



Letter of Notification (LON)
Public Comment Period – 15 Days

Institution: Tennessee Technological University

Proposed Academic Program: Interdisciplinary Computing, Bachelor of Science (BS)

Proposed Implementation Date: Fall 2025

CIP Code and Title: 11.0104 - Informatics

CIP Code Definition: A program that focuses on computer systems from a user-centered perspective and studies the structure, behavior and interactions of natural and artificial systems that store, process and communicate information. Includes instruction in information sciences, human computer interaction, information system analysis and design, telecommunications structure and information architecture and management.

LON Submission Date: June 28, 2024

Posted Date on THEC Website: July 1, 2024

Public Comment Period: July 16, 2024

Tennessee Tech Internal Cover Form for Letters of Notification

Please refer to the TTU Office of the Provost website for New Programs and Program Modifications before developing a proposal. <https://www.tntech.edu/provost/new-programs>.

Name of New Academic Program and Degree Designation:

Interdisciplinary Computing, Bachelor of Science

Proposed Implementation Date: August 2025

Information Contact: Dr. Gerald Gannod/Dr. Steven Frye / 931-372-6855 or 6241
Printed Name Telephone

APPROVED:  / 6/25/24 
Department Chairperson's Signature Date

Digitally signed
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Date: 2024.06.26
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APPROVED:  / 6/25/24
College Dean's Signature Date

APPROVED:  / 6/25/24
Provost's Signature Date



Office of the President

TENNESSEE TECH

June 27, 2024

Steven Gentile
Executive Director
Tennessee Higher Education Commission
312 Rosa Parks Ave, 9th Floor
Nashville, TN 37243

Dear Executive Director Gentile:

In accordance with the Tennessee Higher Education Commission (THEC) policy A 1.0 New Academic Programs: Approval Process, Tennessee Tech University submits a Letter of Notification (LON) for a new program, the Bachelor of Science in Interdisciplinary Computing (IC). This program will address the ever-growing need to create a workforce capable of applying computing solutions across disciplines.

Computing has greatly impacted how government, education, entertainment, commerce, and industry operate, innovate, and create. The most significant impact over the past 50 years has been the increased application of computing solutions across all these sectors. This has led to a demand for computer science graduates and underscored the importance of acquiring expertise in computing to effectively tackle challenges in both established and emerging industries. Tennessee Tech proposes to establish a computing program situated at the intersection of various disciplines. This program will enable 21st-century learners to combine interests and skills in cognate areas with knowledge of computing and data sciences, leading organizations to discover new innovations for solving problems. In addition, we believe this program creates a pathway for adult learners identified through Tennessee Reconnect to pursue computing degrees while also relying on their knowledge gained from careers or past military service.

According to the U.S. Department of Labor, Bureau of Labor Statistics (BLS), overall employment in computer and information technology occupations is projected to grow much faster than the average for all occupations from 2022 to 2032. On average, about 377,500 openings are projected each year in these occupations. Additionally, the THEC State Supply and Demand Report identified information technology as an in-demand occupation in Tennessee and across the nation. The proposed IC program will create opportunities for Tennessee Tech to meet workforce demand by integrating technology-infused coursework into a deep knowledge base and educating students to interact with artificial intelligence using critical thinking, data analysis, and diverse communication skills.

Thank you for your consideration of this request and I look forward to your response.

Sincerely,

Philip B. Oldham
President

Letter of Notification (LON)

for the

Bachelor of Science

in

Interdisciplinary Computing

Submitted By

Tennessee Technological University

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Letter of Notification (LON)

Section 1: Overview

Program Information

Institution Name: Tennessee Technological University

Proposed academic program and concentration(s): BS in Interdisciplinary Computing (BSIC)

Degree name: Interdisciplinary Computing (IC)

Degree designation: Bachelor of Science

Proposed CIP code: 11.0104

CIP code definition: *Informatics*

Corresponding SOC codes and SOC definitions applicable for graduates of the program:

CIP CODE	CIP Title	SOC CODES	SOC Titles
11.0104	Informatics	15-1221	Computer and Information Research Scientists
		15-1252	Software Developers
		15-1253	Software Quality Assurance Analysts and Testers
		15-1255	Web and Digital Interface Designers

Academic Program Liaison names and contact information

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Proposed Implementation Date: Fall 2025

Estimated Timeline:

- LON submission - June 28, 2024
- NAPP submission – September 2024
- External review- October 2024
- Institutional governing board approval – March 2025
- THEC Action - May 2025
- Enroll students for Fall semester August 2025

Section II: Background

Purpose and nature of the academic program

The Interdisciplinary Computing (IC) program is being proposed to address the ever-growing need to create a workforce that can apply computing solutions across disciplines. Computing has had a great impact on the way that government, education, entertainment, commerce, and

industry operate, innovate, and create – indeed, the greatest impact over the past 50 years has been through the increased application of computing solutions to every one of these sectors. This has created a demand for computer science graduates, and while there has been some movement towards informal or ancillary “coding camp”-based training programs, such efforts result in creation of a trade mentality. We recognize, however, that computer science programs may swing to the other end of the spectrum, where gaining expertise in computing eschews other knowledge necessary to apply computing in either established or emerging industries. We are proposing, instead, to create a computing program that lives in the “intersection” between disciplines to allow the 21st century learner (i.e., digital and information age natives) to combine interests and skills in *cognate areas* with the knowledge of computing, artificial intelligence, and data sciences in order to lead organizations to discover new innovations for addressing the problems of an ever-dynamic world. In this context, a cognate area is a discipline that when combined with computing creates a new computationally enhanced area of study. Certainly, there currently exist such disciplines within the sciences, engineering, and business (e.g., computational science, computational engineering, business information systems, etc.). The National Science Foundation has long supported work in this “CS + X” area. It is our intent to create a mechanism on our campus by which CS + X can be embraced and implemented via partnerships between disciplinary units in which the potential for computing-enabled study exists. We believe this program creates a pathway for adult learners identified through Tennessee Reconnect to pursue computing degrees while also relying on knowledge gained from careers or past military service.

As such, the goals of this program are three-fold:

- To design a new kind of degree program that seeks to exist in the “intersection” between the disciplines of computer science, innovation, and entrepreneurship, and the many disciplines that form our public and private sector workforce
- To establish partnerships with the program stakeholders, especially employers, to ensure the future success of program graduates while also paving the way for addressing the need to develop a 21st century workforce
- To launch the IC Program with a cohort of students that come from a diverse set of backgrounds and experiences

The IC program will require 120 credits for completion in four (4) primary areas of focus:

1. General Education Core (41 credits)
2. Computing Core (36 credits)
3. Intersectional Core (15 credits)
4. Cognate Area (28 credits)

The outcomes of the program are aligned with the ABET General Criteria for computing programs as listed below. Graduates from the IC program will have an ability to:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline.

3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

A summary of the program and its structure is shown below.

- General Education Core (41 credits): The general education core follows the university's required model for breadth in writing, communication, history, sociology, humanities and fine arts, mathematics, and natural science. The total number of credits is 41 but will have overlap with the mathematics required in the intersectional core. The General Education core aligns with Student Outcome 3 of the ABET Computing Accreditation Commission's general criteria.
- Computing Core (36 credits): The Computing core aligns with Student Outcomes 1 and 2 of the ABET Computing Accreditation Commission's general criteria.
- Intersectional Core (18 credits): The intersectional core component of the program is designed to equip students with the ability to analyze problems, consider issues related to the cross-section of computing and a cognate area, and apply design thinking and entrepreneurship to support innovation in the intersection of the related disciplines. The Intersectional core aligns with Student Outcome 1 of the ABET Computing Accreditation Commission's general criteria (as shown above). Additionally, it will add support for Outcome 4:
- Cognate Area (28 credits): The Cognate component of the program is designed to provide depth in a non-computing area to facilitate graduates with a level of expertise needed to apply computing in that area. The Cognate includes the construction of a sequence of courses equivalent to a minor in that discipline and 10 credits of formal experiential learning using the studio model. The teamwork experience embedded in practicum and capstone courses in Cognate areas will support ABET Outcome 5.

The program will be delivered in a mixture of hybrid and face-to-face courses that emphasize experiential and learner-centered instruction, including the use of practice-based studio courses. We expect to attract a wide variety of students ranging from traditional populations to adult learners and military veterans.

Alignment with State Master Plan and institutional mission profile

Alignment with State Master Plan

The IC program will address the following strategic initiatives:

- TN Reconnect—Drive to 55
- THEC Master Plan—Future of Work
- Hope Scholarship—Retention
- Future Workforce Initiative—STEM

A 2017 TN Reconnect report indicated that over 900,000 Tennesseans have some college credit but no college degree. For the state of Tennessee to meet the Drive to 55 initiative, we must take every reasonable step to keep students progressing toward the degree. The IC Program will provide options for students and advisors while embracing TTU's Strategic Plan to be responsive to the needs of stakeholders. Moreover, the IC Program addresses TBR's goal of Student Success by "fostering student persistence to degree completion."

The Higher Education Master Plan (entitled Enabling the Competitive Edge), cites a need to *increase computer science and data analytics offerings* in the section on the Future of Work (pp. 34-37). In addition, it emphasizes that programs need to think creatively about offering coursework in a manner that does not require proficiency in upper-level mathematics. This program directly aligns with this language.

Additionally, the Master Plan states that *all individuals employed in Tennessee must learn to interact with artificial intelligence using critical thinking, data analysis, and diverse communication skills*. The IC program will integrate practical artificial intelligence instruction to ensure that its graduates satisfy this goal.

The IC Program will be an efficient pathway for students to maintain scholarship eligibility (HOPE, Pell, and other scholarships). According to a recent THEC report "nearly two-thirds of the students who received the HOPE scholarship lost their awards in the second year of college". The program will enable students to pursue a degree path that is innovative and thus save their GPA and keep their financial aid. According to a recent Forbes study, losing financial aid is the main reason students drop out of college; therefore, maintaining scholarship eligibility is critical to student retention. IC Program will enable students to remain in college and make progress toward their degree. Consequently, the program will have a positive impact on retention rates. Tennessee Tech's fall-to-fall retention rates for first-time freshmen hover around 80%, and the program can enhance this percentage.

Governor Lee announced the Future Workforce Initiative to increase science, technology, engineering, and mathematics (STEM) training. Governor Lee said, "The Future Workforce Initiative is a direct response to the emerging technology industry and making sure our students are first in line to be qualified for technology jobs." Governor Lee noted that "58 percent of all STEM jobs created in the country are in computing but only 8 percent of graduates study computer science in college," The IC program will address workforce initiatives by creating partnerships that engage industry leaders, workplace managers, and business executives. The partnerships will identify gaps in the workforce and shape the IC curriculum to provide innovative solutions to address the shortcomings.

Alignment with Institutional Mission

Tennessee Tech University's Mission is to create, advance, and apply knowledge to expand opportunity and economic competitiveness while delivering enduring education, impactful research, and collaborative service. The proposed Bachelor of Science Degree in Interdisciplinary Computing aligns with the university's mission to create knowledge for

students to be competent and help them apply this knowledge to improving the quality of life for individuals, families, and communities.

With respect to the Tennessee Tech University Strategic Plan, *Tech Tomorrow*, we believe the program will have the following impact:

Goal 1: Education For Life. Tennessee Tech provides education that unleashes the potential and passion within our students and prepares them for successful careers and culturally enriched lives. Tech also provides educational opportunities, programs, credentials, and degrees to fuel the lifelong learning necessary for enduring achievement.

The Program will incorporate experiential learning and workplace partnerships into the program at multiple points to create education/work connections.

Goal 2: Innovation in all We Do. TTU innovates in all we do, embracing and deploying our technological foundation in our education, research, service, and stewardship.

Innovation is at the core of the program. The goal is to create learning opportunities in the intersections between computing and various cognate areas. Building expertise in multiple areas will help create more career-ready, flexible graduates.

Goal 3: Exceptional Stewardship. Tennessee Tech is committed to optimizing resources and continuously improving effectiveness, efficiency, and return on investment for students.

Combining the resources and strengths of both the College of Engineering and the College of Interdisciplinary Studies allows for more effective use and deployment of finances and people. The program will utilize current quality resources and leverage strategic partnerships between departments/schools.

Goal 4: Engagement for Impact. Tennessee Tech fosters partnerships with government, business, and non-profit organizations to advance economic and workforce development, create and disseminate knowledge, serve the public good, and generate cultural impact.

Partnerships with industry/workforce connections will be central to the program. Education will be exploratory, experiential, and real-world applied. Students will work together to solve problems and apply learning.

Institutional capacity to deliver the proposed academic program

Tennessee Tech University offers a comprehensive set of programs that range from science and engineering to nursing, fine arts, business, and education, to name a few. The Department of Computer Science in the College of Engineering has 24 full-time faculty that are available to contribute effort towards this program. The College of Interdisciplinary Studies expects to add a

faculty member to support the program, as well as adjunct faculty. In addition, faculty affiliates from each of the disciplines in which cognates will be developed will also provide support, either indirectly as students complete minors within the disciplines, or directly through engagement in practicum and capstone courses.

Support staff from the College of Engineering, College of Interdisciplinary Studies Student Success Center, and the Launchpad Student Success Center will be available to provide academic advising, and technical support and facilitate students who have other academic needs. Advisors in the College of Interdisciplinary Studies have extensive experience providing support services to students pursuing degrees that combine various fields of study and routinely work with adult students and military students/veterans. In addition, as students receive other instruction within the cognate areas, support will be provided through the affiliated colleges and departments.

Existing space in Bruner Hall and the Ashraf Islam Engineering Building will be used for instruction, including the collaborative spaces that have been created to facilitate team-based projects. Both buildings provide learning spaces that enable teams to seamlessly communicate and collaborate in face-to-face settings supported by technology. We also expect to develop several online and hybrid courses for this program with the support of the Center for Innovation in Teaching and Learning (CITL) at Tennessee Tech.

We expect the impact on other existing computing programs at Tennessee Tech to be negligible. Specifically, our target populations of students are not students that are currently seeking Computer Science, Computer Engineering, or Business Information Technology degrees, but rather students that are interested in the integration of technology within their disciplines of interest. As such, we expect the enrollment to positively affect overall enrollment rather than decreasing enrollment in existing programs.

Existing programs offered at public and private Tennessee universities

Currently, there are no programs in Tennessee's public and private universities that share the same CIP code, 11.0104, as the proposed program. However, multiple programs with similar CIP codes are offered in Tennessee universities.

Table 1 provides a list of the computing programs with similar CIP codes in the public and private universities within the State of Tennessee. These programs are largely situated in traditional locations including colleges of engineering and business. Other programs throughout the state fall within the expected computer science umbrellas, with concentrations ranging from cybersecurity, data science, and AI, to information systems and information technology, and other similarly traditional focus areas. The program most closely aligned with the IC program is the College of Emerging and Collaborative Studies, BS in Data Science, at the University of Tennessee at Knoxville, which will be implemented in Fall 2024. Their program is meant to address many of the same concerns as the program we are constructing, including the focus on

interdisciplinarity, emerging technologies, and collaboration. The primary difference, based on our research into this program, is our focus on explicitly developing a cognate curriculum based on the alignment with minors, and the partnerships needed to provide students with situated experiences within the associated disciplines.

Table 1 List of Computing Programs with Similar CIP Codes at Tennessee Public and Private Universities

Program with Similar CIP Code					Degrees Awarded		
Institution	Public or Private	Degree	Program	CIP Code	2020-21AY	2021-22AY	2022-23AY
Austin Peay State University	Public	B.S.	Computer Information Technology	11.0103	32	26	21
		B.S.	Computer Information Systems	11.0501	41	36	26
		B.S.	Computer Science	11.0701	17	17	25
East TN State University	Public	B.S.	Computing	11.0101	78	91	78
Middle TN State University	Public	B.S.	Computer Science	11.0701	74	83	73
		B.S.	Data Science	30.0701	0	3	19
Tennessee State University	Public	B.S.	Computer Science	11.0701	23	27	28
Tennessee Technological University	Public	B.S.	Computer Science	11.0701	88	115	129
University of Memphis	Public	B.S.	Computer Science	11.0701	56	71	68
University of Tennessee-Chattanooga	Public	B.S.	Computer Science (BS)	11.0701	36	36	44
University of Tennessee-Knoxville	Public	B.S.	Information Sciences	11.0401	2	11	31
		B.S.	Computer Science	11.0701	87	79	113
		B.S.	Data Science*	30.7001	--	--	--
		B.S.	Applied Artificial Intelligence*	11.0102	--	--	--
University of Tennessee-Martin	Public	B.S.	Computer Science	11.0701	12	7	9
		B.S.	Information Systems	52.1201	7	11	12
University of Tennessee-Southern	Public	B.S.	Computer Information Systems**	11.0101	--	--	--
Vanderbilt University	Private	B.S.	Computer Science	11.0701	114	157	158
Lipscomb University	Private	B.S.	Information Technology	11.0103	6	4	5
		B.S.	Computer Science	11.0701	1	2	3
		B.S.	Software Engineer	14.0903	8	6	10
Belmont University	Private	B.S.	Computer and Information Sciences	11.0101	7	15	13

*Program implemented in Fall 2024

**Program implemented in Fall 2021

Accreditation

The proposed program can be accredited through ABET’s Computing Accreditation Commission (CAC) under the “General Criteria Only” option. If we choose to seek accreditation, the program would use the existing, successful ABET processes of the Department of Computer Science as a template and would seek accreditation at the time of the future Computer Science ABET full reaccreditation visit (depending on the completion of the program’s first graduates). This would streamline the self-study process by allowing the reuse of common material and would allow for reduced costs by using the same evaluation team. The costs would include a Readiness Review that is required for all initial program visits in addition to the typical accreditation visit costs, resulting in a total cost of approximately \$8,000.

Section III: Feasibility

Employment Opportunities

Computing is increasingly driving the transformations occurring across industries ranging from health care to finance and beyond. A recent article in Inside Higher Ed noted that students need a computer science foundation to prepare for success later in their curriculum. Archaeologists write programs to piece together fragments of ancient ruins. Economists apply deep learning models to financial data. Linguists write programs to study statistical properties of literary works. Physicists study computational models of the universe to analyze its origins. Musicians work with synthesized sound. Biologists seek patterns in genomes. Geologists study the evolution of landscapes. Artists work with digital images. Whether one thinks that the purpose of a college education is to prepare students for the workplace or to develop foundational knowledge with lifetime benefits (or both), computer science, in the 21st century, is fundamental. The program will cultivate the intersections that already exist within the college environment. Indeed, in addition to the physical computing technologies being used, the increased use of machine learning and analytics is changing the way that every industry conducts business. One needs to look no further than their own pocket to find a transformative device that drives communication and collaboration. Tennessee’s General Assembly recently passed House Bill 2153 (Lamberth, 2022), requiring students enrolled in the ninth grade for the 2024-2025 school year to take a full year of computer science education to receive a traditional high school diploma. Furthermore, no later than the 2024 – 2025 school year, middle school students should receive computer science instruction for at least a minimum of one grading period per day for a full school year.

Tennessee Tech University has created a *first-in-the-state* Computer Science Education (CSED) endorsement program meant to provide both pre-service and in-service teachers with the education and credentials needed to meet the goals of the initiative (TNCS, 2022). As such, Governor Lee has made Computer Science a major component of his legislative agenda. Oracle announced on April 23, 2024 that they are moving their corporate headquarters to Nashville. According to the Tennessean (Leyva, 2024), “The software giant's move to Nashville is expected to create 8,500 jobs over the next decade”. A search of jobs available in Tennessee under “Computer and Information Systems Managers” yielded 560 available positions posted between February 27 and April 25. A similar search under “Computer Systems Analysts” yielded 559

postings, and “Software Developers” yielded 1216 postings for the same two-month period (O*NET Online, April 25, 2024). A search of Computer Information Systems positions on the job site *indeed* yielded 363 open positions in Tennessee requiring a bachelor’s degree (6/21/24).

The THEC State Supply and Demand Report identified information technology as an in-demand occupation in Tennessee and across the nation. IT occupations are projected to grow 2.9 percent annually from 2020 to 2030, faster than the average for all occupations. The most in-demand IT occupations include computer user support specialists, computer network support specialists, computer systems analysts, information security analysts, and software developers. The report also indicated that several aligned academic programs are meeting unmet need criteria, including bachelor’s degrees for computer systems analysts and computer and information sciences. This proposed program will help fill the gap, meet these unmet needs, and serve the state of Tennessee.

According to the U.S. Department of Labor Bureau of Labor Statistics (BLS), overall employment in computer and information technology occupations is projected to grow much faster than the average for all occupations from 2022 to 2032. About 377,500 openings are projected each year, on average, in these occupations due to employment growth and the need to replace workers who leave the occupations permanently.

Clearly, we need more students with knowledge and expertise in computing. With the emphasis on Computer Science from the Governor’s office and the expanding role of Computer Science in our everyday lives, the IC program can help recruit, retain, graduate, and employ students who have a strong foundation in technical (computer science) and critical thinking skills (i.e., innovation) while having competency in the facets of both established and emerging disciplines (i.e., cognate areas). The IC program will weave technology-infused coursework into the deep knowledge base of cognate areas to build a 21st-century degree that more effectively and efficiently addresses the challenges of a changing world.