



TENNESSEE HIGHER EDUCATION COMMISSION

REGULAR CALENDAR ITEM: II.E.

MEETING DATE: May 16, 2024

SUBJECT: New Academic Program
University of Tennessee, Knoxville
Data Science, Bachelor of Science (BSDS)
CIP Code: 30.7001 (Data Science, General)

ITEM TYPE: Action

ACTION RECOMMENDATION: Approval

PROGRAM DESCRIPTION

The University of Tennessee, Knoxville (UTK) proposes a 120-credit hour, Bachelor of Science in Data Science (BSDS). The program builds on the existing Data Science concentration in UTK's Interdisciplinary Program (IDP) housed in the College of Arts and Sciences, as well as an existing minor. The proposed program will be offered through the College of Emerging and Collaborative Studies (CECS) and will differ from the existing concentration by adding additional core courses and resources for course delivery, staffing, student advising, and internship placements.

The proposed program was developed in response to significant workforce demand for data scientists from entry level technicians to specialized research scientists and includes training in applied data science concepts and methods to address problems in a real-world context. The proposed BSDS will be offered via hybrid delivery, providing multiple options for potential students. The curriculum is flexible, enabling students to design a focus area that matches their interests and career aspirations. Internships and capstone courses aimed to prepare students for workforce or graduate school requirements are built into the curriculum, and students will complete at least six (6) credits of service research or internship courses.

INSTITUTIONAL GOVERNING BOARD APPROVAL

The proposed Data Science, BSDS program was approved by the University of Tennessee Board of Trustees on February 29 - March 1, 2024.

PROPOSED IMPLEMENTATION DATE

August 1, 2024

ALIGNMENT WITH STATE MASTER PLAN AND INSTITUTIONAL MISSION/STRATEGIC PLAN

The proposed Data Science, BSDS aligns with the State Master Plan for Higher Education by providing curriculum for an in-demand occupation while ensuring students graduate with an employable skillset, thereby contributing to the Drive to 55. Data science skills are highly sought-after and incredibly versatile, which will also contribute to the family prosperity and employability of graduates of the proposed program. Finally, the proposed data science program addresses the future of work imperative in the State Master Plan for Higher Education Update.

The proposed program supports the mission and goals of UTK in three (3) critical areas. First, by enhancing educational excellence – the proposed program leverages UTK's strengths, and existing course offerings to

create a new valuable program. Second, by creating value through economic, social, and technological development – the program will be cultivating internship opportunities for enrolled students. Finally, by fostering outreach where students will be taught by industry professionals, the program will be engaged in industry engagement, and the capstone will involve real-world research and outreach projects.

CURRICULUM

The proposed program will consist of 120 credit hours of coursework and will be offered in a hybrid delivery method. The coursework will include 51-58 hours of general education requirements, 27 hours of core courses, six (6) credit hours of internship or research courses, and 15 hours of upper-division electives. The program of study allows for 20 credit hours of prerequisite courses for upper-division subjects while remaining within 120 hours. Six (6) new courses will be developed for the program.

The proposed program and associated student learning outcomes (listed below) have been developed to meet the Data Science Council of America (DASCA) accreditation standards. UTK plans to achieve accreditation in academic year 2024-2025.

Upon completion of the proposed program, students will be able to:

- Develop relevant programming abilities.
- Demonstrate proficiency with statistical analysis of data.
- Develop the ability to build and assess data-based models.
- Demonstrate skill in data management.
- Apply data science concepts and methods to address problems in real-world contexts.
- Employ methods to visualize data patterns.
- Uphold and apply principles of data ethics.

PROGRAM PRODUCTIVITY

Projections for the Data Science, BSDS program estimate that 50 students will enroll in the first year, with total enrollment of 90 by year five. The program will graduate its first students in year three. Initial graduates are projected based on current students enrolled in the data science concentration as well as UTK’s first year retention rate of 90 percent.

| | 2024-25 | 2025-6 | 2026-27 | 2027-28 | 2028-29 |
|-------------------|----------------|---------------|----------------|----------------|----------------|
| Enrollment | 50 | 60 | 70 | 80 | 90 |
| Graduates | -- | -- | 10 | 35 | 42 |

PROGRAM DUPLICATION

Several public and private institutions in Tennessee offer certificates, bachelor’s, and master’s degree programs in data science, including bachelor’s degrees offered at Middle Tennessee State University and Belmont University; master’s degrees offered at Middle Tennessee State University, East Tennessee State University, Tennessee State University, University of Memphis, and Vanderbilt University; and graduate certificates offered at Austin Peay State University, Middle Tennessee State University, University of Memphis, and University of Tennessee, Knoxville.

UTK currently offers a data science concentration in their Interdisciplinary, Bachelor of Arts program. During the academic year 2023-2024, the existing Data Science concentration and minor have been moved to the College of Emerging and Collaborative Studies (CECS), and when the proposed program is launched in Fall 2024, CECS will inactivate the data science concentration in the Interdisciplinary Degree Program (IDP) and offer a teach out through the 2028-2029 academic year.

STUDENT DEMAND

The current data science concentration and minor have grown exponentially in one year, from one (1) major and 12 minors in 2021-2022 to 16 majors in the Data Science concentration of the existing interdisciplinary undergraduate Bachelor of Arts (IDP program) and 76 minors in 2022-2023. In addition, UTK distributed an online survey to 3,915 undergraduates in the Tickle College of Engineering and School of Information Sciences. Of the 281 respondents, 66 percent indicated they would be interested in a data science major.

OPPORTUNITIES FOR PROGRAM GRADUATES

The Tennessee Department of Labor and Workforce Development projects that the “Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services” sector will grow by 43 percent in Tennessee by 2030. Further, data scientists earn about \$80,000 annually, with the top 10 percent earning over \$130,000 in 2021. According to the United States Bureau of Labor and Statistics (USBLS), data science has a unique ability to be conducted remotely, increasing employment opportunities in nonmetropolitan areas which includes a high percentage of the southeast region. Based on analysis conducted by Lightcast for UTK, the proposed program will support the region by graduating students with in-demand skills, where 324,600 total job postings were listed in 2022, with almost 35,000 job openings annually. The USBLS also predicts a 36 percent increase of employment by 2031 with 135,000 data scientist openings annually.

Letters of industry support indicate a willingness to provide internships, sponsor capstone projects, and hire graduates. Letters were received from multiple organizations, including the Knoxville Chamber of Commerce, Labcorp, XS Power, Lirio, CGI Federal, Nell One, Moment Energy, JTEKT, Viridi Parent, and iO Urology.

INSTITUTIONAL CAPACITY TO DELIVER THE PROGRAM

Seventeen existing faculty are anticipated to contribute to the proposed program from several colleges at UTK, which is reflective of the program’s interdisciplinary nature. The program anticipates hiring a program director (to be shared with the proposed Applied Artificial Intelligence, Bachelor of Science, which is also in the College of Emerging and Collaborative Studies (CECS)), several full-time lecturers, faculty leads, and undergraduate graders. The proposed program will also utilize two (2) existing UTK faculty as CECS faculty fellows each year. These faculty fellows will contribute to curriculum development, teaching, and program service. In addition, the program will have a coordinator, internship coordinator, a full-time director of advising, and a director of partnerships and economic engagement, all of which will be shared across several CECS programs.

Existing space in the Claxton Education Building will be used for the proposed program, and renovations are underway to create faculty office space, as well as laboratory space. Renovations are expected to be completed by the end of the Spring 2024 semester.

The proposed program will offer specialized supports for students, including tailored academic advising, technical workshops and seminars, internship and research opportunities, and peer support and study groups. Other campus-based resources include the Artificial Intelligence Tennessee Initiative, the Writing Center, the Stat Lab, The Math Place, and a number of supports in place for all UTK undergraduates.

EXTERNAL JUDGEMENT

An external review of the proposed program was conducted during a site visit on November 27, 2023 by Dr. Manuel D. Rossetti, University Professor and Director of the Data Science Program at the University of Arkansas. The site visit included meetings with campus administrators and faculty from UTK, as well as current UTK students and industry partners.

Dr. Rossetti recommended approval of the proposed Bachelor of Science in Data Science, noting, “employers have shown strong signals that indicate the need for graduates with the skill sets of data scientists.” Further, Dr. Rossetti found the proposed program’s employment benchmarking “credible and thorough,” adding that the “level of national demand is more than sufficient to ensure employment in the field of data science.” Finally, Dr. Rossetti was complimentary of the university’s commitment to the proposed program, noting “[t]he administration was supportive of the program, and the proposal itself provides evidence that [it] fits within the mission of UT and CECS, in particular.”

ASSESSMENT AND POST-APPROVAL MONITORING

An annual performance review of the proposed program will be conducted for the first five (5) 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. If benchmarks are not met during the monitoring period, the Commission may recommend that the institutional governing board terminate the program.

PROGRAM COSTS AND REVENUE

The proposed one-time and recurring expenditures for the Data Science, BSDS program are listed in Table 1. Projected revenue is displayed in Table 2.

Table 1: Estimated Costs to Deliver the Proposed Program

| Estimated Costs to Deliver the Proposed Program | | | | | | |
|--|-----------------|----------------|----------------|---------------|-----------------|---------------|
| One-Time Expenditures | | | | | | |
| Category | Planning | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| Faculty & Instructional Staff (Faculty Lead) | \$10,000 | | | | | |
| Accreditation | | | | | \$21,900 | |
| Consultants | | \$2,000 | | | | |
| Equipment | | | | | | |
| Information Tech | | | \$2,000 | | | |
| Library | | | | | | |
| Marketing | | | | | | |
| Facilities | \$62,006 | | | | | |
| Travel | | | | | | |
| Other | | | | | | |
| <i>Total One-Time Expenditures</i> | <i>\$72,006</i> | <i>\$2,000</i> | <i>\$2,000</i> | <i>\$0</i> | <i>\$21,900</i> | <i>\$0</i> |
| Recurring Expenditures | | | | | | |
| Category | Planning | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| Faculty & Instructional Staff* | \$105,600 | \$165,200 | \$188,168 | \$230,831 | \$278,742 | \$282,204 |
| Non-instructional Staff** | | \$51,600 | \$68,524 | \$121,476 | \$145,648 | \$160,273 |
| Graduate Assistants | | | | | | |
| Accreditation | | | | | | |

| | | | | | | |
|---|------------------|------------------|------------------|------------------|------------------|------------------|
| Consultants | | | | | | |
| Equipment | | \$500 | \$500 | \$500 | \$500 | \$500 |
| Information Tech | | \$500 | \$500 | \$500 | \$500 | \$500 |
| Library | | | | | | |
| Marketing | | \$2,000 | \$2,000 | \$2,000 | \$1,000 | \$1,000 |
| Facilities | | | | | | |
| Travel | | | | | | |
| Other | | | | | | |
| <i>Total Recurring Expenditures</i> | \$105,600 | \$219,800 | \$259,692 | \$355,307 | \$426,390 | \$444,477 |
| Grand Total (One-Time and Recurring) | \$177,606 | \$221,800 | \$261,692 | \$355,307 | \$448,290 | \$444,477 |

* This includes the Program Director, Faculty Fellows (Years 1 and 2), and lecturers.

** This includes student graders, lab assistants, program coordinator, and internship coordinator (beginning in Year 3).

Table 2: Projected Revenue

| Projected Revenue | | | | | | |
|----------------------|------------|------------------|------------------|------------------|------------------|--------------------|
| Category | Planning | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| Tuition | | \$158,940 | \$333,774 | \$654,833 | \$948,872 | \$1,091,918 |
| Grants | | | | | | |
| Other | | | | | | |
| Total Revenue | \$0 | \$158,940 | \$333,774 | \$654,833 | \$948,872 | \$1,091,918 |