

PROPOSAL FOR:

X **NEW INSTRUCTIONAL PROGRAM**

SUBSTANTIAL EXPANSION/MAJOR MODIFICATION

COOPERATIVE DEGREE PROGRAM

X **WITHIN EXISTING RESOURCES or** REQUIRING NEW RESOURCES



CAPITOL

Technology University

Institution Submitting Proposal

Fall 2025

Projected Implementation Date

Doctor of Philosophy

Award to be Offered

0701

Suggested H.E.G.I.S. Code

PhD in Forensic Linguistics

Engineering

Title of Proposed Program

111003

Suggested C.I.P. Code

Graduate School

Department of Proposed Program

Dr. Kellep Charles

Name of Department Head

Dr. Ashley Babcock

Dean of Graduate
School

Albabcock@captechu.edu

Contact E-Mail Address

301-369-3612

Contact Phone Number

PAIS 12-16-24

President/Chief Executive Approval

DECEMBER 16, 2024

Date Endorsed/Approved by Governing Board



December 16, 2024

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

Dear Dr. Rai,

Capitol Technology University is requesting approval to offer a **Ph.D. in Forensic Linguistic Engineering** degree. 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 Forensic Linguistic Engineering**.

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 Forensic Linguistic Engineering degree** is consistent with this mission.

The requirement for expert linguists in the legal, forensic, security and intelligence settings at the highest level is experiencing significant growth. This program is in response to that need. The **Ph.D. in Forensic Linguistic Engineering degree** is primarily aimed at professional linguists who have earned the master's or bachelor's degree in theoretical linguistics, computational linguistics, psycholinguistics and speech science and want to serve in a new capacity in corporate, government, and research settings.

To respond to the needs of **the legal, forensic, security and intelligence industries**, we respectfully submit for approval a **Ph.D. in Forensic Linguistic Engineering degree**. Please find the required, letter confirming the adequacy of the university's library to serve the needs of the students in this degree.

Respectfully,

A handwritten signature in blue ink, appearing to read 'B. Sims'.

Dr. Bradford L. Sims, Ph.D.
President



December 16, 2024

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

Dear Dr. Rai,

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

Respectfully,

A handwritten signature in blue ink, appearing to read 'BLS'.

Dr. Bradford L. Sims, Ph.D.
President



Office Use Only: PP#

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

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

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

Payment <input checked="" type="radio"/> Yes	Payment <input type="radio"/> R*STARS # 97625	Payment	Date
Submitted: <input type="radio"/> No	Type: <input checked="" type="radio"/> Check # 97625	Amount: 850.00	Submitted: 12/16/24

Department Proposing Program	Department of Doctoral Programs		
Degree Level and Degree Type	Doctor of Philosophy		
Title of Proposed Program	Ph.D. in Forensic Linguistic Engineering		
Total Number of Credits	60		
Suggested Codes	HEGIS: 701.00	CIP: 111003.0000	
Program Modality	<input type="radio"/> On-campus <input checked="" type="radio"/> Distance Education (fully online) <input type="radio"/> Both		
Program Resources	<input checked="" type="radio"/> Using Existing Resources <input type="radio"/> Requiring New Resources		
Projected Implementation Date <small>(must be 60 days from proposal submission as per COMAR 13B.02.03.03)</small>	<input checked="" type="radio"/> Fall <input type="radio"/> Spring <input type="radio"/> Summer Year: 2025		
Provide Link to Most Recent Academic Catalog	URL: https://catalog.capttechu.edu/index.php		

Preferred Contact for this Proposal	Name: Ashley Babcock
	Title: Dean of the Graduate School
	Phone: (301) 369-3612
	Email: albabcock@capttechu.edu

President/Chief Executive	Type Name: DRAIFORD SIMS
	Signature: <i>[Handwritten Signature]</i> Date: 12-16-24
	Date of Approval/Endorsement by Governing Board: 12-16-24

Revised 1/2021

Proposed Doctor of Philosophy in Forensic Linguistic Engineering Degree
The Graduate School
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.

Forensic linguistics applies methodology and analytical techniques from linguistics to four main areas related to the legal, forensic, security, and intelligence industries:

- Identification (author, speaker, handwriter, language, human or machine)
- Text classification (classification of a document as a forensically important type such as suicide note, threat, predatory text, deception, etc.)
- Textual Similarity (measurement of how closely related documents are, for use in detection of plagiarism, investigation of malware, and efficient e-discovery); and
- Profiling (estimate of demographics of source from linguistic behavior in a document, including native language, non-native language, dialect, age, evidence of psychiatric disorders, etc.).

Investigations around these four issues arise constantly in criminal, civil, security, and intelligence scenarios. Cases related to language as evidence range from murder to intellectual property theft to defamation, from kidnapping to golden parachute disputes, from insider threat to trademark and copyright infringement.

The **Ph.D. in Forensic Linguistic Engineering degree** is a unique program designed to meet the long-standing needs of disseminating research skills to linguists who want (i) to work in the legal, forensic, security and intelligence industries, (ii) to develop linguistics-based, valid solutions and (iii) to engineer reliable applications implementing solutions. The proposed **Ph.D. in Forensic Linguistic Engineering degree** is for recent graduates and current professionals in the fields of theoretical linguistics, psycholinguistics, computational linguistics and speech science that require knowledge of data collection and curation, statistical analysis, data science, validation testing, and forensic, legal and ethical principles for scientific evidence in order to serve the legal, forensic, security and intelligence industries. The University is in a unique position to give those students an avenue to pursue proficiency in this area using an interdisciplinary methodology, cutting-edge courses, and dynamic faculty. The **Ph.D. in Forensic Linguistic Engineering** is designed to meet the need for the highest-skilled professionals to become leaders who will be involved in the advancement, expansion, and support of **reliable, valid, and admissible linguistic evidence in corporate, private and government investigations and courts in the United States and abroad.**

The Ph.D. in Forensic Linguistic Engineering is structured for professional linguists with master's or bachelor's degrees who desire to elevate their skills to the highest level and to contribute to the body of knowledge in Forensic Linguistic Engineering in particular and Forensic Linguistics in general.

The Ph.D. in Forensic Linguistic Engineering prepares the linguist to be able to develop and test new methods in the four main areas of Forensic Linguistics. The doctoral dissertation is expected to showcase the development and testing of a new method or the validation testing of current methods on a new dataset. Graduates of the Ph.D. in Forensic Linguistic Engineering program will be known as "forensic linguists" or "forensic linguistic engineers" and will be able to produce technology in the field. This unique degree enables students to embrace a paradigm which is

respectful of scientific, legal, forensic, and ethical standards, i.e. **the development and validation testing of linguistics-based methods implemented in user-friendly tools.**

The completion of the Ph.D. in Forensic Linguistic Engineering 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 Forensic Linguistic Engineering 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 doctoral dissertation 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:

- a. 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.*
- b. 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 650 undergraduates, 350 masters' students and 450 doctoral candidates.*
- c. 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.*
- d. 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 Forensic Linguistic Engineering degree** 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 Artificial Intelligence, B.S. in Counterterrorism, B.S. in Cyber Analytics, B.S. in Cybersecurity, B.S. in Data Science, B.S. in Information Technology, and B.S. in Software Engineering.

The proposed degree also supports the existing areas of degrees of graduate study, **including the M.S. in Cyber Analytics, M.S. in Cybersecurity, M.S. in Engineering Technology, M.S. in Product Management, T.M.B.A. in Cybersecurity, D.Sc. in Cybersecurity, Ph.D. in Artificial Intelligence, Ph.D. in Cybersecurity Leadership, Ph.D. in Cyberpsychology, Ph.D. in Forensic Cyberpsychology, Ph.D. in Business Analytics and Data Science, Ph.D. in Product Management, Ph.D. in Technology, and Ph.D. in Machine Learning.**

The University's programs have been preparing professionals for the rapid advances in computer science, cybersecurity, intense global competition, and increasingly sophisticated technological environments for decades. The **Ph.D. in Forensic Linguistic Engineering degree** follows that tradition and serves **the legal, security, forensic and intelligence** sectors both locally and nationally, as well as internationally.

The proposed degree is fully supported by the University's Vision 2025 and Strategic Plan 2017-2025. It also segues into the next Strategic Plan currently under development. Funding to support the **Ph.D. in Forensic Linguistic Engineering degree** is already available within the existing budget as we're using existing faculty and courses already scheduled as part of other approved degree programs.

The University has active partnerships in the private and public sectors (e.g., NASA, Parsons Corporation, Leidos, Patton Electronics, Lockheed Martin, Northrup Grumman, Cyber Security Forum Initiative (CSFI), Internal Revenue Service (IRS), and National Security Agency (NSA)). The **Ph.D. in Forensic Linguistic Engineering 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 forensic science, linguistics and computational linguistics fields will help 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 level of support 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 on 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 2022-2023, 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 Forensic Linguistic Engineering 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.**

The Ph.D. in Forensic Linguistic Engineering degree is needed for two reasons. First, the field of forensic linguistics, using popular but unreliable methods, has become so dissociated from linguistics, on the one hand, and forensic and legal standards for scientific evidence, on the other hand, that it is often neither forensic science nor linguistics. Second, objective, reliable tools for the analysis of language as forensic evidence must be developed, tested and made available to law enforcement, forensic scientists, corporate investigators and security analysts in order to meet current legal standards and to protect the rights of all citizens. This degree trains linguists to engineer tools for objective and reliable analysis. This degree program embraces a paradigm of validation testing, initiated in 1995 by Dr. Carole Chaski, which has successfully developed, tested and validated methods that are then implemented in user-friendly software. This degree rectifies a dire situation that has life-changing ramifications for anyone involved in the criminal or civil justice systems.

The idea of language as evidence has a long history in American jurisprudence. Starting in the early 1900's, lawyers presented spelling errors, grammatical errors and word usage as evidence (Donaldson, 1985; Chaski, 1998). This early approach to language as evidence relies only on grammar school pedagogy; anyone with a high school diploma can evaluate a document in this way because this is the way that compositions are evaluated in secondary education. This approach is now known by several names: "forensic stylistics", "forensic behavioral analysis", "forensic sociolinguistics", "forensic discourse analysis", or "forensic linguistics." In fact, this early approach to language as evidence, relying on school grammar, is not founded in linguistics. Linguistics as a scientific and academic field was not developed in the United States until the 1920's (Sampson, 1980). Clearly, any approach to language as evidence that predates the founding of linguistics as an academic discipline cannot be grounded in linguistics.

Meanwhile, also independent of linguistics, the field of forensic handwriting identification was developed in the early 1930's, notably in response to the Lindbergh kidnapping in 1932 (Sellers, 1937). Like the lawyers, the new forensic handwriting examiners relied on spelling errors, grammatical errors and word usage to serve as forensic linguistic evidence. But, as pointed out by one handwriting expert, handwriting experts were not and are still not trained in linguistics or any kind of language analysis (Dillon, 1996) and are operating outside their expertise when they opine about language as evidence.

Linguistics --the study of language as a system of behavior and thought -- divides language phenomena into these subfields:

- phonetics and phonology (sounds and sound patterns);
- morphology (minimal units of sound and sound combinations to which meaning is

associated);

- lexicology (words and word structure);
- syntax (phrase, phrase structure, sentence, sentence structure);
- semantics (interface of language and logic, interface of meaning and syntax);
- pragmatics (context-driven meanings related to syntactic and semantic structure).

Since language permeates human behavior, linguistics also includes subfields that focus on the interface of language and an adjacent discipline.

- Psycholinguistics studies the relationship between cognition and language such as memory constraints on language structure and production, language acquisition, child language development, and literacy.
- Neurolinguistics studies the relationship between the brain and language, especially the effect of brain injury on language production and comprehension.
- Sociolinguistics studies the relationship between social demographics and language use, with a focus on the variable behaviors that differentiate different social groups, such as accent and dialect.
- Corpus linguistics gathers data in electronic format so that large datasets can be analyzed to identify trends in language structures and use and is closely related to historical linguistics, the study of variation and structural change in a language over time.
- Computational linguistics produces software to perform linguistics tasks for humans, such as search engines, summarizers, tone analyzers and basic abilities like sentence diagramming and semantic inferences.

Quantitative and mathematical analysis permeates linguistics, and is especially obvious in phonetics, syntax, semantics, psycholinguistics, experimental sociolinguistics, experimental pragmatics, neurolinguistics, corpus linguistics and computational linguistics. Likewise, psycholinguistics, corpus linguistics, some sociolinguistics, and computational linguistics regularly use statistical analysis to predict and classify linguistic patterns. Any analysis presented as forensic linguistics should be recognizable as linguistics, relatable to one of the subfields of linguistics and use the standard tools of linguistic analysis including quantification and statistics.

The first use of actual linguistics for the analysis of linguistic evidence occurred in 1968, when Dr. Jan Svartvik of Lund University (Sweden) coined the term “forensic linguistics” to describe how he used syntactic analysis to determine if a confession had been authored by a defendant. Dr. Svartvik provided an excellent role model for the field he pioneered (Svartvik, 1968). First, he used a standard method of linguistic analysis from a core field of linguistics, syntax. Second, he explained each step of his analysis so that it could be replicated by others. Third, he used statistical analysis in his decision-making. However, Dr. Svartvik did not pursue additional research in the field. Dr. Svartvik did not provide any evidence that his syntactic method could be used in other cases with a reliable success rate. His work was essentially forgotten or ignored for close to thirty years.

In the early 1980's, several academic linguists popularized forensic linguistics through consulting for attorneys as forensic linguists. However, none of these linguists followed in Dr.

Svartvik's footsteps. Instead in their own ways, the academic linguists adopted the stylistic approach of the early non-linguists, lawyers and handwriting experts. Further, the qualitative techniques put forth as forensic linguistics (variously called forensic sociolinguistics or forensic stylistics or forensic behavioral analysis) were developed on a case-by-case basis. Each linguist performed an analysis with techniques that were never tested to determine how reliable or unreliable they actually are. In other words, these linguists created a method for each case, and typically got the "answer" that the hiring attorney was seeking. The blatant confirmation bias of this case-by-case approach was finally documented in a case study. In 1996, Dr. Edward Finegan, a professor at the University of Southern California, documented a case in which five linguists, all using the prevailing case-by-case qualitative techniques, managed to analyze the same exact data and each get an answer that their hiring attorney wanted. This result can easily happen because the examiner picks and chooses whatever features he wants to use to get a specific result; a linguist on one side picks features *a* and *b*, ignoring features *c*, *d* and *e*, while a linguist on the other side picks features *c*, *d* and *e*, ignoring features *a* and *b*. Dr. Finegan, one of the five linguists, concluded that this state of affairs with conflicting results would be good for the field of forensic linguistics because a battle of the experts requires more experts to be in the battle. But another way of interpreting this case is that there is something seriously wrong with a supposedly scientific method if different experts can use it and get different results.

Because the qualitative, subjective, case-by-case techniques descend from school grammar and do not rely on linguistics, this approach has also been adopted by some law enforcement agencies and other investigators. Thus, there can be "forensic linguists" who do not hold any degree in linguistics.

In 1993, the United States Supreme Court ruled that scientific evidence in a court of law must prove that the method upon which it rests is reliable; this is known as the Daubert or reliability standard (*Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993)). The first forensic method to fall under this new ruling was forensic handwriting identification (*United States v. Starzeczpyzel*, 880 F. Supp. 1027 (S.D.N.Y. 1995)). In 2001, this standard was applied to the prevailing, qualitative, subjective "forensic linguistics;" the Court ruled that such an analysis was not scientific, and would not allow the "forensic linguist" (an FBI agent with no training in linguistics) to state a conclusion about the authorship of a threat, the issue at hand (*U.S. v van Wyk* 83 F. Supp. 2d 515 (D.N.J. 2000)). In an overview of the field, Chaski had actually predicted that the Courts would eventually rule the qualitative, subjective approach at least partially if not fully inadmissible for failing to meet the Daubert reliability standard (Chaski 1998). Since the van Wyk case, other Courts have ruled the qualitative, subjective "forensic linguistics" completely inadmissible.

Starting in 1995, with funding from the United States Department of Justice National Institute of Justice, Dr. Carole Chaski began testing the popular methods. Dr. Chaski was the first person in the field to actually test the techniques used by the academic linguists. First, Dr. Chaski collected writing samples from adults, who wrote at their leisure on ten topics which were designed to elicit different registers (level of formality), topics and genres (communicative types such letters or essays). This formed the first ground-truth database for forensic linguistic authorship identification. Second, with the help of an intern, Dr. Chaski blindly applied popular methods to a set of documents matched for gender, age and dialect. This created a controlled dataset so that differences between authors could not be explained by differences in gender, age or dialect. Third, when Dr. Chaski blindly tested the popular techniques on the writing samples, and the results were unblinded and analyzed, she found that these popular techniques were extremely unreliable by themselves and in combination with each other (Chaski, 1998, 2001).

Since her initial tests, Dr. Chaski has repeatedly explained and demonstrated the method of

validation testing to determine the reliability and error rates of forensic methods in order to meet the Daubert reliability standard (Chaski 2005, 2012). The reaction to her work is described by law Professor Lawrence Solan, (JD and Ph.D. in linguistics):

The issue involved authorship attribution and the insistence of one practitioner, Carole Chaski, that the methods employed in actual cases first be tested and validated, based on their ability to perform accurately in test cases in which the ground truth is known. She has further argued that developing a set of criteria that can be applied across cases is an essential aspect of developing valid methodology. This appears to me to be simply an effort to bring ordinary scientific methodology to a particular forensic identification task (see, e. g., Chaski 2001, 2012). Two reports (National Research Council (2009) and President's Council of Advisors (2016)) have harshly criticized the forensic identification sciences generally for a lack of rigor and the failure to validate methods. Yet Chaski's suggestion was not well-received at the time (see, e.g., Grant and Baker 2001), and a cultural gap remains (Solan, 2019).

Although Dr. Chaski initiated validation testing in the field of forensic linguistics, and has been providing validation test results for her own methods (Chaski 2005, 2012, 2013, 2022, 2023, 2024), validation testing has not become the norm for forensic linguistics.

In the early 2000's, computer scientists became interested in the issue of authorship identification using stylometry. Stylometry counts linguistic features that are obvious and easy for a computer to be programmed to find, such as word count, word frequency, word length, sentence length, overlap of words between document and so forth. Several academic computer scientists published articles describing stylometric methods, and began presenting themselves as "forensic linguists" even though they hold no degrees in linguistics. Stylometric software has also been developed by computer scientists (Eder, Rybicki and Kestemont, 2016; Juola 2014; Millican 2003). But the computer scientists did not pursue validation testing of their stylometric methods. Instead, like the forensic stylists from academe and law enforcement, the computer scientists pick whatever features they want to measure on a case by case basis. This "picking and choosing" to get the "right answer" is antithetical to any scientific method, and undercuts reliability as it dodges validation testing. The stylometric approach is quantitative, because linguistic features are counted, but the value of these linguistics features is constantly changing from case to case and the quantification is therefore just as subjective as the school grammar approach.

In fact, validation studies in the field are extremely rare and often fraught with dishonest reporting of results or ruined by ignorance of what is actually required for validation testing to be performed correctly (Nini and Grant, 2013; Juola, 2016, 2019).

For almost fifty years now, the fate of defendants charged with any crimes in which language evidence is examined has been at the mercy of unreliable methods using subjective qualitative or quantitative analysis from forensic stylistics or stylometry, neither of which is grounded in linguistics or normal science. But for the last thirty years, an alternative approach for developing methods that are grounded in linguistics, tested for validity and reliability independent of any litigation, and examined for known quantity requirements and error rates has been available, as described by Professor Solan, not from academics and law enforcement, but from the practitioner, Carole Chaski.

In 2012, "Words On Trial" in *The New Yorker* described this situation, featuring extensive quotations from academic linguists in the tradition of qualitative, subjective school grammar. The article also included Dr. Chaski's lone dissent from the current and popular forensic linguistics, and her explanation of why validation testing is so crucial to the field's evolution. Letters to the editor that followed are persuasive. Ben Bahney wrote:

The disagreement between experts in Jack Hitt's article about how to use linguistics to solve crimes illustrates the fact that, as is often the case in the other forensic disciplines, linguistics [as illustrated by popular forensic linguistics in the article] does not involve a set of common repeatable, precise and peer-reviewed methods that are grounded in theory and substantiated by a body of evidence ("Words on Trial," July 23rd). Even the more established forensic disciplines have no mandatory standard certification or accreditation. To make matters worse for the accused, forensic experts are most often trotted out in court to testify on behalf of the prosecution. This is because defendants frequently do not have the resources to commission an alternative forensic analysis, which puts them at a pronounced and unfair disadvantage. Linguistics experts with a clearly unreliable set of methods are subject to the same cognitive biases that color the judgment of criminal investigators, judges and juries. This only weakens the process, by giving it a false air of objectivity, and further tilts the balance against the accused who are supposedly deemed innocent until proven guilty. Until forensic linguistics emerges as a discipline rooted in scientific rigor, courts should reject it.

James C Raymond, president of International Institute for Legal Writing and Reasoning, particularly took exception to the conclusions offered by academic linguists and wrote:

Judges routinely exclude evidence when its prejudicial effect outweighs its probative value -- an odd phrase that can be explained with an example from Hitt's article. Robert Leonard's testimony that the language of graffiti and threatening emails was consistent with the language of the defendant's writings in other contexts is the equivalent of a witness pointing to someone in the courtroom and saying "That man could have been the assailant." "Could have been" is hardly sufficient when the standard of proof is "beyond a reasonable doubt." But when an "expert" like Leonard tells a jury with little knowledge of science or linguistics that the language in one sample is consistent with the language in another the prejudicial effect far outweighs any probative value that the observation might have in identifying the murderer. ... As reliable evidence in a trial, forensic linguistics is far from scientific.

David A Harris, Esq, a law professor at University of Pittsburgh Law School, and author of *Failed Evidence: Why Police Resist Science*, posted this commentary on his blog:

For me, what was so striking was how the same old forensic science questions from fingerprint analysis, tool marks, and hair and fiber comparisons emerge in this very new forensic discipline. Is this a field the power of which is based on human interpretation, in which the experience and knowledge of the analyst rules, as is true with fingerprint analysis? If so, does it suffer already from the same deficiencies? Or should forensic linguists strive for a data-based standard, such as DNA? Both approaches are on display in the article, though the former is featured as the probable future of the field.

After looking hard at the 2009 NAS report, we should be cautious about introducing another forensic methodology that cannot quantify its error rate, cannot state the probability that the answer it gives is correct, and therefore cannot truly state whether or not a particular piece of writing is in fact associated with a defendant. One forensic linguist says that he does not testify that he knows who wrote the items he analyzes; he will only say that the language in a given item "is consistent with" the language in the defendant's other writings. The caution is absolutely appropriate, but I wonder whether a jury will overlook this nuance, and simply hear "it matches."

Every new tool that promises to solve crimes deserves serious attention; some new methods will make the world safer from predators. But let's not take these new tools

where we have gone blindly before — into the land of failed forensics. Instead, courts should accept them only when they can actually claim to use rigorous methods that support their claims. Anything else will just generate a new wave of wrongful convictions.

(Source: *The New Yorker*, Letters to the Editor)

Later, he responded directly to Chaski:

I think the tension between the work you [Chaski] do and that of the others mentioned in the NYer article is a very important issue that we need to pay attention to now, on the front end, instead of later, when we're dealing with wrongful convictions.

(Source: <https://failedevidence.wordpress.com/2012/07/27/forensic-linguistics-dna-for-language-or-more-failed-forensics/>)

Current degree programs in forensic linguistics do not teach validation testing, and thus do not teach the calculation of error rates for their espoused methods. For this reason, expert witnesses in forensic linguistics, whether they hold academic degrees in linguistics or not, are regularly presenting “evidence” that is neither mainstream linguistics nor reliable forensic science. The ramifications of this state of affairs for the possibility of wrongful convictions should not be ignored or dismissed.

The evolution of senior leadership and effective use of advanced technology in forensic linguistics can only be achieved with the cutting-edge approach that Chaski has pioneered: i.e., the development and validation testing of linguistics-based methods implemented in user-friendly tools. The advanced skills and strategies required for this evolution are covered in the 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 Forensic Linguistic Engineering degree** 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 Forensic Linguistic Engineering** degree 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 Forensic Linguistic Engineering degree** will add to the base of minority participation in the **Forensic Linguistic Engineering** field in particular and forensic linguistics in general.

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

The 2022 Maryland State Plan for Postsecondary Education articulates three goals for postsecondary education: **a) Student Access; b) Student Success; c) 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 postsecondary 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 members 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

The proposed **Ph.D. in Forensic Linguistic Engineering degree** 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 Forensic Linguistic Engineering degree**, with its academic rigor, will produce highly qualified leaders in forensic linguistic engineering 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 of its degrees. The University is fully accredited by five accrediting organizations. The University receives its regional accreditation from the Middle States Commission on Higher Education (MSCHE). The University also has specialized accreditation from the International Accreditation Council of Business Education (IACBE), Accreditation Board for Engineering and Technology (ABET), National Security Agency (NSA), and Department of Homeland Security (DHS). The **Ph.D. in Forensic Linguistic Engineering degree** is consistent with the MSCHE criteria for regional accreditation of the delivery of high-quality higher education.

Goal 2: Student Success

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

The content courses for the **Ph.D. in Forensic Linguistic Engineering degree** will be offered in a sync manner but allowing for real time communication 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 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 advice 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 in support of 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 ability 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 Artificial Intelligence 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 launched their latest satellite aboard a NASA rocket from a location in Norway at the beginning of the 2019 Fall Semester.

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 Forensic Linguistic Engineering degree** will be expected to fill technical executive, senior-level and mid-level positions in commercial companies as well as local, state, and federal government with a variety of titles such as:

- Forensic Linguistics Subject Matter Expert
- Forensic Computational Linguistics Subject Matter Expert
- Executive, Litigation Support Consulting Firm
- Senior Analyst, Litigation Support Consulting Firm
- Executive, Private Investigation Firm
- Senior Analyst, Private Investigation Firm
- Forensic Scientist, Digital Evidence Firm
- Forensic Scientist, Crime Laboratory (Local, State and Federal Levels, US and abroad) , e.g.
 - Forensic Scientist, Digital Evidence Section,
 - Forensic Scientist, Behavioral Analysis Section,
 - Forensic Scientist, Audio or Speech Science Section
 - Forensic Scientist, Questioned Documents Section
- Investigator, District Attorney's Office (State and Federal Levels)
- E-Discovery Support Linguist, Law Firm, Prosecutor's Office, Public Defender's Office
- Vice President, Human Resources or People Operations, Major Corporation
- Researcher, US Government Agency
- Researcher, Major Corporation Receiving government grants
- Trainer, US Government Agency (Local, State and Federal, Military)
- Trainer, Major Corporation
- Assistant Professor, Linguistics Department, Computer Science Department, University

Graduates from the proposed **Ph.D. in Forensic Linguistic Engineering degree** will possess a technical knowledge of linguistics applied in the legal, forensic, security and intelligence industries with the ability to serve immediately as subject matter experts and expert witnesses. Graduates will also possess the required knowledge to form their own private company, serving as consultants to law enforcement, attorneys, corporations, school systems and universities, as well as the armed forces and veteran's administration services. Further, graduates will be able to work internationally for law firms, law enforcement and sovereign governments. Graduates will easily interface with other forensic sciences, such as digital forensics, multimedia forensics, questioned documents forensics, behavioral analysis forensics, and cybersecurity, depending on the focus of the dissertation.

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 Forensic Linguistic Engineering or Forensic Linguistics. The field is generally populated by linguistics professors who perform consulting on

the side, with very few exceptions of linguists who own their own consulting firms or work in large corporations serving legal database clients. As a result, there are no concise government statistics for this sector. The proposed doctoral degree is designed to address senior leaders' needs within Forensic Linguistic Engineering and Forensic Linguistics 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 Forensic Linguistic Engineering or Forensic Linguistics. The field is generally populated by linguistics professors who perform consulting on the side, with very few exceptions of linguists who own their own consulting firms or work in large corporations serving legal database clients. As a result, there are no concise government statistics for this sector. The proposed doctoral degree is designed to address senior leaders' needs within Forensic Linguistic Engineering and Forensic Linguistics over the next 25 years.

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

There are no doctoral degrees in Forensic Linguistic Engineering in Maryland or the rest of the United States. The proposed Ph.D. in Forensic Linguistic Engineering would be the first. As a result, there is no data on the current and projected supply of prospective graduates. However, in the broader related fields of data science and computational linguistics, there is virtually no unemployment. The average salary of a data scientist with a bachelor's degree is \$108,020 and the field is expected to grow by 36% from 2023-2033 (Source: <https://www.bls.gov/ooh/math/data-scientists.htm>).

Likewise, the average salary for a computer and information research scientist with a master's degree is \$145,000 and the field is expected to grow by 26% from 2023-2033

(Source: <https://www.bls.gov/ooh/computer-and-information-technology/computer-and-information-research-scientists.htm>).

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 is no other degree program in Forensic Linguistic Engineering in Maryland, the United States or the world.

In the United States, there is no Ph.D. in forensic linguistics, forensic linguistic engineering or forensic linguistic technology. The current degree programs include:

- Hofstra University offers an MA in Applied Linguistics: Forensic Linguistics, and a combined bachelor's and master's program.
- Alliant University offers a three-course Certificate in forensic linguistics which can be transferred into its M.S. in Forensic Behavior Science or M.S. in Forensic Administration and Leadership.
- Pennsylvania Western University, through its PennWest Global Online, offers a concentration

in forensic linguistics as eight courses of its MA in Criminal Justice.

In the United Kingdom, there is one Ph.D. in forensic linguistics and three master's degree programs.

- Aston University offers the Ph.D. in forensic linguistics; graduates of Hofstra's program are automatically accepted into the Aston Ph.D.
- Cardiff University offered the first MA in forensic linguistics, and still does.
- University of York offers an M.S. in Forensic Speech Science. It has only recently, within the last few years, begun using software for automatic speech recognition and speaker identification.
- University of Lancaster offers an M.S. in Forensic Linguistics and Speech Science

None of the degree programs listed above teach or require validation testing of methods, and in fact, these programs continue to teach methods based on school grammar that have been proven empirically through validation testing to be highly unreliable. The proposed Ph.D. in Forensic Linguistic Engineering is differentiated from the other available degrees in five ways.

First, the proposed Ph.D. in Forensic Linguistic Engineering teaches and requires students to perform validation testing, outside of any litigation, or, as Professor Solan calls it, to do normal science.

In contrast, the current programs at Hofstra, Aston et al hardly even mention validation testing and do not devote even one course to the skills required for performing validation testing.

Second, only the proposed Ph.D. in Forensic Linguistic Engineering requires courses in statistical analysis, coding and data collection and curation. These skill requirements are needed because the aim of the proposed program is the development and testing of reliable methods, as required by the legal Daubert or reliability standard.

In contrast, the current programs at Hofstra, Aston et al do not. The current programs rely instead on subjective methods which are either, as one proponent recently admitted in a deposition, actually untestable, or have been found to be empirically unreliable, often even worse than chance (Chaski 2001).

Third, the proposed Ph.D. in Forensic Linguistic Engineering requires as an entrance requirement a bachelor's or master's degree in linguistics, computational linguistics, psycholinguistics or speech science. The applicant must provide documentation of training in the core fields of syntax, formal semantics, phonology and phonetics, as well as classes in coding and statistics. Applicants who have earned a Ph.D. in Linguistics are welcome to apply, and Capital Technology University offers post-doctoral scholars a generous transfer of credits. The graduate of the proposed Ph.D. can be known as a forensic linguist (a linguist with forensic training) or a forensic linguistic engineer (a language engineer who has developed methods for linguistic evidence in the forensic setting).

In contrast, the current programs at Hofstra, Aston et al do not require any previous training in linguistics. A review of the current programs' degree requirements shows that students will not attain solid training in the core fields of linguistics in these current degree programs, as Professor Solan reported (Solan 2019). Further, the current programs at Hofstra, Aston et al do not require previous training in coding and statistics; nor do these programs provide training in coding or statistics. The result of these programs is that people who have no substantial training in

linguistics now present themselves to courts as “forensic linguists.”

Fourth, in line with Capitol Technology’ University’s long-standing commitment to innovation, the proposed Ph.D. in Forensic Linguistic Engineering focuses on the development and testing of new methods in the field. The dissertation is expected to showcase the development and validation testing of a new method for forensic linguistics or the validation testing of a current method on new data. Graduates of the proposed degree will contribute new knowledge in terms of methods and reliability of methods. While the graduates will certainly serve as expert witnesses and subject matter experts, their credibility as experts rests on the innovative contributions they have made to their field.

In contrast, the current programs at Hofstra, Aston et al focus on the students’ role as expert witnesses rather than contributing scholars. In fact, the program descriptions repeatedly suggest that the utmost point of the current degrees is lucrative or glamorous consulting as expert witnesses rather than scholarly contribution to the field. But as the Hofstra material itself explains, the master’s is typically discounted as a credential for serving as an expert witness, so the Hofstra graduates are not qualified to serve as expert witnesses.

Fifth, the proposed Ph.D. in Forensic Linguistic Engineering is designed to be ethical regarding the confidentiality of data and the crucial avoidance of any possible taint of ongoing cases. Students will study fully adjudicated cases in all their courses. During the last year of the Ph.D., students will be allowed to work on cases through an internship with ALIAS Technology or another agency. As part of this internship, with ALIAS Technology, students will be bound by the standard non-disclosure agreement that protects all client data and cases. It is expected that any other agency will require the same non-disclosure agreement. Further, ALIAS Technology clients will be asked permission for a doctoral student is allowed to work on their cases, and this fact will be disclosed in any case report.

In contrast, the current programs at Hofstra, Aston et al regularly use students to perform work in cases without informing the client or disclosing this in the case report. This practice is unethical for two reasons. First, the client has contracted with the faculty in these programs because the faculty has specific qualifications, but the work is actually performed by students in these programs who do not have those specific qualifications. The client is paying for what he is not getting. It is unethical to lie. Second, the client may have a non-disclosure agreement with the faculty but does not have a non-disclosure agreement with the students. The client’s data and case are unprotected. It is unethical to design a system where confidentiality can so easily be breached.

2. Provide justification for the proposed program.

The proposed Ph.D. in Forensic Linguistic Engineering is strongly aligned with the University’s strategic priorities and is supported by adequate resources. The proposed Ph.D. in Forensic Linguistic Engineering will strengthen and expand upon the existing cybersecurity, cyberpsychology, artificial intelligence, technology, management, and applied engineering degree programs at the University. In addition, the Ph.D. in Forensic Linguistic Engineering 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 & 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. The proposed **Ph.D. in Forensic Linguistic Engineering degree** is largely research focused and unique to Capitol Technology University.

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 other **Ph.D. in Forensic Linguistic Engineering degrees** in the state of Maryland, nor in the United States, nor in the world.

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 proposal is a rigorous collaboration between selected faculty and administrators and was submitted to the university's executive council for scrutiny and approval. Please see Section I for a detailed list of the faculty's backgrounds and qualifications. Capitol Technology University is a STEM university with a strong focus on computer science, cybersecurity, artificial intelligence, technical management and engineering. It is a teaching university offering degrees at undergraduate, master's and doctoral levels.

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

Educational Objectives:

1. Students will evaluate the need for forensic linguistic engineering and the robust testing of methodologically sound solutions for their legal system (U.S. or international).
2. Students will demonstrate advanced knowledge and competencies for the future of forensic linguistic evidence in the legal, security, forensic or intelligence settings.
3. Students will analyze and synthesize paradigms, theories, and tools used in forensic linguistics.
4. Students will execute a plan to complete a significant piece of scholarly work in Forensic Linguistic Engineering.
5. Students will develop the skills to implement forensic linguistic engineering solutions in the legal, security, forensic or intelligence settings.

Learning Outcomes:

Upon completion of the program, graduates will be able to:

1. Use their knowledge of technological applications to support legal, security, forensic or intelligence operations;
2. Evaluate datasets, design collection procedures, curate datasets for use in validation testing and casework in the legal, security, forensic or intelligence settings;
3. Refute methodologically unsound analyses and support methodologically

sound analyses by communicating technical and statistical information appropriately and honestly;

4. Contribute to the body of knowledge and practical use of forensic linguistic engineering solutions and create original scholarly work that addresses a current deficit in forensic linguistics.

3. Explain how the institution will:

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

Students will be assessed on achievement of learning outcomes through a variety of discussion forums, written assignments, projects and presentations, including several mock evidence hearings. All assignments are graded using a specific rubric and are mapped to specific course learning outcomes and program outcomes. All courses are delivered asynchronously on-line using specific course templates embedded in the Canvas learning management system.

b. Document student achievement of learning outcomes in the program.

Student achievement of learning outcomes will be documented through use of a grading rubric for each assignment. Results of rubrics are used to calculate scores/grades which are visible to students in Canvas gradebook for each course. At the end of the course, grades are transferred from Canvas to the university's student management system and then added to students' transcripts.

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

The following is a list of courses for the **Ph.D. in Forensic Linguistic Engineering degree** program. Students expecting to complete this degree must meet all prerequisites for the courses listed below.

Program Entrance Requirements

To be accepted into the Ph.D. in Forensic Linguistic Engineering program, students must have completed an appropriate bachelor's or master's degree with a cumulative GPA of no less than 3.0 on a 4.0 scale. Students must also demonstrate experience in the field of theoretical linguistics, psycholinguistics, computational linguistics, speech science or a closely related field such as speech pathology, communication disorders, or acoustic engineering with courses in the core fields of linguistics (phonetics, phonology, syntax, semantics), 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 **Forensic Linguistic Engineering** 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.

There are three entrance requirements for which the applicant must demonstrate proficiency. These are: (i) methods of linguistic analysis; (ii) coding; and (iii) basic statistical analysis. Linguistic analysis is a necessary skill for forensic linguistic engineers because they must have a broad and deep expertise in what methods in linguistics can be used for the measurement of documents, handwriting and speech, measurements that can be coded and statistically analyzed. Coding is a necessary skill for forensic linguistic engineers because they must be able to develop a useable software tool. Statistical analysis is a necessary skill for forensic linguistic engineers because they must be able to test different statistical algorithms during development to discover the statistical algorithm that performs best with the different quantity and quality of datasets.

METHODS OF LINGUISTIC ANALYSIS

The Ph.D. in Forensic Linguistic Engineering builds upon the student's bachelor's or master's degree in theoretical linguistics, psycholinguistics, computational linguistics or speech science. The linguistics degree curriculum of the bachelor's or master's degree must include rigorous courses in the core fields of linguistics: phonetics, phonology, syntax and formal semantics. It would be extremely rare for a student who has earned a bachelor's or master's in linguistics from a respectable program to need any remediation in linguistics coursework.

The applicant will take an entrance examination covering linguistic analysis methods and must pass the examination with at least a 90%. The examination includes both multiple choice questions and problem sets.

If the applicant's linguistics degree transcript lacks the prerequisite linguistics courses or the applicant does not pass the entrance examination, the applicant will be required to successfully complete courses at a linguistics department approved by the Admissions Committee before beginning coursework in the Ph.D. in Forensic Linguistic Engineering. Admission will be conditional upon the applicant's successful completion of the prerequisite linguistics courses.

CODING

Students entering the Ph.D. in Forensic Linguistic Engineering must show evidence of proficiency in Python programming or another programming language (such as Java, C, C# or R). Many linguistics departments require a course in coding.

If the applicant's linguistics degree transcript lacks the prerequisite coding course, and the applicant cannot document coding proficiency through an earned certification, the applicant will be required to successfully complete a course or training and provide either an academic transcript or a certification.

The Open EDG Python Institute provides training leading to PCEP (certified Entry-Level Python Programmer), PCAP (certified Associate Python Programmer), PCPP-1 (certified Professional Programmer-Level 1) and PCPP-2 (certified Professional Programmer-Level 2). Applicants must complete at least the PCEP.

Alternatively, the applicant can take and pass one of Capitol Technology University's courses in coding such as CS-120 Introduction to Programming Using Python.

Admission to the Ph.D. in Forensic Linguistic Engineering will be conditional upon the applicant's successful completion of the prerequisite coding course or certification.

STATISTICS

Students entering the Ph.D. in Forensic Linguistic Engineering must show evidence of proficiency in basic statistics and using statistical software such as SPSS, SAS, MATLAB or R. Many linguistics departments require course(s) in statistics which use one of these software platforms.

If the applicant's linguistics degree transcript lacks the prerequisite statistics course, and the applicant cannot document proficiency in statistics through an earned certification, the applicant will be required to successfully complete a course or certification training and provide either an academic transcript or a certification.

The applicant must demonstrate proficiency in one of the following platforms: SPSS, MATLAB or R.

SPSS

IBM offers online tutorials in SPSS through its training partners. Applicants must show successful completion of IBM SPSS Statistics Essentials (V26) and IBM Statistical Analysis Using IBM SPSS Statistics (V26). IBM also offers courses through edX, such as IBM: Introduction to Statistics for Data Science Using Python, which is recommended.

MATLAB

MathWorks offers online tutorials in MATLAB. Applicants must document successful completion of these tutorials: MATLAB Onramp, Core MATLAB Skills, Build MATLAB Proficiency, Data Analysis in MATLAB, and Programming in MATLAB.

R

DataQuest offers several courses in the statistical programming language R . Applicants should complete Part 1: Introduction to R (17 hours), Part 2: Data Visualization in R (4 hours), Part 3: Data Cleaning in R (13 hours); Part 6: Probability and Statistics (12 hours); Part 7: Predictive Modeling and Machine Learning (5 hours).

Alternatively, the applicant can take and pass one of Capitol Technology University's courses in coding such as MA 128 Introduction to Statistics and one upper level course such as MA 525 Statistics Using Excel or DS 511 Statistical Methods in Data Science.

Admission to the Ph.D. in Forensic Linguistic Engineering will be conditional upon the applicant's successful completion of the prerequisite statistics course or certification.

Program Degree Requirements

The Ph.D. in Forensic Linguistic Engineering is earned by a total of 60 credits in ten courses. The completion of the **Ph.D. in Forensic Linguistic Engineering** 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 Forensic Linguistic Engineering** 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.

The completion of the **Ph.D. in Forensic Linguistic Engineering degree** requires students to complete (60 credit hours) in ten courses. These courses include:

FLE 800: Forensic Linguistic Engineering Research Background (6)

The student will focus on the study of the latest Forensic Linguistic Engineering strategies, tactics and developments. The student will synthesize the growing effect of Forensic Linguistic Engineering on current operations, international relationships and effects on the field, and where there are areas of improvements or failings. The focus will be to start identifying areas for research at a later stage and explore the background of Forensic Linguistic Engineering. The faculty will directly support and mentor the exploration phase of the planning.

FLE 810: Forensic Linguistic Engineering Research Methodologies (6)

Under a Chair and committee, a student will continue evaluating and develop research methodologies and strategies suitable for understanding Forensic Linguistic Engineering and address the data sources, information, and legal, security and forensic requirements to test a hypothesis or research question. It is expected the student will be building upon FLE-800 in refining and developing their research task and plan.

FLE 820: Forensic Linguistic Engineering Future Demands (6)

Under a Chair and committee, a student will research the future demands in the fields of Forensic Linguistic Engineering, Forensic Linguistics Technology and general Forensic Linguistics and how these influence specific research questions. Data collection and applications will be central to evaluating the needs of Forensic Linguistic Engineering programs on the short, medium and long term. The literature review will be more specific in focus and direction at this stage.

FLE 830: Strategies for Forensic Linguistic Engineering (6)

The student will undertake a robust and comprehensive analysis of the strategies for the growth and evolution of the Forensic Linguistic Engineering field under the direction of their Chair/committee.

FLE 840: Forensic Linguistic Engineering Research Proposal (6)

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 at this stage.

FLE 900: Forensic Linguistic Engineering Doctoral Writing I (6)

The student will compose and complete Chapters 1 and 2 within the boundaries of the proposal and research plan. Chapters 1-2 will cover the need for this research and a thorough literature review explaining the current state of the art with regard to the research question. Chapters 1- 2 will be reviewed by the student's Chair and Committee and must be approved for the student to advance. Any disagreement within the committee will be reviewed by the Dean of Doctoral Programs. If the student chooses the publication option, the student should submit the literature review for publication.

FLE 910: Forensic Linguistic Engineering Doctoral Writing II (6)

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. If the student chooses the publication option, the student should submit the description of the data collection and curation for publication.

FLE 920: Forensic Linguistic Engineering Doctoral Writing III (6)

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. If the student chooses the publication option, the student should submit the research results for publication.

FLE 930: Forensic Linguistic Engineering Doctoral Writing IV (6)

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.

FLE 940: Forensic Linguistic Engineering Doctoral Defense (6)

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. RSC 899 cannot be taken without first attempting this course.

5. **Discuss how general education requirements will be met, if applicable.** Not Applicable.
6. **Identify any specialized accreditation or graduate certification requirements for this program and its students.** Not Applicable
7. **If contracting with another institution or non-collegiate organization, provide a copy of the written contract.** Not Applicable
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 university has a comprehensive on-line catalog that addresses these areas in detail: <https://catalog.capttechu.edu/>. Additionally, the university has a team of highly proactive and responsive admissions counsellors, graduate advisors, financial aid counsellors and a Dean of Students to ensure students receive the support necessary to successfully complete their program.

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.**

In addition to our comprehensive online catalog, our university website also provides students with timely and professional marketing and program details: <https://www.capttechu.edu/degrees-and-programs> . We also invite prospective students to join us at our monthly virtual open house events to learn more about how the university can help them achieve their academic and professional goals.

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 year. For example, Dr. Hassan, Dr. Chowdhury, Dr. Butler, and Dr. Charles are fulltime faculty members.

All of the faculty members hold terminal degrees. The breadth of the faculty encompasses linguistics, computational linguistics, artificial intelligence, law, technology, cyberpsychology and cybersecurity. Thus, the doctoral student will be able to focus the doctoral research and dissertation on a specific area of forensic linguistics (identification, text classification, text similarity and linguistic profiling) in relation to the legal, security, forensic or intelligence environment. Further, the faculty has expertise in artificial intelligence and engineering related to language, speech and handwriting so that the student can focus on a specific modality for the research and dissertation.

The mentored-research courses delivered one-on-one with dedicated Doctoral Chair for each student. 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 doctoral faculty will be added as needed.

Instructors who will be engaged with the **Ph.D. in Forensic Linguistic Engineering degree** are:

INSTRUCTOR	BACKGROUND	COURSES TAUGHT
Carole E Chaski Ph.D.	Ph.D. Linguistics M.A. Linguistics (Computational) M.Ed. Psychology of Reading A.B. magna cum laude English & Ancient Greek Diplomate, International Board of Forensic Engineering Sciences Fellow, American Academy of Forensic Sciences, Engineering & Applied Sciences Section	FLE 800 and 900 courses
Najam U Hassan, Ph.D. Full time	Ph.D. Business Analytics and Decision Science MBA International Management M.S. Computer Science B.S. Computer Science	DS 235, 502 AIT 201 IAE 677 FLE 800 and 900

		courses
Tashnim Chowdhury Ph.D. Full time	Ph.D. Information Systems M.S. Electrical Engineering	AIT 360, 370 AIT 440 FLE 800 and 900 courses
William Butler, D.Sc. 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	FLE 800 and 900 courses
Kellep Charles, D.Sc. Full time	D.Sc. Cyber Security M.S. Telecommunications Management B.S. Computer Science CISSP CCNA CISA NSA-IAM ITILv3	FLE 800 and 900 courses
Joshua Sinai, PhD	Ph.D. Political Science/Comparative Politics M.A. Political Science/Comparative Politics B.A. Political Science/Comparative Politics	FLE 800 and 900 courses

Narrative biographies of faculty and advisory board members

Carole E. Chaski, PhD is the Executive Director of the Institute for Linguistic Evidence, the first non-profit research organization devoted to research and development in linguistic evidence (founded in 1998) and the CEO of ALIAS Technology LLC (founded in 2007).

Chaski began work in forensic linguistics in 1992 and is credited with pioneering the field of forensic computational linguistics and the paradigm of linguistics as a forensic science. She has developed methods and software –ALIAS–for authorship identification; classification and authentication of threat letters, suicide notes, predatory chats, and deceptive witness statements; measurement of text similarity; and linguistic profiling. She has consulted on cases in North America, South America, Europe, Asia and Australia.

Chaski has been invited to lecture at New Jersey Institute of Technology, University of Michigan, Duquesne University, Princeton, University of Bonn (Germany), Chungbuk National University (Korea), National Police University of China (China), University of Murcia and University of Alicante (Spain), Murcia Guardia Civil, Spanish Air Force Academy (CUD), FBI Academy and United States Secret Service., among others. She has presented her research at universities such as Stanford, Yale, Princeton, Pennsylvania, Brown, Northwestern, Chicago, Michigan, and Mary Washington, and at conferences such as the Linguistic Society of America, the American Academy of Forensic Science, International Academy of Forensic Science, InterForensics, Law and Society Association, the International Academy of Law and Mental Health, the International Classification Society, IEEE Homeland Security, the

International Association of Forensic Linguistics, the International Language and Law Association, the American Pragmatics Association, the International Pragmatics Association, and The Association for Linguistic Evidence. She has taught at the Linguistic Society of America's Summer Institute at the University of Michigan, University of Chicago and University of California-Davis. She has published over 70 abstracts, articles and book chapters in forensic linguistics. Chaski holds a US patent in authorship identification.

Chaski held a Visiting Research Fellowship (1995-1998) at the US Department of Justice's National Institute of Justice (NIJ). Chaski was the first person to receive Federal funding for forensic linguistic research in the USA, and she has subsequently helped other researchers win funding. During her fellowship, Chaski developed the first linguistic corpus designed for research in forensic linguistics and conducted the first empirical testing for popular linguistic methods of determining authorship of forensic texts. Chaski has served as an expert witness in Federal and State Courts in the United States, in Canada and in The Hague; she has provided unrestricted testimony on linguistic issues in Federal State, and Military courts after Daubert, Frye and Hauser hearings on admissible evidence. She was the first linguist in the United States to successfully undergo a Daubert hearing for the admissibility of authorship identification evidence based on computational linguistics. She is also the first linguist in the United States to successfully be admitted under a Frye hearing for the admissibility of evidence based on the linguistic capacity method for authorship identification and the text-typing method for discourse type identification.

Chaski earned her doctorate and master's in linguistics (syntax, language variation and computational linguistics) at Brown University, her master's in psychology of reading (psycholinguistics) at the University of Delaware and her bachelor's magna cum laude in English and Ancient Greek from Bryn Mawr College.

She has served on dissertation committees for students in the United States, Pakistan and Greece and currently serves as an advisor to students in Malta and Spain.

Additional Justification For Key Faculty

Capitol Technology University recognizes the need to hire additional faculty members as new programs emerge. Below are the biographies of academic professionals in the field that have expressed interest in mentoring doctoral students in these programs.

Nathan Holmes, Esq. is of counsel with Boles Holmes White, a boutique full-service law firm providing general and corporate counsel legal services and litigation services to a wide range of clients throughout the United States. Holmes practices corporate and civil litigation with a focus on advising companies in the use of Artificial Intelligence and other emerging technologies.

Holmes has experience as a law professor, having taught technology related legal classes at both the University of Alabama School of Law and Cumberland School of Law.

Holmes attended the University of Alabama as a Dr. Fred A. and Frances Pickens Lewis Endowed scholar and as a member of the Honors College and Computer Based Honors Program, the nation's first undergraduate research program. Holmes earned his bachelor's degree in pure mathematics, graduating summa cum laude and as a

recipient of a mathematics departmental award as a junior. After completing his undergraduate work, he continued his education at the University of Alabama School of Law where he received his J.D. while simultaneously completing a dual degree program with a master's degree in civil engineering. Holmes is currently completing his master's degree in applied mathematics with an emphasis on speech science at Columbia University.

Homayoon Beigi, Ph.D. has conducted research and development, since the mid-1980s, in the fields of Biometrics, Optimization, Pattern Recognition, Machine Learning, and Internet-Commerce. His work, as the President of [Recognition Technologies, Inc.](#), has included research and development, leading to the production of a series of Speaker Recognition, Speech Recognition, Face Recognition, and Signature Recognition software engines. He is the author of the first and only textbook on speaker recognition, "[Fundamentals of Speaker Recognition.](#)" published by Springer, the electronic version of which has been downloaded more than 100,000 times. Beigi earned his B.S., M.S. and Ph.D. in Mechanical Engineering from Columbia University. He taught as an adjunct for Columbia since 1995 and has recently joined the faculty as a fulltime professor.

Bruce Breon, Ph.D., J.D. earned his Ph.D. in Linguistics and his J.D. at the University of Georgia. He studied European Union Law at the Vrije Universiteit Brussel. Breon earned his B.A. on Communications at Prescott College.

One of the first linguist-lawyers to work outside academe, Breon has held positions with Venable LLP, Quinn Emanuel, Lockheed Martin, Leidos. IN these corporate environments, Breon has used his skills in linguistics and law to provide litigation support, e-discovery and investigation. Since 2017 he has been an Alzheimer's Disease Case Manager.

Blake Howald, Ph.D., J.D. earned his Ph.D. and M.S. in Linguistics (computational linguistics, semantics) at Georgetown University after his J.D. from University of Detroit Mercy School of Law, after his B.A. in Linguistics from the University of Pittsburgh.

Howald has taught computational linguistics as an adjunct in the Computer Science departments at the University of Minnesota and Carleton College. He has worked a computational linguist at NetBase Solutions, Ultralingua and Thomson Reuters. At Thomson Reuters, he currently serves as the Director of Enterprise Content Platform Technical Consulting and User Experience and with his team has gained ten (10) US patents.

Howald has published 16 articles since 2006 on forensic linguistics methodology, semantics, narration and linguistic engineering.

Angela Almela Sanchez Lafuenta Ph.D. is an associate dean of students at the University of Murcia, in Murcia, Spain, where she is a member of the LACELL research group in Linguistics Applied to Computing, Language Teaching and Lexicography. Almela earned her Ph.D., M.A. and B.A. at the University of Murcia. Almela's dissertation concerned the computational detection of deception in English and Spanish which has recently been published as a book.

After her dissertation, Almela had two post-doctoral fellowships, one in Italy and one at the Institute for Linguistic Evidence in the USA. She has also won research funding from the Seneca Foundation and the European Union through the University of Murcia MIND project.

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. (2018, May 1). *Active Learning: The Perfect Pedagogy for the Digital Classroom*.)

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 fulltime 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 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 well 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 fulltime and adjunct, to ensure all members receive the training. Additionally, the live sessions are recorded for those faculty who are unable to attend the live training session due to other professional commitments or who are teaching classes at the training delivery time. 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

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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.**

The University's library currently supports 106 STEM-related degree programs at the bachelor, master's and doctoral level; it's fully prepared to support a **Ph.D. in Forensic Linguistic Engineering degree**.

Library Services: The Puente Library offers extensive services and a wide collection for Capitol Technology University students to be academically successful. Library resources include both a traditional hard-copy collection and a digital virtual library. The library also provides a mailing service for materials borrowed through the Maryland system.

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 access to historical management and decision science materials through its membership in the Maryland Independent College and University Association (MICUA). 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.

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 Business and Technology 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.

Capitol Technology University has been using Canvas for over eight 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. Resources and Narrative Rationale.

Table 1. Program 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)	\$180,900	\$233,928	\$304,128	\$389,880	\$492,840
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	15	19	24	30	37
e. Credit Hour Rate	\$670	\$684	\$704	\$722	\$740
f. Annual Credit Hour	18	18	18	18	18
g. Total P/T Revenue (d x e x f)	\$180,900	\$233,928	\$304,128	\$389,880	\$492,840
3. Grants, Contracts and Other External Sources	0	0	0	0	0

4. Other Sources	0	0	0	0	0
TOTAL (Add 1 - 4)	\$180,900	\$233,928	\$304,128	\$389,880	\$492,840

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.

a. Reallocated Funds

The University will not need to reallocate funds for the program.

b. Tuition and Fee Revenue

Tuition is calculated based on part-time students only and includes an annual 2.5% tuition increase.

c. Grants and Contracts

There are currently no grants or contracts.

d. Other Sources

There are currently no other sources of funds.

e. Total Year

No additional comments needed.

2. Program Expenditures.

Table 2. Program Expenditures

Expenditure Category	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	\$96,000	\$98,880	\$101,846	\$104,902	\$108,048
a. Number of FTE	1	1	1	1	1
b. Total Salary	\$80,000	\$82,400	\$84,872	\$87,418	\$90,040
c. Total Benefits (20% of salaries)	\$16,000	\$16,480	\$16,974	\$17,484	\$18,008
2. Admin Staff (b + c below)	\$5,942	\$6,091	\$6,244	\$6,400	\$6,559
a. #FTE	0.08	0.08	0.08	0.08	0.08
b. Total Salary	\$4,952	\$5,076	\$5,203	\$5,333	\$5,466
c. Total Benefits	\$990	\$1,015	\$1,041	\$1,067	\$1,093
3. Support Staff (b + c below)	\$36,000	\$46,968	\$61,128	\$78,750	\$99,900
a. Number of FTE	0.45	0.57	0.72	0.9	1.1

b. Total Salary	\$36,000	\$46,968	\$61,128	\$78,750	\$99,900
c. Total Benefits	\$0	\$0	\$0	\$0	\$0
4. Technical Support and Equipment	\$1,050	\$1,429	\$1,920	\$2,550	\$3,330
5. Library	\$0	\$0	\$0	\$0	\$0
6. New or Renovated Space	\$0	\$0	\$0	\$0	\$0
7. Other Expenses	\$6,000	\$7,500	\$9,375	\$11,720	\$14,650
TOTAL (ADD 1-7)	\$144,192	\$177,547	\$180,513	\$204,322	\$232,537

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

This figure is an estimate; it's difficult to assign an accurate cost to this degree program because the courses themselves are included in other existing programs and are currently taught by existing faculty with students enrolled from several other programs. The existing scheduled courses have spare capacity to absorb additional student enrollments without the addition of new faculty assignments/hires.

b. Administrative Staff

Capitol Technology University will continue with the current administrative staff through the proposed time period.

c. Support Staff

Support staff consist of adjuncts who will be contracted to perform the function of a Dissertation Chair assigned to students on a one-to-one basis. Each thesis chair can mentor up to 10 students per semester.

d. Equipment

Software for courses is available free to students or is freeware. Additional licenses for the LMS will be purchased by the University 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 current material serves the needs of this degree 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.

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 Dean. 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 Dean 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 Forensic Linguistic Engineering degree** 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 the 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 assessment 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 Dean review the student evaluations for every course offered at the University. The Department Chairs and Academic Dean 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 Dean. 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 Dean 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 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 Forensic Linguistic Engineering degree**.

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 four specialized accrediting organizations: International Accreditation Council of Business Education (IACBE), Accreditation Board for Engineering and Technology (ABET), NSA, and DHS. All five accrediting organizations have reviewed the University's distance education program as IACBE, 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 Forensic Linguistic Engineering degree**.

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

a. 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.

b. 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.

c. 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.

d. 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 academic rigor of the online course is comparable to the traditionally offered course. The University Academic Dean, 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.

- e. 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 Dean 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.

- f. 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 Graduate School is supported by the Chair of the Department of Computer and Data Science. 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).

- g. 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 ground 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 students' learning needs.

- h. 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.

i. The institution assures the integrity of its online offerings.

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

When new faculty or outside consultants 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 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 Dean, 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 Dean and Department Chairs. Annually, the information is reported to the University's accreditation authorities such as MSCHE and NSA/DHS.