Expedited Letter of Notification (ELON)
Policy A1.6 Expedited Academic Programs: Approval Process

Institution:	Tennessee Technological University
Proposed Academic Program:	Interdisciplinary Computing and Innovation, Bachelor of Science (BS)
Proposed Implementation Date:	August 2023
Proposed CIP Code:	11.0104 (Informatics)
ELON Submission Date:	November 19, 2021
Posted on the THEC Website:	November 19, 2021
Public Comment Period:	November 19, 2021 – November 30, 2021

Expedited Letter of Notification Checklist

THEC Academic Policy A1.6 (Section 1.6.4A) Expedited Letter of Notification (ELON) Requirements:

- ✓ Letter of Support from the President/Chancellor signifying institutional governing board or system office support for development;
- ✓ Institution name, proposed academic program, degree designation, proposed CIP code, and CIP code title;
- ✓ Academic Program Liaison (APL) name and contact information;
- ✓ Implementation timeline;
- ✓ Background narrative;
- ✓ Justification for consideration of expedited policy;
- ✓ Existing programs of study at the institution;
- ✓ Community and industry partnerships;
- ✓ Accreditation;
- ✓ Administrative structure;
- ✓ Enrollment and graduate projections;
- ✓ Alignment with State Master Plan and institutional mission profile;
- ✓ Student interest;
- ✓ Existing programs offered at public and private Tennessee universities; and
- ✓ Articulation and transfer.

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 and Innovation, Bachelor of Science

Proposed Implementation Date: August 2023

Information Contact: Gerald Gannod / 931-372-6855

                                   Printed Name   *Telephone*

APPROVED: _(Digitally signed by Gannod, Gerald. Date 2021.10.18 09:12:39 -05'00')_ / 10.18.2021

                     Department Chairperson's Signature   *Date*

APPROVED: _(signature)_ / 10/18/2021 ... 16/19/21

                     College Dean's Signature   *Date*

APPROVED: _(signature)_ / 11/18/21

                     Provost's Signature   *Date*

Tennessee Tech Board of Trustees Approval: _____

                                                 Date

Office of the President

TENNESSEE TECH

November 4, 2021

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

Dear Executive Director House:

In accordance with THEC policy A 1.6 Expedited Academic Programs: Approval Process, Tennessee Tech University submits an expedited letter of notification (ELON) for a new program in the Department of Computer Science in the College of Engineering. This proposed **Bachelor of Science in Interdisciplinary Computing and Innovation (ICI) Program** will 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 operates, innovates, and creates. 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 toward informal or ancillary "coding camp"-based training programs.

We recognize, however, that computer science programs may swing to the other end of the spectrum, where gaining expertise in computing is emphasized over 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 in order to allow the 21st century learner to combine interests and skills in cognate areas with the knowledge of computing and data sciences in order to lead 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 knowledge gained from careers or past military service.

We request this ELON to be considered for expedited academic program approval because computer science, in the 21st century, is fundamental.

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.
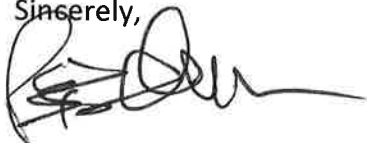
The ICI program will cultivate the intersections that already exist within the college environment. In addition to the physical computing technologies being used, the increased use of machine learning and analytics is changing the way that every industry conducts business.

In February 2019, Gov. Lee said that 58% of all STEM jobs created in the country are in computer science fields, but only 8% of graduates study computer science in college. Gov. Lee has made computer science a major component of his legislative agenda. According to the U.S. Department of Labor Bureau of Labor Statistics, the computer and information technology field is expected to grow by 22% from 2019-2029 — faster than the average growth rate of all occupations. By 2026, another 557,100 jobs are expected to be added within the field.

The ICI program can help recruit, retain, graduate, and employ students that have a strong foundation in technical (computer science) and critical thinking skills (i.e., innovation) while being competent in established and emerging disciplines. The ICI program will weave technology infused coursework into the deep knowledge base to build a 21st century degree that more effectively and efficiently addresses the challenges of a changing world.

Please consider this letter a formal request for the expedited approval process.

Sincerely,

Philip B. Oldham
President

Expedited Letter of Notification
for the
Bachelor of Science
in
Interdisciplinary Computing and Innovation Program

Submitted By
Tennessee Technological University

Overview

Tennessee Technological University
Interdisciplinary Computing and Innovation (ICI)
Bachelor of Science
11.0104
Informatics

Academic Program Liaison (APL) name and contact information

Gerald C. Gannod
Department of Computer Science
Box 5101
Tennessee Technological University
jgannod@tntech.edu
931-372-6855

Implementation timeline

Action	Timeline Option #1
Submission of the Expedited Letter of Notification (ELON)	November 19, 2021
THEC Approval of the ELON	November 29, 2021
Develop the Expedited New Academic Program Proposal (ENAPP)	November 29, 2021 – February 28, 2022
University Curriculum Committee (UCC) Approval of ENAPP	March 2022
Academic Council Approval of ENAPP	March 2022
Submit ENAPP to THEC and a list of proposed external reviewers	March 2022
Send NAPP to the External Reviewer	March 2022
External Reviewer Visit (Virtual)	April 2022
External Review's Report due	May 2022
Response to External Reviewer's report and revised ENAPP	May 2022
THEC Support Letter	June 2022
Tennessee Tech Board of Trustees	June 23, 2022
THEC Commission Meeting	July 2022
Program Effective Date	**August 2023**

Background and Overview

Background narrative

The Interdisciplinary Computing and Innovation (ICI) 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 operates, innovates, and creates – 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 in order 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 and data sciences in order to lead organizations to discover new innovations for addressing the problems of an ever-dynamic world. In addition, 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 provide educational opportunities for students seeking careers 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, in order to ensure future success of program graduates while also paving the way for addressing the need to develop a 21st century workforce
- To launch the ICI Program with a cohort of students that come from a diverse set of backgrounds and experiences

The ICI program will consist of 120 credit hours 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.

Justification for consideration of expedited policy
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. In February 2019, Governor Lee said that 58 percent of all STEM jobs created in the

country are in computer science fields, but only 8 percent of graduates study computer science in college. Governor Lee has made Computer Science a major component of his legislative agenda. According to the U.S. Department of Labor Bureau of Labor Statistics (BLS), the computer and information technology field is expected to grow by 22 percent from 2019-2029 — faster than the average growth rate of all occupations. By 2026, another 557,100 jobs are expected to be added within the field. Clearly, we need more students with an emphasis 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 ICI program can help recruit, retain, graduate, and employ students that 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 ICI 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.

Existing programs of study at the institution
The proposed program is not emerging from an existing minor or certificate program at Tennessee Technological University.

Community and industry partnerships
We are attaching letters of support from the following organizations:
- Highlands Economic Partnership – The Highlands Economic Partnership is a group focused on vertical workforce development in the Upper Cumberland Region. This group has representatives from K-12, vocational, community college, and higher education institutions, high tech companies ranging from organizations with local scope to national presence, and local government. The customers of the employers represented in this group range from business and finance, government, and engineering, amongst others.
- SAIC – SAIC is a company headquartered in Reston, VA with sites located all over the United States, including Cookeville and Knoxville (as well as San Diego CA, Huntsville AL, Reston VA, Fort Knox KY, and Columbia SC). SAIC is primarily a government contractor that supports a number of government agencies including the EPA, USDA, and DoD.
- Oak Ridge National Laboratory (ORNL) – ORNL is a national laboratory in Oak Ridge, TN that has a focus on research and development in support of, among other things, the Department of Energy. ORNL employs a multi-disciplinary workforce that includes people with backgrounds in computing, engineering, and science.

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 time of the next Computer Science ABET full reaccreditation visit (Fall 2026 or after depending on 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 the 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.

Administrative Structure

We have designed the architecture of the Interdisciplinary Computing and Innovation (ICI) program so that students with interests originating from all colleges and divisions can have experiences that integrate computing and innovation with those interests. It is our intention that faculty from the different colleges will work in collaboration with the ICI core unit. The program will be explicitly offered by the College of Interdisciplinary Studies. However, the computing core of the program will be taught by faculty in or affiliated to the Department of Computer Science in the College of Engineering. The entrepreneurship, design thinking, and innovation core will be taught by faculty in or affiliated across interdisciplinary studies, engineering, and business. The computational cognate areas will be taught by faculty in or affiliated to the disciplines embedded in the colleges. Cognate areas can be located in any college or division. Graduates of this program will have affiliations with the degree programs that align with their cognate of choice in order to enable better alignment with the industries in which they will eventually be employed.

Potential Cognate areas include:

Agri-Business

Nursing

Project Management

Business

Sociology

Criminal Justice

Journalism

Computational Engineering

Corporate Communication

Bio-Science

Interdisciplinary Studies

Geo-Sciences

Digital Humanities

Environmental Studies

Education

Benefits:
- The ICI program recognizes the "technological" part of our university identity by integrating computing across the curriculum of the associated cognate areas.
- By affiliating students with their choice of cognate, students retain their identity within that discipline (viewing computing as a foundational skillset for that discipline) and units maintain a relationship with those students as part of their departments, enabling all of campus to share in the anticipated enrollment growth (cooperation not competition)
- Increased inter-disciplinary opportunities across campus (for students and faculty), leading to increased innovation both inside and outside the classroom.
- Provides a new option for a population of students whose needs do not match well with our existing options.

Enrollment and Graduation Projections

Table 1 – Projected Enrollments and Graduates

Projected Enrollments and Graduates				
Year	Academic Year	Projected Total Fall Enrollment	Projected Attrition (% per year)	Projected Graduates
1	2023-2024	25	10	0
2	2024-2025	40	10	0
3	2025-2026	65	10	0
4	2026-2027	90	10	15
5	2027-2028	120	10	25

Institutional Alignment and Demand

Alignment with State Master Plan and institutional mission profile

The program will address the following strategic initiatives:
- TN Reconnect—Drive to 55
- Hope Scholarship—Retention
- Future Workforce Initiative—STEM
- Tennessee Technological University "Tech Tomorrow" Strategic Plan

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 ICI Program will provide options for students and advisors while embracing TTU's Strategic Plan to be responsive to the needs of stakeholders. Moreover, the ICI Program addresses TBR's goal of Student Success by "fostering student persistence to degree completion."

The ICI 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. ICI 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. TTU retention rates for first time freshmen hover around 75%, and the program can increase 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 ICI 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 ICI curriculum to provide innovative solutions to address the shortcomings.

With respect to the Tennessee Technological University Strategic Plan, we believe the program will have the following impact (TNTech Plan in italics):

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 the 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.

Student interest
The Computer Science BS program grew from 364 to 570 between 2016 and 2020 (growth of approximately 60%). In Fall 2021, we experienced a record enrollment in CS, with nearly 200 students selecting CS as their major. An associated *pre-major* program (Interdisciplinary Studies Interest in Computer Science) has seen 12.7% growth over the past three years to approximately 80 students. The Computer Science minor enrolled 35 students in 2020, while Computer Engineering BS has over 110 students. In the College of Business, the Business & Information Technology (BIT) program has grown 11%, while the Business Intelligence & Analytics (BIA)

program has grown 19%. Both programs combined number approximately 120 students. Including graduate programs, there are nearly 1000 students (roughly 10% of the total enrollment) at Tennessee Technological University that are pursuing computing-based degrees.

The demand for computing graduates continues to grow both in Tennessee and nationwide. According to the Bureau of Labor and Statistics, nationwide it is expected that the demand for software developers will increase by 22% between 2019 and 2029. Other similar jobs such as information security analysts, are expected to see similar increases in job availability.

Existing programs offered at public and private Tennessee universities
There are no computing programs in the State of Tennessee public university system that would directly compete with the unique makeup and focus of this program. There are programs that stack a computing component on to specific majors, but in those programs the major field holds the focal point. Two examples are ETSU's Geoscience major with a geospatial concentration, and the BBA with an Analytics concentration.

Among the six Locally Governed Institutions (LGIs) and the UTK system, Computer Science programs with additional components would not reach the same targeted audience. MTSU offers a Computer Science major with a Business Applications concentration. The program has a 26-hour Computer Science core, with 18 hours of Business Applications courses and 15 hours of Business courses.

Lipscomb University offers two programs that have some similarities with the ICI program. The Data Analysis major, fully online, combines a 24-hour leadership core and an 18-hour Data Science core. The program is adult-learner focused and offers traditional and accelerated course options. The Integrated Studies major offers concentrations in Data Analytics for Leaders and Tech Management for Leaders.

Articulation and transfer
Since the program pairs computing with a secondary discipline, pathways associated with the secondary disciplines that the proposed program supports are likely to be acceptable for entry into the proposed program. We expect the number of supported secondary disciplines to grow over time. Therefore, the number of acceptable entry pathways should grow correspondingly. Additionally, there are a small number of community college programs that are good candidates for articulation into the proposed program as the appropriate secondary disciplines are supported. These include Medical Informatics at both Cleveland State and Roane State as well as Health Informatics at Volunteer State.

Appendix

The following pages contain the letters of support from the university president as well as the companies and organizations listed in the Community and Industry section.

August 25, 2021

Dr. Gerald Gannod
Department Chair, Computer Science
Tennessee Tech University
1 William Jones Dr.
Cookeville, TN 38505

Dr. Gerald Gannod:

Please accept this letter as an indication of our support of Tennessee Tech University's Department of Computer Science and College of Interdisciplinary Studies as they work together to create an Interdisciplinary Computing and Innovation (ICI) program.

In my role as one of the larger IT employers in the region and as chair of our regional Highlands IT Pathway committee, I am acutely aware of the need to offer opportunities such as this to allow students every chance to gain an understanding of growing job markets in our region and the education and skills required to obtain those jobs. Grants like this are exactly what we need to ensure that we are prepared to meet the needs of employers in years to come.

EpiOn and the Highlands IT Pathway Committee are committed to supporting the goals and objectives presented in this proposal. We are part of an extremely strong collaborative made up of K-12 education partners, postsecondary institutions, employers, and community organizations that produce outstanding results that have led to a pipeline of students being prepared for the regional labor market.

We believe Tennessee Tech University's Department of Computer Science and College of Interdisciplinary Studies have presented a proposal with clear intent to create new and strong pathways into computer science while broadening the availability of graduates to serve a wide variety of industries. We are happy to assist with any planning needs of Tennessee Tech as well as provide meaningful data and feedback to encourage the success of this program.

Sincerely,

Don Viar
Information Technology Pathway Committee, Chair
Highlands Economic Partnership

Barney Maccabe
PO Box 2008
Oak Ridge, TN 37831-6164
(865) 241-6504 | maccabeab@ornl.gov

OAK RIDGE
National Laboratory

October 15, 2021

The Tennessee Higher Education Commission
312 Rosa Parks Ave, 9th Floor
Nashville, Tennessee 37243

To Whom It May Concern:

I am writing in support of the *Letter of Notification* being submitted by Tennessee Technological University (TTU) for the proposal on the Interdisciplinary Computing and Innovation (ICI) program.

In regards to the ICI program, we have discussed the idea with Dr. Jerry Gannod, Harry C. Stonecipher Distinguished Professor and Department Chair at TTU, and how it would potentially impact Oak Ridge National Laboratory (ORNL), especially as we continue to establish best practices in Software Engineering for the support of our research activities at the Lab. We are interested in continuing this conversation and are willing to help TTU further identify needs and outcomes for this program. As currently specified, we believe that the graduates of this program would have the background needed for software development internships and careers at ORNL and look forward to this collaboration with TTU.

Regards,

Sincerely,

Arthur (Barney) Maccabe, Director
Computer Science and Mathematics Division

September 27, 2021

Dr. Gannod,

Thank you for providing a vision of your future Interdisciplinary Computing and Innovation program. I am looking forward to hearing more about the program as it evolves.

As you know computing has a great impact on all of our business lines. SAIC would be interested in seeing how the graduates can support our other business lines outside of Engineering, in particular healthcare and business with strong computing foundations, possibly others depending upon the established programs. As such we offer our full support in establishment of this new program and look forward to engaging with the students.

Thank you,

Jill C. Moffitt

Jill C. Moffitt, PMP, PMI-ACP
Software Engineer Senior Manger
Cookeville Site Director