

DATE: May 20, 2021

SUBJECT: New Academic Program
University of Tennessee, Knoxville
Geographic Information Science and Technology, Bachelor of Science
(CIP Code: 45.0702 - Geographic Information Science and
Cartography)

ACTION RECOMMENDED: Approval

PROGRAM DESCRIPTION

The University of Tennessee, Knoxville (UTK) proposes a Bachelor of Science (BS) in Geographic Information Science and Technology (GIS&T). Geographic Information Science is an interdisciplinary field that encompasses a wide range of application areas, including transportation logistics, network analysis, emergency management, urban planning, public health, resource and environmental management, location intelligence, and energy analytics. Demand for well-trained GIS&T professionals currently exceeds the supply of graduates in this area.

Since 2016, UTK has offered instruction in GIS&T within the Geography, Bachelor of Arts program. The proposed program will expand and enhance the existing curriculum and offer additional STEM and cutting-edge GIS&T coursework for this program.

The proposed GIS&T program will allow graduates to bridge the gap between advanced geographic information technology and real-world problems/applications and to use spatial mapping, modeling, and analytics to make informed decisions. Further, the proposed degree will provide foundational training in the principles of spatial, statistical, and mathematical analysis, as well as knowledge of computer science, spatial data structures, algorithms, and information visualization.

INSTITUTIONAL GOVERNING BOARD APPROVAL

The proposed Geographic Information Science and Technology, BS program was approved by the University of Tennessee Board of Trustees on February 25-26, 2021.

PROPOSED IMPLEMENTATION DATE

Fall 2021

RELEVANCE TO INSTITUTIONAL MISSION AND STRATEGIC PLAN

The proposed program aligns with the State’s Master Plan by creating an undergraduate degree program focused on one of the largest economic growth industries in Tennessee and neighboring regions: the geospatial technology industry. In alignment with UTK’s mission, the proposed Geographic Information Science and

Technology will leverage existing partnerships between the UTK Geography Department, Oak Ridge National Laboratory (ORNL), and the U.S. Department of Energy to enhance teaching, scholarship, and service in the GIS-T fields.

CURRICULUM

The proposed Geographic Information Science and Technology, Bachelor of Science program will require 120 credit hours including 43 credit hours of general education courses, 53 credit hours of prerequisite and core courses, 20 hours of elective courses and a 4 hour capstone or internship course. Since the pandemic started in March 2020, the Department of Geography has made a strong push to redesign courses with the instructional modality changing to hybrid and fully-online. A total of six new courses will be developed for the proposed program.

Graduates from the proposed GIS&T program will be able to:

- Comprehend fundamental concepts and practices of Geographic Information Systems (GIS) and advances in Geospatial Information Science and Technology.
- Apply basic graphic and data visualization concepts in cartography, such as color theory, symbolization, normalization, and classification.
- Demonstrate knowledge of interdisciplinary applications of GIS&T.
- Apply GIS analysis to address geospatial problems and/or research questions.
- Demonstrate proficiency in the use of GIS tools to create maps that are fit-for-purpose
- Demonstrate confidence in undertaking new analysis using GIS, troubleshoot problems in GIS, and seek help from software/website help menus and the GIS community to solve problems.
- Apply statistical methods to data to be used in geospatial analysis.
- Effectively communicate and present project results in oral, written, and graphic forms.

PROGRAM PRODUCTIVITY

Enrollment projections for the proposed GIS&T program are based on historical data for the Geospatial Science and Technology concentration within the Geography, Bachelor of Arts program. The program is expected to enroll 10 students in the first year with 82 students expected by the fifth year. A total of six graduates are expected in year four.

Five-year enrollment and graduation projections are listed below.

	2021	2022	2023	2024	2025
Enrollment	10	24	41	60	82
Graduates	--	--	--	6	16

PROGRAM DUPLICATION

The proposed Bachelor of Science in Geographic Information Science and Technology will be the first such program in the state of Tennessee. Tennessee State University and the University of Memphis both offer graduate certificate programs in Geospatial/Geographical Information Systems.

EXTERNAL JUDGEMENT

An external review of the proposed program was conducted during a virtual institution site visit on September 28, 2020. Dr. Yongmei Lu, Professor and Chair, Department of Geography at Texas State University served as the external reviewer. The site visit included meetings with campus administrators, faculty, prospective students, and community partners.

Dr. Lu made a recommendation for the approval of the proposed GIS program for the following reasons:

- The readiness of the university, the college, the department, and the current students who are studying GIS in the Department of Geography to embrace this proposed B.S. in GIS&T degree program as a nature growth;
- The outstanding quality of faculty for teaching and research in the field of GIS&T, the sufficient facility support at the different levels (i.e. the department, the college, and the university), the library and space resources, and the outstanding GIS staff support; and
- The strong and unreserved support the Department has secured from the university, the college, and communities (e.g. ORNL, private sector, and local and state government agencies).

STUDENT DEMAND

A student interest survey was distributed by instructors in the Department of Geography current students along with a focus group to gauge interest in the proposed GIS&T program. Seventy percent of respondents indicated that they would be interested in completing a GIS&T degree. Additionally, a focus group of 18 geography students were gauged on their interest of a GIS&T program. The students unanimously agreed that a GIS&T program that emphasized advanced training and encouraged real-world projects that graduates would have stronger prospects for a GIS job with a higher starting salary.

OPPORTUNITIES FOR PROGRAM GRADUATES

Numerous projections from government agencies indicate considerable growth and employment opportunities in the geospatial technology industry. The U.S. Department of Labor Employment and Training Administration cites an annual growth rate of approximately 35 percent for the geospatial technology industry. Additionally, the U.S. Department of Labor's Occupational Information Network (O*NET) offers a projected growth for Geospatial Information Scientists and Technologists and Geographic Information Systems Technicians at faster-than-average rates (7 percent to 10 percent) from 2018 to 2028, with 2018 median wages at \$43.40 hourly and \$90,270 annually. In November 2019, Forbes Magazine highlighted the limitless future of GIS&T professionals and predicted that

GIS&T would be one of the fastest-growing fields in terms of job availability, desired skillset, and high pay in the next few years and decade

UTK's Department of Geography has a strong connection to the GIS industry, both public and private. Letters of support for the proposed program were provided by the Oak Ridge National Laboratory, Tennessee Department of Finance and Administration, ESRI Environmental Systems Research Institute, Inc., GEO Jobe, and the Blount County GIS Group.

INSTITUTIONAL CAPACITY TO DELIVER THE PROGRAM

The Department of Geography at the University of Tennessee, Knoxville will support the proposed program by drawing on current resources and faculty expertise. The department already offers much of the coursework for the proposed program. In addition to these courses, students will also take other STEM courses from Mathematics, Computer Science, and Information Sciences.

A team of seven full-time faculty and three full-time GIS staff members in the Department of Geography will provide the instruction for the proposed program. GIS&T faculty members in the Department of Geography are experts in the diverse fields of geographic information science at both the national and international levels. An adjunct faculty member is budgeted to ensure the implementation of a high-quality program if the projected demand is met and exceeded. Appendix A outlines the five-year financial projections for the proposed Geographic Information Science and Technology BS program which outlines minimal expenditures.

ASSESSMENT AND POST-APPROVAL MONITORING

An annual performance review of the proposed program will be conducted for the first five years following program approval. The review will be based on benchmarks established in the approved proposal. At the end of this period, the campus, institutional governing board, and THEC staff will perform a summative evaluation. The benchmarks include, but are not limited to, enrollment and graduation, program cost, progress toward accreditation, and other metrics set by the institution and staff. If benchmarks are not met during the monitoring period, the Commission may recommend that the institutional governing board terminate the program. If additional time is needed and requested by the institutional governing board, the Commission may choose to extend the monitoring period.

Tennessee Higher Education Commission

Attachment A: THEC Financial Projections

University of Tennessee, Knoxville

BS in Geographic Information Science & Technology

Seven-year projections are required for doctoral programs.

Five-year projections are required for baccalaureate and Master's degree programs

Three-year projections are required for associate degrees and undergraduate certificates.

Projections should include cost of living increases per year.

	Year 1	Year 2	Year 3	Year 4	Year 5
I. Expenditures					
A. One-time Expenditures					
New/Renovated Space ¹	\$ -	\$ -	\$ -	\$ -	\$ -
Equipment	-	-	-	-	-
Library	-	-	-	-	-
Consultants	-	-	-	-	-
Travel	-	-	-	-	-
Other	-	-	-	-	-
Sub-Total One-time	\$ -	\$ -	\$ -	\$ -	\$ -
B. Recurring Expenditures					
Personnel					
Administration					
Salary	\$ -	\$ -	\$ -	\$ -	\$ -
Benefits	-	-	-	-	-
Sub-Total Administration	\$ -	\$ -	\$ -	\$ -	\$ -
Faculty					
Salary	\$ 40,000	\$ 41,200	\$ 42,436	\$ 43,709	\$ 45,020
Benefits	13,200	13,596	14,004	14,424	14,857
Sub-Total Faculty	\$ 53,200	\$ 54,796	\$ 56,440	\$ 58,133	\$ 59,877
Support Staff					
Salary	\$ -	\$ -	\$ -	\$ -	\$ -
Benefits	-	-	-	-	-
Sub-Total Support Staff	\$ -	\$ -	\$ -	\$ -	\$ -
Graduate Assistants					
Salary	\$ -	\$ -	\$ -	\$ -	\$ -
Benefits	-	-	-	-	-
Tuition and Fees* (See Below)	-	-	-	-	-
Sub-Total Graduate Assistants	\$ -	\$ -	\$ -	\$ -	\$ -
Operating					
Travel	\$ -	\$ -	\$ -	\$ -	\$ -
Printing	1,000	1,000	1,000	1,000	1,000
Equipment	-	-	-	-	-
Other	-	-	-	-	-
Sub-Total Operating	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000
Total Recurring	\$ 54,200	\$ 55,796	\$ 57,440	\$ 59,133	\$ 60,877
TOTAL EXPENDITURES (A + B)	\$ 54,200	\$ 55,796	\$ 57,440	\$ 59,133	\$ 60,877

	Year 1	Year 2	Year 3	Year 4	Year 5
II. Revenue					
Tuition and Fees ¹	96,240	235,596	410,525	612,784	854,221
Institutional Reallocations ²	(42,040)	(179,800)	(353,085)	(553,651)	(793,344)
Federal Grants ³	-	-	-	-	-
Private Grants or Gifts ⁴	-	-	-	-	-
Other ⁵	-	-	-	-	-
BALANCED BUDGET LINE	\$ 54,200	\$ 55,796	\$ 57,440	\$ 59,133	\$ 60,877

Notes:

(1) Provide the funding source(s) for the new or renovated space.

Not applicable

(2) In what year is tuition and fee revenue expected to be generated? Tuition and fees include maintenance fees, out-of-state tuition, and any applicable earmarked fees for the program. Explain any differential fees.

Year 1 tuition is estimated at \$401 per credit hour. Tuition in subsequent years has a 2% inflation factor

Years	Tuition rates	# of students	credit hours	Semesters	Total
Year 1	401	10	12	2	96,240
Year 2	409	24	12	2	235,596
Year 3	417	41	12	2	410,525
Year 4	426	60	12	2	612,784
Year 5	434	82	12	2	854,221

(3) Identify the source(s) of the institutional reallocations, and grant matching requirements if applicable.

There are no reallocations.

(4) Provide the source(s) of the Federal Grant including the granting department and CFDA(Catalog of Federal Domestic Assistance) number.

No Federal grants are used to fund this degree.

(5) Provide the name of the organization(s) or individual(s) providing grant(s) or gift(s).

No external grants or gifts are used to fund this degree.

() Provide information regarding other sources of the funding.

This degree is funded entirely through tuition revenue.