D. programs, or other doctoral degrees, in Healthcare Technology in Maryland or the rest of the United States. The proposed **Ph.D. in Healthcare Technology** degree would be the first.

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 University does not anticipate any impact on the uniqueness and institutional identities and missions of HBIs. There are no Ph.D. programs, or other doctoral degrees, in Healthcare Technology in Maryland or the rest of the United States. The proposed **Ph.D. in Healthcare Technology** would be the first.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes (as outlined in COMAR 13B.02.03.10):

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

The University's New Programs Group established the proposed program through a rigorous review of unmet needs. The group includes selected representation from the University's faculty, administrators, and Executive Council. Please see Section I for a detailed list of the faculty's backgrounds and qualifications.

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

Learning Objectives:

1. Students will evaluate the need for Healthcare Technology and the robust protection of healthcare systems.
2. Students will demonstrate advanced knowledge and competencies needed for the future in Healthcare Technology.
3. Students will analyze and synthesize theories, tools, and frameworks used in Healthcare Technology.
4. Students will execute a plan to complete a significant piece of scholarly work in Healthcare Technology.

5. Students will develop the skills to implement Healthcare Technology plans required for advanced global protection of healthcare assets.

Learning Outcomes:

Upon graduation, graduates will be able to:

1. Utilize their knowledge of technological applications to create solutions that will support healthcare organizations in streamlining processes, automating tasks, and improving workflows.
2. evaluate complex problems, synthesize varying perspectives, and develop advanced solutions to Healthcare Technology challenges.
3. Develop and implement Healthcare Technology plans for use in the protection of healthcare assets
4. Graduates will contribute to the body of knowledge in Healthcare Technology and will design and implement an original scholarly work that addresses a current deficit in the Healthcare Technology body of knowledge.

3. **Explain how the institution will:**

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

Capitol Technology University will assess student achievement of the learning outcomes per the regulations specified by the University's regional accreditation organization: the Middle States Commission on Higher Education (MSCHE).

Under MSCHE, the University will use Standard V, Educational Effectiveness Assessment, of the Standards for Accreditation and Requirements of Affiliation. Standard V requires:

Assessment of student learning and achievement demonstrates that the institution's students have accomplished educational goals with their program of study, degree level, the institution's mission, and appropriate expectations for institutions of higher education.

(Source: https://www.msche.org/standards/, retrieved 7/22/2019)

Per the MSCHE's accreditation requirements, Capitol Technology University will measure Standard V by using the following criteria:

An accredited institution possesses and demonstrates the following attributes or activities:

1. [C]learly stated educational goals at the institution and degree/program levels, which are interrelated with one another, with relevant educational experiences, and with the institution's mission;

2. [O]rganized and systematic assessments, conducted by faculty and/or appropriate professionals, evaluating the extent of student achievement of institutional and degree/program goals. Institutions should:

   a. define meaningful curricular goals with defensible standards for evaluating

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whether students are achieving those goals; articulate how they prepare students in a manner consistent with their mission for successful careers, meaningful lives, and, where appropriate, further education. They should collect and provide data on the extent to which they are meeting these goals;
b. support and sustain assessment of student achievement and communicate the results of this assessment to stakeholders;

3. [C]onsideration and use of assessment results for the improvement of educational effectiveness. Consistent with the institution's mission, such uses include some combination of the following:

a. assisting students in improving their learning;
b. improving pedagogy and curriculum;
c. reviewing and revising academic programs and support services;
d. planning, conducting, and supporting a range of professional development activities;
e. planning and budgeting for the provision of academic programs and services;
f. informing appropriate constituents about the institution and its programs;
g. improving key indicators of student success, such as retention, graduation, transfer, and placement rates;
h. implementing other processes and procedures designed to improve educational programs and services;

4. [I]f applicable, adequate and appropriate institutional review and approval of assessment services designed, delivered, or assessed by third-party providers; and

5. [P]eriodic assessment of the effectiveness of assessment processes utilized by the institution for the improvement of educational effectiveness.

(Source: http://www.msche.org/wp-content/uploads/2018/06/RevisedStandardsFINAL.pdf)

The University will also evaluate student achievement of the learning outcomes using the Quality Assurance Agency for Higher Education (QAA) Framework for Higher Education Qualifications and its related assessment tools. The following tables (on the next page) provide a high-level view of the QAA Qualification Frameworks for doctoral programs:

AA Qualifications Framework for Ph.D.

4.18 Descriptor for a higher education qualification at level 8 on the FHEQ and SCQF level 12 on the FQHEIS: doctoral degree

The descriptor provided for this level of the frameworks is for any doctoral degree which should meet the descriptor in full. This qualification descriptor should also be used as a reference point for other level 8/level 12 qualifications.

Doctoral degrees are awarded to students who have demonstrated:

- the creation and interpretation of new knowledge, through original research or other advanced scholarship, of a quality to satisfy peer review, extend the forefront of the discipline, and merit publication

- a systematic acquisition and understanding of a substantial body of knowledge which is at the forefront of an academic discipline or area of professional practice

- the general ability to conceptualise, design and implement a project for the generation of new knowledge, applications or understanding at the forefront of the discipline, and to adjust the project design in the light of unforeseen problems

- a detailed understanding of applicable techniques for research and advanced academic enquiry.

Typically, holders of the qualification will be able to:

- make informed judgements on complex issues in specialist fields, often in the absence of complete data, and be able to communicate their ideas and conclusions clearly and effectively to specialist and non-specialist audiences

- continue to undertake pure and/or applied research and development at an advanced level, contributing substantially to the development of new techniques, ideas or approaches.

And holders will have:

- the qualities and transferable skills necessary for employment requiring the exercise of personal responsibility and largely autonomous initiative in complex and unpredictable situations, in professional or equivalent environments.

QAA Qualifications Framework for Ph.D. (Continued)

4.18.1 Doctoral degrees are awarded for the creation and interpretation, construction and/or exposition of knowledge which extends the forefront of a discipline, usually through original research.

4.18.2 Holders of doctoral degrees are able to conceptualise, design and implement projects for the generation of significant new knowledge and/or understanding. Holders of doctoral degrees have the qualities needed for employment that require both the ability to make informed judgements on complex issues in specialist fields and an innovative approach to tackling and solving problems.

4.18.3 Doctoral programmes that may have a substantial taught element in addition to the research component (for example, professional doctorates), lead usually to awards which include the name of the discipline in their title (for example, EdD for Doctor of Education or DClinPsy for Doctor of Clinical Psychology). Professional doctorates aim to develop an individual's professional practice and to support them in producing a contribution to (professional) knowledge.

4.18.4 The titles PhD and DPhil are commonly used for doctoral degrees awarded on the basis of original research.

4.18.5 Achievement of outcomes consistent with the qualification descriptor for the doctoral degree normally requires study equivalent to three full-time calendar years.

4.18.6 Higher doctorates may be awarded in recognition of a substantial body of original research undertaken over the course of many years. Typically a portfolio of work that has been previously published in a peer-refereed context is submitted for assessment. Most degree awarding bodies restrict candidacy to graduates or their own academic staff of several years' standing.

(Source: UK Quality Code for Higher Education, Part A: Setting and Maintaining Academic Standards, The Frameworks for Higher Education Qualifications of UK Degree-Awarding

Bodies, October 2014)

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

Doctor of Philosophy in Healthcare Technology Program Description:

The **Doctor of Philosophy (Ph.D.) in Healthcare Technology** degree is a unique program designed to meet the rapidly evolving Cybersecurity threats to healthcare organizations worldwide. Conflict within the cybersphere continues to expand within healthcare at every level. The **Ph.D. in Healthcare Technology** program provides students with the opportunity to conduct extensive and sustained, original research at the highest level in the field of Healthcare Technology. The **Ph.D. in Healthcare Technology** is designed to meet the demands of the highest-skilled professionals to become leaders who will be involved in the advancement, expansion, and support of Healthcare Technology nationally and internationally. The **Ph.D. in Healthcare Technology** is for current professionals in the field who desire to elevate their skills to the highest level and to contribute to the body of knowledge in Healthcare Technology.

The proposed **Ph.D. in Healthcare Technology** degree is for current professionals in the field. The degree provides a path for Healthcare Technology personnel to explore new ground in the ongoing battle within cybersphere. The University is in a unique position to give those students an avenue to pursue a deep proficiency in this area using an interdisciplinary methodology, cutting-edge courses, and dynamic faculty. Graduates will contribute significantly to the Healthcare Technology field through the creation of new knowledge, ideas, and technology. The **Ph.D. in Healthcare Technology** program is designed as a doctorate by research where students will quickly become able to engage in leadership, research, and publishing.

Description of program requirements:

Entrance Requirements

To be accepted into the **Ph.D. in Healthcare Technology** program, students must have completed an appropriate master's degree with a cumulative GPA of no less than 3.0 on a 4.0 scale. Students must also possess a high level of experience in the field, or a closely related field, and show the academic promise of their future ability to produce original research of publishable quality (suitable for a scholarly peer-reviewed journal or publication and presentation of high stature).

Students must also provide a prospectus of at least 1000 words that details their existing expertise and preparation for success in conducting original research within Capitol Technology University's **Ph.D. in Healthcare Technology** program. International students are required to take the TOEFL and score at least 550 on the paper-based test or 79 on the internet-based test.

Degree Requirements:

The **Ph.D. in Healthcare Technology** program is designed for students with an appropriate master's degree and significant years of field experience. During the program, students will conduct original research in an approved area of study. Successful completion of the program

culminates in the award of the **Doctor of Philosophy (Ph.D.) in Healthcare Technology** degree.

There are two options for completion of the **Ph.D. in Healthcare Technology** program. Under the thesis option, the student will produce, present, and defend a doctoral dissertation after receiving the required approvals from the student's Committee and the Ph.D. Review Board. Under the publication option, the student will produce, present, and defend their original doctoral research after receiving the required approvals from the student's Committee and the Ph.D. Review Board. The student must also publish three works of original research in a scholarly peer-reviewed journal(s). One of the three published works may be in a peer-reviewed conference proceeding.

Degree Requirements:

The following is a list of courses for the **Ph.D. in Healthcare Technology** degree.

<div align="center">

Doctor of Philosophy in Healthcare Technology
Courses
Total Credits: 60

HEALTHCARE TECHNOLOGY DOCTORAL CORE: 30 CREDITS

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HCT-800 Healthcare Technology Research Background (6 Credits)
The student will focus on the study of the Healthcare Technology strategies, tactics, and developments. The student will synthesize the growing effect of Cybersecurity threats to healthcare operations, international relationships, and impact on the healthcare field overall. The student will identify areas for improvements and failings. The faculty will directly support and mentor the exploration phase of the planning. Prerequisite: None.

HCT-810 Healthcare Technology Research Methodologies (6 Credits)
Under a Chair and committee, a student will continue evaluating the Healthcare Technology field. The student will also develop research methodologies and strategies suitable for understanding Healthcare Technology. The student will address the data sources, information, and intelligence to test a hypothesis or research question. It is expected the student will be building upon HCT-800 in refining and developing their research task and plan.

HCT-820 Healthcare Technology Future Demands (6 Credits)
Under a Chair and committee, a student will further research the future demands in the Healthcare Technology field and how these influence specific research questions. Data collection and applications will be central to evaluating the needs of Healthcare Technology in the short, medium, and long term. The literature review will be more specific in focus and direction at this stage.

HCT-830 Strategies for Healthcare Technology (6 Credits)
The student will undertake a robust and comprehensive analysis of the strategies for the growth and evolution of the Healthcare Technology field under the direction of their Chair/committee. A firm direction and draft of a methodology will be taking shape and direction. The topic will be reviewed to ensure the scope is not too broad.

HCT-840 Healthcare Technology Research Proposal (6 Credits)
The student will produce a proposal for research that is comprehensive in detail and planning. The proposal will address the research topic, scope and aims, objectives and include a timing plan. The doctoral student will then complete the research milestones according to the proposal and research plan. The IRB and ARB will need to be completed by this stage.

HEALTHCARE TECHNOLOGY DOCTORAL RESEARCH AND WRITING: 30 CREDITS

HCT-900 Healthcare Technology Doctoral Writing I (6 Credits)
The student will compose and complete Chapters 1 and 2 within the boundaries of the proposal and research plan. Chapters 1-2 will be reviewed by the student's Chair and Committee and must be approved for the student to advance. The material for these chapters will have been established in the HCT 800 series. Any disagreement within the committee will be reviewed by the Dean of Doctoral Programs.

HCT-910 Healthcare Technology Doctoral Writing II (6 Credits)
The student will compose and complete Chapter 3 (methodology chapter that is robust and identifies all implications) according to the approved proposal. After receiving the necessary approvals, the student will conduct data collection and analysis activities consistent with the research plan.

HCT-920 Healthcare Technology Doctoral Writing III (6 Credits)
The student will compose and complete Chapter 4. The student will provide a complete and substantive presentation of the research results in Chapter 4. The student's Chair and Committee must review and approve Chapter 4 for the student to advance.

HCT-930 Healthcare Technology Doctoral Writing IV (6 Credits)
The student will compose and complete Chapter 5 and submit the work to the student's Chair and Committee. The student will also finalize all required elements of their research. The student's Chair and Committee must review and approve the complete document. The student's Chair and Committee will then submit the complete document to the University Reviewers and Ph.D. Review Board for approval. The student must receive approval from the University Reviewers and Ph.D. Review Board to advance forward.

HCT-940 Healthcare Technology Doctoral Defense (6 Credits)
Upon approval from the University Reviewers and Ph.D. Review Board, the student will prepare and deliver an oral presentation summarizing the body of research and defend the same through *viva voce* (i.e., oral examination). The student's Chair, Committee and Ph.D. Review Board will confer to determine if the student has provided a sufficient and necessary final oral defense of the research.

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

   N/A. This is a graduate program.

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

The program will be accredited regionally by Middle States Commission on Higher Education (MSCHE). The University will also evaluate student achievement of the learning outcomes using the UK Quality Assurance Agency for Higher Education (QAA) Framework for Higher Education Qualifications.

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

   The University will not be contracting with another institution or non-collegiate organization.

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.**

   The **Ph.D. in Healthcare Technology** 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.

   Curriculum, course, and degree information will be available on the university website and via e-mail as well as regular mail (by request). The expectations for faculty/student interaction are available to students during virtual open house events, literature, website, etc. This information is also part of the material distributed for each course. Students receive guidance on proper behavior/interaction with their Department Chair and faculty members both in-person and online to facilitate a high-level experience. The technology competence, required skills, and technical equipment requirements are part of the material distributed for each course. The technical equipment requirements are also listed on our website and provided to students in the welcome package.

   The University's academic support services, financial aid resources, costs and payment policies, and Learning Management System are covered in the University Open Houses, the application process, the Welcome Aboard process, Orientation, Student Town Halls, and individual counseling.

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.**

   The **Ph.D. in Healthcare Technology** program's advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and the services available. The content for every new program is derived from the new program request sent to the Maryland Higher Education Commission is the source of the content for every new program at the University.

H. Adequacy of Articulation:

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

   This program does not currently have articulation partners. However, the articulation process will work as it does for the University's current degrees. The University is very active with its transfer partners throughout the state and beyond. The goal of the University is to work with partners to make the transfer as seamless as possible and to maximize the student's transfer credits as possible. There are University transfer admissions personnel to guide the student through the process.

I. Adequacy of Faculty Resources (as outlined in COMAR 13B.02.03.11):

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

   Almost all of the faculty listed below have been engaged with the University for at least several years. Dr. Ashmall, Dr. Bajracharya, Dr. Baker, Dr. Butler, Dr. Goodwin, Dr. McAndrew, and Dr. McCaskey are fulltime faculty members. All of the faculty members hold terminal degrees. The University leadership is confident in the quality of the faculty and their abilities to provide a learning environment supportive of the University goals for student success. Additional Ph.D.-qualified faculty will be added as needed.

   Instructors who will be engaged with the **Ph.D. in Healthcare Technology** are:

Dr. Tariq Abughazaleh Adjunct	Ph.D. Technology M.Sc. Quality Engineering B.S Mechanical Engineering	HCT 800 courses
Dr. Richard Baker Full time	Ph.D. Information Systems M.S. Computer Science B.S. Mathematics	HCT 800 and 900 courses
Dr. Benjamin Larson Adjunct	Ph.D. Management and Decision Sciences M.S. Analytics B.S. Information Technology and Management	HCT courses
Dr. William Triplett Adjunct	Ph.D. Cyber Security Leadership Ph.D. Strategic Leadership MBA BS Healthcare Management	HCT courses
Dr. Dennis Beatty Adjunct	D.Sc. Information Assurance M.S. Information Technology B.S. Computer Science	HCT 800 and 900 courses

Dr. Malcolm Beckett Adjunct	D.B.A. Quality Systems Management in Homeland Security and Defense M.S. Information Systems Management B.S. Criminal Justice CISSP PMP	HCT 800 and 900 courses
Dr. William Butler Full time	D.Sc. Cyber Security M.S. Strategic Studies B.S. Computer Science NSTISSI No. 4011 CNSSI No. 4012 NSTISSI No. 4015 CNSSI No. 4016	HCT 800 and 900 courses
Dr. Susan Goodwin Full time	Ph.D. Technology M.S Security Studies, Cybersecurity Concentration M.S. Information Technology Graduate Certificate Network Security B.S. Computer Science American Society for Quality - Certified Software Quality Engineer Raytheon Six Sigma Specialist CompTIA Linux Certified	HCT 800 and 900 courses
Dr. Ian McAndrew Full time	Ph.D. Mechanical Engineering M.Sc. Manufacturing Engineering M.A. Education Management Post-Graduate Diploma in Education B.Sc. (Hons) Mechanical Engineering B.A. Production Engineering	HCT 900 courses
Dr. Steven Wood Adjunct	D.Sc. Cyber Security M.S. Computing and Cyber B.S. Systems Engineering	HCT 800 and 900 courses

ADDITIONAL JUSTIFICATION FOR KEY FACULTY:
Capitol Technology University's instructors for this program are leading experts in cybersecurity, terrorism, counterterrorism, technology, and supporting fields, including:

Dr. Susan Goodwin
Dr. Goodwin is a professor at Capitol Technology University. She is an expert in healthcare and financial cybersecurity. Dr. Goodwin has served as a consultant for Partners HealthCare Services. She has worked for Charles Stark Draper Laboratory, Wang Laboratories, Hewlett-Packard Corporation, iRobot Corporation, Polaroid Corporation, General Dynamics Information Technology, Harvard University Information Technology, and Computervision. Dr. Goodwin is equally accomplished in the financial cybersecurity arena, most recently serving as the Assistant Vice President for Compliance and Operational Risk at Bank of America. Her technical expertise includes CMMI, Raytheon Six Sigma, Linux, UNIX, MS-Windows, VMware, Networking, GUI, Bug Tracking Systems, SQL, MySQL, Relational Database Management Systems, Amazon Web Services, Microsoft Azure, Cloud Services, RCS, ODE, PVCS, CVS, Subversion, TortoiseSVN, Microsoft Team Foundation Server, Process Management Software (PTC Windchill), Microsoft SharePoint Site Owner Administration, SharePoint, and JIRA. Dr. Goodwin is also a noted speaker, moderator, and panelist at local, national, and international meetings and conferences.

Dr. Benjamin Larson
Dr. Larson has 25 years plus experience in the healthcare technology sector, first within the US Army involved with supporting healthcare equipment. Both on base and deployed and subsequently has extensive experience in industry previously to entering academia. His range of skills includes a doctor of science in cyber security and extensive knowledge of how to get energy from the side of the equipment it uses and ultimately technical aspects. Dr. Larson's areas of research interests include AI, Machine Learning, NLP, Cyber Security, Healthcare Informatics, and Healthcare Technology. Specifically, he likes to focus on problems where data driven decision making can improve outcomes and processes. Professionally, he focuses on the use of machine learning and AI to improve rare event detection.

Dr. William Triplett
Dr. William Triplett specializes in cybersecurity, health information technology, ransomware, human factors, leadership, business management, and data analytics. As postdoctoral researcher at Capitol Technology University, he developed interpretable theories involving cybersecurity human factors and ransomware attacks involving the healthcare industry. Dr. Triplett's current research is on the increase of cybersecurity threats that pose a significant risk to industry, specifically, hospitals and universities. The increase in the development of smart medical equipment and mobile devices has made industry increasingly vulnerable to ransomware.

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

a) Pedagogy that meets the needs of the students

The primary pedagogy for faculty at Capitol Technology University is the Active Learning model. The university believes strongly in a highly interactive, thinking, and hands-on experience for students in each class to the maximum extent possible.

It was two Missouri State professors, historian Charles Bonwell and psychologist James Eison, who coined the term "active learning." In their 1991 book on the subject, Active Learning: Creating Excitement in the Classroom, they offered this definition of the concept: "active learning involves students in doing things and thinking about the things they are doing."

The definition, though it seems circuitous, marks a definitive pedagogical shift in college teaching and learning. Rather than think about what they are watching, hearing, or reading, students are first encouraged to be "doing" something in class, and then to apply critical thought and reflection to their own classroom work and activity. Their argument was backed up by research. Even Bligh, 20 years earlier, had pointed out that the immediate rehearsal of new information and knowledge had a significant impact on learning.

This approach is as helpful in the sciences as it is in the arts or humanities: whether it's organic chemistry, creative writing, or behavioral economics, concepts are all best understood through repeated practice and open, social exploration. The central tenet of active learning is that practice matters, and that classroom time is better spent giving students opportunities to work with concepts over and over, in a variety of ways and with opportunities.

The central tenet of active learning — that practice and interaction matters— can be applied across disciplines for immediate feedback, so that knowledge can take hold in their own minds.

(Source: Preville, P. Active Learning: The Perfect Pedagogy for the Digital Classroom: An Essential Guide for the Modern Professor)

All faculty receive regular periodic and recurring pedagogical training during the academic year. Those training sessions occur in a hybrid format – simultaneously live online and live on-ground in the classroom. The sessions are designed to reach all faculty, both full-time and adjunct, in order to ensure everyone receives the training. Additionally, the sessions are recorded for those faculty who are unable to attend the live training session due to other professional and teaching commitments.

b) The Learning Management System

The University's Department of Online Learning and Information Technology Division supports the online program needs of faculty and students. The Department of Online Learning and the IT Help Desk provide 24-hour support to the faculty. Canvas is the University's online Learning Management System. When a new faculty member is assigned to teach an online course, the Department of Online Learning provides formal training for the instructor. New faculty are assigned an experienced faculty mentor to ensure a smooth transition to the online environment as well as to ensure compliance with the institution's online teaching pedagogy. The University believes this provides the highest-level learning experience for the faculty member and, in turn, students attending online classes.

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

Faculty at Capitol Technology University receive training in Keller's ARCS Motivational Model

and his associated strategies for distance education/online learning.

A model used in the online delivery of teaching and learning to increase learner motivation is Keller's ARCS motivational model. This model has been considered an important element in online education because of its implications on increased learner motivation and learning outcomes. The Keller's model consists of motivating students by maintaining and eliciting attention (A), such as virtual clinical simulations; making the content and format relevant (R), by modeling enthusiasm or relating content to future use; facilitating student confidence (C), by providing "just the right challenge"; and promoting learner satisfaction (S), by providing reinforcement and praise when appropriate. Examples of Keller's model include increasing motivation including the arousal of curiosity of students, making the connection between learning objectives and future learning goals, autonomous thinking and learning, and fostering student satisfaction. Keller's ARCS model has been researched by various educational online programs to analyze student motivation and learning outcomes. Keller's model serves as an example and guide for instructors to motivate and increase online engagement with their students as wells as research purposes.

A qualitative study by Chan Lin investigated online student learning and motivation. Discussion boards, student projects, and reflection data were collected and analyzed from a 12-week web-based course. Respondents indicated the importance of online feedback from the instructor and peer modeling of course tasks to visualize learning progress. The study revealed using Keller's ARCS strategies fosters greater student online engagement by fostering self-efficacy and a sense of accomplishment.

In a mixed-method study, assessing the use of Keller's ARCS on instructional design, the use of educational scaffolding fostered positive levels of student motivation. Relevancy, attention, confidence, and satisfaction were all common factors associated with student success in the course and course completion.

(Source: Pinchevsky-Font T, Dunbar S. Best Practices for Online Teaching and Learning in Health Care Related Programs. The Internet Journal of Allied Health Sciences and Practice. January 2015. Volume 13 Number 1.)

All faculty receive regular periodic and recurring training on evidence-based practices for distance education/online learning during the academic year. Those training sessions occur in multiple formats: asynchronous, synchronous (i.e., live online), hybrid (i.e., simultaneously live online and live on-ground), and on-ground in the classroom. The sessions are designed to reach all faculty, both full-time and adjunct, to ensure all members receive the training. Additionally, the live sessions are recorded for those faculty who cannot attend the live training session due to other professional commitments or who are teaching classes at the training delivery time.

J. Adequacy of Library Resources (as outlined in COMAR 13B.02.03.12):

1. **Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program. If the program is to be implemented within existing institutional resources, include a supportive statement by the President for library resources to meet the program's needs.**

   Library Services: The Puente Library offers extensive services and a wide collection for Capitol Technology University students to be academically successful. Library resources are available

digitally. The library also provides a mailing service for materials borrowed through the Maryland system.

The library is currently supporting the following degrees at the undergraduate level: B.S. in Astronautical Engineering, B.S. in Aviation Professional Pilot, B.S. in Computer Engineering, B.S. in Computer Engineering Technology, B.S. in Computer Science, B.S. in Construction Information Technology and Cybersecurity, B.S. in Construction Management and Critical Infrastructure, B.S. in Construction Safety, B.S. in Counterterrorism, B.S. in Cyber Analytics, B.S. in Cybersecurity, B.S. in Data Science, B.S. in Electrical Engineering, B.S. in Electrical Engineering Technology, B.S. in Engineering Technology, B.S. in Facilities Management and Critical Infrastructure, B.S. in Information Technology, B.S in Management of Cyber and Information Technology, B.S. in Mechatronics Engineering, B.S. in Mechatronics and Robotics Engineering Technology, B.S. in Mobile Computing, B.S. in Professional Trades Administration, B.S. in Software Engineering, and B.S. in Technology and Business Management, B.S in Unmanned and Autonomous Systems, and B.S. in Web Development.

The library is currently supporting the following degrees at the graduate level: Master of Business Administration (M.B.A.), Master of Science (M.S.) in Astronautical Engineering, M.S. in Aviation, M.S. in Aviation Cybersecurity, M.S. in Computer Science, M.S. in Construction Cybersecurity, M.S. in Construction Safety, M.S. in Critical Infrastructure, M.S. in Cyber Analytics, M.S. in Cybersecurity, M.S. in Information Systems Management, M.S. in Engineering Technology, M.S. in Internet Engineering, M.S. in Unmanned and Autonomous Systems Policy and Risk Management, Technical Master of Business Administration (T.M.B.A.) in Business Analytics and Data Science, and T.M.B.A. in Cybersecurity, Doctor of Science (D.Sc.) in Cybersecurity, Doctor of Philosophy (Ph.D.) in Artificial Intelligence, Ph.D. in Aviation, Ph.D. in Business Analytics and Data Sciences, Ph.D. in Construction Science, Ph.D. in Counterterrorism, Ph.D. in Critical Infrastructure, Ph.D. in Cybersecurity Leadership, Ph.D. in Emergency and Protective Services, Ph.D. in Human Factors, Ph.D. in Manufacturing, Ph.D. in Occupational Health and Safety, Ph.D. in Operational Technology, Ph.D. in Product Management, Ph.D. in Quantum Computing, Ph.D. in Real Estate Management, Ph.D. in Technology, Ph.D. in Technology/M.S. Research Methods Combination Program, and Ph.D. in Unmanned Systems Applications.

Therefore, the library is fully prepared to support a **Ph.D. in Healthcare Technology.**

Services provided to online students include:

- "Ask the Librarian"
- Research Guides
- Tutorials
- Videos
- Online borrowing

The John G. and Beverley A. Puente Library provides access to management, decision science, and research methods materials through its 10,000-title book collection, e-books, and its 90 journal subscriptions. The library will continue to purchase new and additional materials in the management, decision science, and research methods area to maintain a strong and current collection in the subject area. Students can also access materials through the library's

participation in Maryland's Digital eLibrary Consortium. This online electronic service provides access to numerous databases (Access Science, NetLibrary) that supply students with the documents they need. Available databases include ProQuest, EBSCO, ACM, Lexis Nexis, Taylor Francis, and Sage Publications.

The Puente Library can provide historical management and decision science materials through its membership in the Maryland Independent College and University Association (MICUA) and the American Society of Engineering Education (ASEE). Reciprocal loan agreements with fellow members of these organizations provide the library access to numerous research facilities that house and maintain archives of management and decision science documents. The proximity of the University of Maryland, College Park, and other local area research and academic libraries provide the Puente Library with quick access to these materials as well.

The library currently supports the needs of students at the undergraduate, master's, and doctoral levels.

K. Adequacy of Physical Facilities, Infrastructure and Instructional Equipment (as outlined in COMAR 13B.02.03.13):

1. **Provide an assurance that the physical facilities, infrastructure, and instruction equipment are adequate to initiate the program, particularly as related to spaces for classrooms, staff and faculty offices, and laboratories for studies in the technologies and sciences. If the program is to be implemented within existing institutional resources, include a supportive statement by the President regarding adequate equipment and facilities to meet the program's needs.**

   No new facilities are required for the program. The online class platform is web-based and requires no additional equipment for the institution. The current Learning Management System, Canvas, and Zoom meet the needs of the degree program. The Fusion Lab, Computer Science Lab, Cyber Lab, Robotics Lab, and Unmanned Systems Lab meet the potential research needs of the students. The labs provide both local and virtual support.

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:**

   a. **An institutional electronic mailing system**

   Capitol Technology University provides an institutional electronic mailing system to all students and faculty. The University requires the use of the email system by all students and faculty in all the institution's modalities of course delivery. Capitol Technology University students and faculty are required to use the institution's email addresses (e.g., xxxxxxxx@captechu.edu) in all University matters and communications. The University uses the email capabilities in Microsoft Office 365 and Microsoft Outlook.

   b. **A Learning Management System that provides the necessary technological support for distance education**

   Capitol Technology University provides a robust Learning Management Systems (LMS) through the use of the Canvas LMS by Instructure (www.canvaslms.com). The University

pairs Canvas with Zoom (zoom.us) to provide a platform for every student and faculty member to meet face-to-face in a synchronous "live" mode of communication. The University requires Canvas for every class; as a result, every course has a classroom on Canvas and Zoom. All syllabi, grades, and assignments must be entered into Canvas on a timely basis throughout the semester.

Canvas provides the world's most robust LMS. It is a 21st Century LMS; Canvas is a native cloud, Amazon Web Service hosted system. The system is adaptable, reliable, and customizable. Canvas is easy to use for students and faculty. The system is fully mobile and has proven to be timesaving when compared to other systems. The following list provides the features of the system:

<u>Time and Effort Savings</u>

- CANVAS DATA
  Canvas Data parses and aggregates more than 280 million rows of Canvas usage data generated daily.

- CANVAS COMMONS
  Canvas Commons makes sharing a whole lot easier.

- SPEEDGRADER ANNOTATIONS
  Preview student submissions and provide feedback all in one frame.

- GRAPHIC ANALYTICS REPORTING ENGINE
  Canvas Analytics helps you turn rich learner data into meaningful insights to improve teaching and learning.

- INTEGRATED MEDIA RECORDER
  Record audio and video messages within Canvas.

- OUTCOMES
  Connect each learning outcome to a specific goal, so results are demonstrated in clearly measurable ways.

- MOBILE ANNOTATION
  Open, annotate, and submit assignments directly within the Canvas mobile app.

- AUTOMATED TASKS
  Course management is fast and easy with automated tasks.

- NOTIFICATION PREFERENCES
  Receive course updates when and where you want - by email, text message, even Twitter or LinkedIn.

- EASE OF USE
  A familiar, intuitive interface means most users already have the skills they need to navigate, learn, and use Canvas.

- IOS AND ANDROID
  Engage students in learning anytime, anywhere from any computer or mobile device with a Web-standard browser.

- USER-CUSTOMIZABLE NAVIGATION
  Canvas intelligently adds course navigation links as teachers create courses.

- RSS SUPPORT
  Pull feeds from external sites into courses and push out secure feeds for all course activities.

- DOWNLOAD AND UPLOAD FILES
  Work in Canvas or work offline—it's up to you.

- SPEEDGRADER
  Grade assignments in half the time.

  Student Engagement

- ROBUST COURSE NOTIFICATIONS
  Receive course updates when and where you want—by email, text message, and even Facebook.

- PROFILE
  Introduce yourself to classmates with a Canvas profile.

- AUDIO AND VIDEO MESSAGES
  Give better feedback and help students feel more connected with audio and video messages.

- MULTIMEDIA INTEGRATIONS
  Insert audio, video, text, images, and more at every learning contact point.

- EMPOWER GROUPS WITH COLLABORATIVE WORKSPACES
  By using the right technologies in the right ways, Canvas makes working together easier than ever.

- MOBILE
  Engage students in learning anytime, anywhere from iOS or Android, or any mobile device with a Web-standard browser.

- TURN STUDENTS INTO CREATORS
  Students can create and share audio, video, and more within assignments, discussions, and collaborative workspaces.

- WEB CONFERENCING
  Engage in synchronous online communication.

- OPEN API
  With its open API, Canvas easily integrates with your IT ecosystem.

- BROWSER SUPPORT
  Connect to Canvas from any Web-standard browser.

- LTI INTEGRATIONS
  Use the tools you want with LTI integrations.

- MODERN WEB STANDARDS

Canvas is built using the same Web technologies that power sites like Google, Facebook, and Twitter.

Lossless Learning

- CANVAS POLLS
Gauge comprehension and incorporate formative assessment without the need for "clicker" devices.

- MAGICMARKER
Track in real-time how students are performing and demonstrating their learning.

- QUIZ STATS
Analyze and improve individual assessments and quiz questions.

- LEARNING MASTERY FOR STUDENTS
Empower students to take control of their learning.

(Source: https://www.canvaslms.com/higher-education/features)

Capitol Technology University has been using Canvas for over five years. Canvas has proven to be a wholly reliable LMS system that provides the necessary technological support for distance education/online learning.

L. Adequacy of Financial Resources with Documentation (as outlined in COMAR 13B.02.03.14):

1. **Table 1: Resources.**

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)	$235,116	$412,992	$669,636	$938,808	$1,184,256
a. Number of F/T Students	0	0	0	0	0
b. Annual tuition/Fee rate	$0	$0	$0	$0	$0
c. Total F/T Revenue (a x b)	$0	$0	$0	$0	$0
d. Number of P/T Students	14	24	38	52	64
e. Credit Hour Rate	$933	$956	$979	$1,003	$1,028
f. Annual Credit Hour	18	18	18	18	18
g. Total P/T Revenue (d x e x f)	$235,116	$412,992	$669,636	$938,808	$1,184,256
3. Grants, Contracts and Other External Sources	0	0	0	0	0
4. Other Sources	0	0	0	0	0
TOTAL (Add 1 – 4)	$235,116	$412,992	$669,636	$938,808	$1,184,256

A. **Provide a narrative rationale for each of the resource categories. If resources have been or will be reallocated to support the proposed program, briefly discuss those funds.**

1. **Reallocated Funds**
   The University will not need to reallocate funds for the program.

2. **Tuition and Fee Revenue**
   Tuition is calculated to include an annual 2.5% tuition increase. A 20% attrition rate has been calculated.

3. **Grants and Contracts**
   There are currently no grants or contracts.

4. **Other Sources**
   There are currently no other sources of funds.

5. **Total Year**
   No additional explanation or comments needed.

2. **Table 2: Program Expenditures.**

TABLE 2: EXPENDITURES

Expenditure Category	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	$113,468	$155,071	$238,421	$325,843	$417,486
a. #FTE	1.5	2	3	4	5
b. Total Salary	$94,557	$129,226	$198,684	$271,536	$347,905
c. Total Benefits (20% of salaries)	$18,911	$25,845	$39,737	$54,307	$69,581
2. Admin Staff (b + c below)	$5,942	$6,091	$6,244	$6,400	$6,559
a. #FTE	.08	.08	.08	.08	.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	1.00	1.5	2	2.5	3
b. Total Salary	$49,905	$76,730	$104,864	$134,358	$165,261
c. Total Benefits	$9,980	$15,346	$20,973	$26,872	$33,052
4. Technical Support and Equipment	$980	$1,800	$3,040	$4,420	$5,760
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7.Other Expenses	$5,600	$10,800	$19,000	$28,600	$38,400
TOTAL (ADD 1-7)	$185,875	$265,838	$392,542	$526,493	$666,518

A. **Provide a narrative rationale for each expenditure category. If expenditures have been or will be reallocated to support the proposed program, briefly discuss those funds.**

a. **Faculty**
Table 2 reflects the faculty hours in total, but this does not necessarily imply that these are new hire requirements.

b. **Administrative Staff**
Capitol Technology University will continue with the current administrative staff through the proposed time period.

c. **Support Staff**
Capitol Technology University will add additional support staff to facilitate the program.

d. **Equipment**
Software for courses is available free to students or is freeware. The University will purchase additional licenses for the LMS at the rate of $70 per student in Year 1. The rate is estimated to increase by $5 per year.

e. **Library**
Money has been allocated for additional materials to be added to the on-campus and virtual libraries to ensure the literature remains current and relevant. However, it has been determined that the existing materials serve this degree's needs due to the extensive online database.

f. **New or Renovated Space**
No new or renovated space is required.

g. **Other Expenses**
Funds have been allocated for office materials, travel, professional development, course development, marketing, and additional scholarships.

h. **Total Year**
No additional explanation or comments needed.

M. Adequacy of Provisions for Evaluation of Program (as outlined in COMAR 13B.02.03.15):

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

The assessment process at the University consists of a series of events throughout the Academic Year. The results of each event are gathered by the University Assessment Team and stored in Canvas for analysis and use in annual reports, assessments, etc. The University Assessment Team analyzes the results, develops any necessary action plans, and monitors the implementation of the action plans.

Academic Year Assessment Events:

Fall Semester:

- At the August Faculty Retreat, the faculty reviews any outstanding student learning challenges that have not been adequately addressed. The issues are brought to the Academic Deans for review and development of implementation plans.
- Faculty submit performance plans consistent with the mission and goals of the University and department. The documents are reviewed and approved by the Academic Deans.
- Department Chairs and Academic Deans review the Graduating Student Survey data.
- Department Chairs and Academic Deans review student internship evaluations.
- Department Chairs and Academic Deans review grade distribution reports from the spring and summer semesters.
- Department Chairs and Academic Deans review student course evaluations from the Summer Semester.
- Departments conduct Industrial Advisory Board meetings to review academic curriculum recommendations. The Advisory Board meets to begin curriculum review or address special

issues that may arise related to the curriculum. Based on an analysis and evaluation of the results, the Academic Deans, faculty, and the advisory boards will develop the most effective strategy to move the changes forward.

- o NOTE: A complete curriculum review for degrees occurs every two years. In most cases, the changes only require that the Academic Deans inform the Vice President of Academic Affairs and University President and provide a report that includes a justification and the impact of the changes as well as a strategic plan. Significant changes typically require the approval of the Executive Council.

- The Academic Deans attend the Student Town Hall and review student feedback with Department Chairs.
- Department Chairs conduct interviews with potential employers at our Career Fair.
- Post-residency, the Academic Deans meet with the faculty to review the student learning progress and discuss needed changes.

Spring Semester:

- Faculty Performance Plans are reviewed with faculty to identify issues of divergence and to adjust the plan as needed.
- Department Chairs and Academic Deans review grade distribution reports from the Fall Semester.
- Department Chairs and Academic Deans review the Graduating Student Survey data.
- Department Chairs and Academic Deans review student course evaluations from the Fall Semester and the Spring Semester (in May before the Summer Semester begins).
- Department Chairs and Academic Deans meet to review the content of the graduating student, alumni, and course surveys to ensure the surveys continue to meet the university's assessment needs.
- At the Annual Faculty Summit in May, the faculty review and discuss student learning challenges from the past academic year and provide recommendations to the Academic Deans. The results also lead to implementation plans for improvement.
- Department Chairs conduct interviews with potential employers at our Career Fair.
- Departments conduct Industrial Advisory Board meetings to review academic curriculum recommendations.

In addition to these summative assessments, the Academic Deans meet with the Department Chairs every week to review current student progress. This formative assessment allows for immediate minor changes, which increase faculty effectiveness and, ultimately, student outcomes.

The Faculty Senate meets monthly from August through April. The Faculty Senate addresses issues that impact student outcomes as those issues emerge. The leadership of the Faculty Senate then provides a report on the matter to the Academic Deans. The report may include a recommendation or a request to move forward with a committee to examine the issue further. In most cases, the changes only require the Academic Deans to inform the Vice President of Academic Affairs and University President and provide a report that includes a justification and the impact of changes as well as a strategic plan. Significant changes typically require the approval of the Executive Council.

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.

Student Learning Outcomes:

Student learning outcomes for the proposed **Ph.D. in Healthcare Technology** will be measured using the instruments identified in Section G and Section M as well as the assessment measures dictated by the accreditation requirements of the University's regional accreditor [i.e., Middle States Commission in Higher Education (MSCHE)]. This program is designed to meet the requirements of MSCHE. The University will also evaluate student achievement of the learning outcomes using the UK Quality Assurance Agency for Higher Education (QAA) Framework for Higher Education Qualifications and its related assessment tools. The University is in good standing with all its accrediting bodies.

Student Retention:

The University maintains a comprehensive student retention program under the Vice President for Student Engagement. The program assesses student retention at all levels, including the individual course, major, and degree. During the semester and term, the University's Drop-Out Detective capability, within its Learning Management System (i.e., Canvas), provides an early alert at the course level to potential issues related to retention. Within the Office of Student Life, Academic Advisors monitor Drop-Out Detective and contact students who appear to have problems with their academic performance. The Academic Advisors work with each student to create a plan to remove any barriers to success. The Academic Advisors also work with the course instructors as needed to gain additional insight that may help correct the situation.

Each student also meets with their Academic Advisor each semester to evaluate their progress toward degree completion. An updated plan of action is developed for each student for their next semester's registration and each following semester through degree completion.

The Vice President for Student Engagement also meets regularly with the Vice President of Academic Affairs and Academic Deans to review student retention within each degree program and address any issues that appear to be impediments to degree completion.

Student and Faculty Satisfaction:

Evaluations and assessments of Student and Faculty satisfaction occur every semester. Faculty members are evaluated every semester by students enrolled in their courses. Students are required to complete a course evaluation online within a specified time frame at the end of the semester for every enrolled course, or they are locked out of Canvas (the University's Learning Management System) until they complete each survey. Every faculty member is also required to review each of their courses after each semester; the goal is to ensure up-to-date content, effective and efficient methods of delivery, and appropriate outcomes.

The Department Chairs and Academic Deans review the student evaluations for every course offered at the University. The Department Chairs and Academic Deans also review faculty satisfaction every semester. If changes are needed at the course level, the changes are developed and implemented by the faculty upon approval of the Department Chairs and Academic Deans. If changes are required at the faculty level, the Department Chairs will make the changes. At the end of the following semester, appropriate stakeholders analyze the results of a follow-on evaluation for the effectiveness of the changes. This cycle is an ongoing process.

Cost Effectiveness:

Based on the year-long inputs, evaluations, and reviews described in Section M.1, the Department Chairs and Academic Deans prepare the proposed academic budget for each program for the upcoming year. Budget increases are tied to increasing student learning and performance as well as critical strategic initiatives.

The Interim Vice President of Finance and Administration also monitors each academic program throughout every semester and term for its cost-effectiveness. Additionally, the revenue and costs of every University program are reviewed annually by the Executive Council and Board of Trustees before approving the next year's budget.

N. Consistency with the State's Minority Student Achievement goals (as outlined in COMAR 13B.02.03.05 and the State Plan for Post-Secondary Education):

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

   Capitol Technology University is a majority-minority school. Our programs attract a diverse set of students who are multiethnic and multicultural. The University actively recruits minority populations for all undergraduate and graduate-level degrees. Special attention is also provided to recruit females into the STEM and multidisciplinary programs at all degree levels – undergraduate, master's, and doctoral. The University will use the same approach for the **Ph.D. in Healthcare Technology.**

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.**

   This program is not associated with a low productivity program identified by the Commission.

P. Adequacy of Distance Education Programs (as outlined in COMAR 13B.02.03.22)

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

   Capitol Technology University is fully eligible to provide distance education. The University has a long history of providing high-quality distance education. The University is accredited regionally by the Middle States Commission in Higher Education (MSCHE) and through three specialized accrediting organizations: Accreditation Board for Engineering and Technology (ABET), NSA, and DHS. All four accrediting organizations have reviewed the University's distance education program as part of their accreditation process. Capitol Technology University is fully accredited by MSCHE, ABET, NSA, and DHS. The University is in good standing with all its accrediting bodies.

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 has a long history of providing high-quality distance education/online learning that complies with the Council of Regional Accrediting Commissions (C-RAC) Interregional Guidelines for the Evaluation of Distance Education. The University will also continue to abide by the C-RAC guidelines with the proposed **Ph.D. in Healthcare Technology**.

a. **Council of Regional Accrediting Commissions (C-RAC) Interregional Guidelines for the Evaluation of Distance Education.**

   1. **Online learning is appropriate to the institution's mission and purposes.**

      Online learning is consistent with the institution's mission, purpose, and history. Please refer to Section A of this proposal.

   2. **The institution's plans for developing, sustaining, and, if appropriate, expanding online learning offerings are integrated into its regular planning and evaluation processes.**

      All programs at the University – online, hybrid, and on-ground – are subject to the same regular planning, assessment, and evaluation processes. Please see Section M of this proposal for the detailed process.

   3. **Online learning is incorporated into the institution's systems of governance and academic oversight.**

      All programs at the University – online, hybrid, and on-ground – are subject to the same regular planning, assessment, and evaluation processes. Please see Section M of this proposal for the detailed process.

   4. **Curricula for the institution's online learning offerings are coherent, cohesive, and comparable in academic rigor to programs offered in traditional instructional formats.**

      Online programs/courses meet the same accreditation standards, goals, objectives, and outcomes as traditional instruction at the University. The online course development process incorporated the Quality Matters research-based set of standards for quality online course design to ensure the academic rigor of the online course is comparable to the traditionally offered course. The University Academic Deans, chairs, and faculty review curriculum annually. Courses are reviewed at the end of each term of course delivery. This process applies to online and traditional classes. In addition, advisory boards are engaged in the monitoring of course quality to ensure quality standards are met regardless of the delivery platform.

   5. **The institution evaluates the effectiveness of its online learning offerings, including the extent to which the online learning goals are achieved, and uses the results of its evaluations to enhance the attainment of the goals.**

      Online programs/courses meet the same accreditation standards, goals, objectives, and outcomes as traditional classroom delivery. The University selects the learning platforms to ensure the high standards of the technical elements of each course. The Academic

Deans monitor any course conversion from in-class to online to ensure the online course is academically equivalent to the traditionally offered course and that the technology is appropriate to support the expected rigor and breadth of the course.

6. **Faculty responsible for delivering the online learning curricula and evaluating the students' success in achieving the online learning goals are appropriately qualified and effectively supported.**

   The Department of Doctoral Programs, where this degree will be sponsored, is staffed by a qualified University Academic Dean, Dr. Ian McAndrew, and supported by a Director of Doctoral Programs. Other appropriately credentialed faculty with multi-disciplinary level skills will be part of the delivery process.

   The evaluation of the courses in the program will be done using the same processes as all other programs at the University. (Please see Section M.) All Capitol Technology University faculty teach in the traditional classroom environment and online. (Please see faculty qualifications in Section I of this document.)

7. **The institution provides effective student and academic services to support students enrolled in online learning offerings.**

   Students can receive assistance in using online learning technology via several avenues. Student aides are available to meet with students and provide tutoring support in both subject matter and use of the technology. Tutors are available in live real-time sessions using Zoom or other agreed-upon tools. Pre-recorded online tutorials are also available.

   In addition to faculty support, on-ground and online tutoring services are available to students in a one-on-one environment.

   Laboratories (on-campus and virtual) are available for use by all students. Faculty and highly-qualified tutors staff the laboratories and provide academic support.

   Library services and resources are appropriate and adequate. Please refer to Section J of this document and the attached letter from the University President. The library adequately supports the students learning needs.

8. **The institution provides sufficient resources to support and, if appropriate, expand its online learning offerings.**

   The University has made the financial commitment to the program (please refer to Section L). The University has a proven record of accomplishment in supporting degree completion.

9. **The institution assures the integrity of its online offerings.**

   Current faculty serve on internal advisory boards that examine possible program changes, including course and program development. All faculty are selected on domain expertise and program-related teaching experience.

When new faculty or outside consults are necessary for the design of courses offered, the University's Human Resource Department initiates a rigorous search and screening process to identify appropriate faculty to design and teach online courses. Again, all faculty are selected on domain expertise and program-related teaching experience

The University's online platforms offer several avenues to support instructors engaged in online learning. The Director of the Online Learning Division is highly skilled and trained in faculty development. Several seminars and online tutorials are available to the faculty every year. Mentors are assigned to new faculty. Best practice sharing is facilitated through the Academic Deans, Department Chairs, and formal meetings.

The assessment for online learning classes/students is the same as for all academic programs at the University. Faculty provide required data on student achievement. The Learning Management System includes data on student achievement. Proof of these assessments is available during the class and following class completion to the Academic Deans and Department Chairs. On an annual basis, the information is reported to the University's accreditation authorities such as MSCHE, NSA, and DHS.

CAPITOL TECHNOLOGY UNIVERSITY

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