Middle Tennessee State University
Board of Trustees
Academic Affairs, Student Life, and Athletics Committee

November 9, 2021

MEC Meeting Room – 2nd Floor
Miller Education Center
503 East Bell Street
Murfreesboro, Tennessee 37130

Middle Tennessee State University
Board of Trustees

Academic Affairs, Student Life, and Athletics Committee

November 9, 2021

AGENDA

Call to Order and Opening Remarks

Roll Call

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Approval of New Academic Degree Program (Action) ..... Tab 2

Master of Science in Data Science

Approval of Expedited Tenure (Action) ..... Tab 3

Approval of Policy Revision (Action) ..... Tab 4

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Athletics Update (Information) ..... Tab 7

Closing Remarks

Adjournment

Middle Tennessee State University
Board of Trustees

Academic Affairs, Student Life, and Athletics Committee

Action Item

DATE: November 9, 2021

SUBJECT: **Minutes of the August 24, 2021 Academic Affairs, Student Life, and Athletics Committee Meeting**

PRESENTER: Pam Wright
Committee Chair

BACKGROUND INFORMATION:

The Academic Affairs, Student Life, and Athletics Committee met on August 24, 2021. Minutes from the meeting are provided for review and approval.

MIDDLE TENNESSEE STATE UNIVERSITY
BOARD OF TRUSTEES

ACADEMIC AFFAIRS, STUDENT LIFE, AND ATHLETICS COMMITTEE MINUTES

The Academic Affairs, Student Life, and Athletics Committee met on Tuesday, August 24, 2021, in the Miller Education Center Meeting Room at Middle Tennessee State University.

Call to Order

Committee Chair Pam Wright called the meeting to order at 9:05 a.m.

Roll Call

Committee Chair Wright requested that Board Secretary James Floyd call the roll. The following Committee members were in attendance: J.B. Baker, Tom Boyd, Pete DeLay, Joey Jacobs, Steve Smith, Pam Wright, Rick Cottle, Gabriela Jaimes, Keith Huber, and Chris Massaro. A quorum was declared.

Also present were Trustees Darrell Freeman and Chris Karbowiak. President Sidney A. McPhee; Mark Byrnes, University Provost; Joe Bales, Vice President for University Advancement; Andrew Oppmann, Vice President for Marketing and Communications; Bruce Petryshak, Vice President for Information Technology and Chief Information Officer; Deb Sells, Vice President for Student Affairs and Vice Provost for Enrollment and Academic Services; Alan Thomas, Vice President for Business and Finance; Brenda Burkhart, Chief Audit Executive; James Floyd, University Counsel and Board Secretary; and, Kim Edgar, Assistant to the President and Chief of Staff, were also in attendance.

Approval of Minutes - Action

The first agenda item was approval of the minutes from the May 25, 2021, Academic Affairs, Student Life, and Athletics Committee meeting. Trustee Delay moved to approve the minutes from the May 25, 2021, meeting and Trustee Jacobs seconded the motion. A voice vote was taken

and the motion to approve the minutes from the May 25, 2021, meeting of the Academic Affairs, Student Life, and Athletics Committee passed unanimously.

Update on Graduate Enrollment - Information

President McPhee asked that this item be presented first based on requests from Trustees Boyd and Freeman and then introduced Vice Provost for Research and Dean of the College of Graduate Studies, David Butler. Vice Provost Butler outlined the steps taken for graduate student enrollment growth. Key decisions were made during the pandemic: spent more on marketing; led with positive advertising messages; waived GRE and standardized tests; and reduced application fee. Results showed a 28% increase from Fall 2019 to Fall 2020 and another 2% growth in Fall 2021. The next challenge is to contact eligible people multiple times over the years. By 2025 there will be approximately 420,000 people in the greater Nashville MSA who hold bachelor's degrees but not a graduate degree.

President McPhee connected undergraduate enrollment to the discussion by distributing an information update in response to Trustee Freeman's requests, and asked Vice President Sells to discuss. New freshman enrollment is down 350 students. Recruiters couldn't get into high schools, and the True Blue Tour was cancelled last year. Some high schools are canceling college fairs; however, we will continue our True Blue Tour and online recruiting this fall. New transfer enrollments are down 150 students, not surprising since enrollment at community colleges was down last year. We will be able to go to community colleges to recruit. Undergraduate returners are down 5.5% reflecting their struggle with online learning. The overall enrollment decline will be just over 5%. The official census is not yet available.

President McPhee added that 1,300 students were purged for non-payment last week. If they had not been purged, we would have had flat enrollment.

Trustee Freeman asked what the Board can do to help reverse the trend of declining enrollment.

President McPhee expressed his comfort that the staff is doing the work and creating innovative programs. We had stopped the decline two years ago, but many factors go into the recent decline. Vice President Sells added that in Fall 2019 our total new undergraduate enrollment was the second highest since 2011.

Trustee Boyd next asked when free community college started, and when did MTSU eliminate remedial and developmental programming.

President McPhee responded that we raised our admission standards twice over the last ten years. We have a partnership with Motlow whereby we send students with lower ACT scores to Motlow for remedial and developmental courses. This is one reason that our transfer enrollment is higher over the years. We have an enrollment management plan and group chaired by President McPhee that addresses these environmental and demographic issues.

Trustee Boyd commended the graduate enrollment and noted the Business School in particular. He credited the growth to the online MBA program and the use of consultants to help recruit students and asked if the same strategy could be applied to other online programs.

President McPhee asked Provost Byrnes to speak to our efforts in the online space. Provost Byrnes added that, in addition to the excellent work done by the College of Graduate Studies, contracting with All Campus has provided great growth in the MBA program, but roughly one-third of the revenue goes to the consultant. Vice President Thomas advises on return on investment for these type consultants as we look at adding other programs to their efforts.

Trustee Freeman asked about the decline in minority enrollment over the past five years. He stated that we must address this group to help overall enrollment. Provost Byrnes responded that despite the decrease in the number of minority students, the campus is more diverse proportionately.

President McPhee reminded the Committee that the materials show the good, the challenges, and in the data, retention and graduation rates broken down by demographic groups. The data does not show that Pell-eligible students perform worse than other students.

Committee Chair Wright reminded everyone that the Board passed a motion to increase graduation rates, and the administration is committed to achieving that goal. President McPhee referred to the packet showing plans and programs in progress to meet that goal.

Trustee Jaimes asked how the Board can help with expanding corporate partnerships like the McGuire Management. President McPhee responded that one of the committees today will be dealing with the policy for corporate rates, so more companies can participate.

Rule Promulgation and Related Policy Revision - Action

Associate University Counsel Jeff Farrar presented a revision to Policy 540 Student Conduct and a related rule promulgation. State law dictates a student conduct rule must be promulgated in addition to our internal policy. While the substance is essentially the same; the implementation procedures are different. The policy revisions include cross references to Title IX policy, recognize that administrative law judges can hear student conduct cases, change sanctions related to fines, and incorporate new provisions regarding the right to cross-examination in student discipline hearings. Rule 0240-07-05 is new and incorporates the revised Policy 540.

Chairman Smith moved to approve Rule 0240-07-05 and revisions to Policy 540 Student Conduct, and Trustee Baker seconded the motion.

Trustee Boyd suggested a wording change in Section I, D of the policy to delete “his/her/its” and replace with “the” for clarity.

Trustee Karbowiak questioned the deletion of the Section X, B, 1-7 on victim’s rights. Mr. Farrar said victim’s rights for sexual misconduct and sexual violence are already covered in Policies 27

and 29, so they were not repeated in 540. The remaining part of Section X was moved up to the section on Purpose. Victim's rights are covered in Section I, D.

Trustee Wright questioned the deletion of fines. Mr. Farrar said fines were taken out because they were never utilized or implemented.

Trustee Jaimes questioned the rights of victims, and Mr. Farrar explained that if the victim withdraws the complaint, the University will be able to proceed with the case.

Trustee DeLay moved to amend the motion to accept the revised language, and Trustee Baker seconded. A roll call vote was taken and the motion to approve Rule 0240-07-05 and revisions to Policy 540 Student Conduct passed unanimously.

Rule Promulgation and Related Policy Revision - Action

Assistant University Counsel Sondra Wade presented revisions to Policy 541 Residential Life and Housing and introduced a new rule, 0240-07-07. The revisions aim to clarify the types of spaces within our residential facilities. Also, as requested by the Student Government Association, the visitation section was revised, and revisions to the University's fire safety policy were incorporated. Lastly, the eligibility of housing for part-time students and the availability of summer housing were added.

Trustee Wright asked if the liability for damage section was located somewhere else, and Assistant Counsel Wade said the liability language is located in Section XVI, C.

A motion was made by Trustee Boyd to approve Rule 0240-07-07 and revisions to Policy 541 Residential Life and Housing, and the motion was seconded by Trustee Baker. A roll call vote was taken and the motion to approve Rule 0240-07-07 and revisions to Policy 540 Student Conduct passed unanimously.

Approval of Expedited Tenure - Action

Provost Byrnes presented two newly hired department chairs who were recommended for tenure by their respective deans, department and college committees, the Provost, and President.

Chairman Smith moved to approve expedited tenure for the two candidates. Trustee Boyd seconded the motion. A voice vote was taken, and the motion passed unanimously.

Approval of Appointment of Chair of Excellence - Action

Provost Byrnes distributed a proposal to tie the Jennings and Rebecca Jones Chair of Excellence in Urban and Regional Planning to the Director of the Business Economic Research Center and to appoint Dr. Murat Arik as the chair holder. The Jennings Jones Foundation has been consulted and approves of this plan to see the chair filled.

Chairman Smith moved to approve the appointment of the Jennings and Rebecca Jones Chair of Excellence in Urban and Regional Planning. Trustee Boyd seconded the motion. A voice vote was taken, and the motion passed unanimously.

Notification of New Center - Information

The Office of Professional Sales housed in the Jones College of Business will be elevated to the Center for Professional Selling. Its establishment will hone our students' skills in the area of selling and attract funding as the only center of its kind in Tennessee.

Post-Approval Monitoring Report - Information Item

THEC invites us to provide enrollment and graduation rate information about new programs for five years from approval, and a summary is included in the materials.

Trustee Boyd asked about the process when a program doesn't meet benchmarks. Provost Byrnes said that the low producing program may be folded under another degree as a concentration or eliminated. Chairman Smith asked that the actual benchmarks for each new program be included the next time this data is presented.

Athletics Update – Information Item

Athletics Director Massaro presented on facilities and conference realignment. The two are connected. We just received approval to begin designing our tennis facility. The larger facility project related to the student athlete performance center is also in progress with meetings in September and October. This fall, we will cut the ribbon on a new golf facility at the Grove in Williamson County.

ACC, Big 10, and Pac-12 will announce a scheduling alliance to enhance their television packages. Their non-conference games will be cut in half, so the number of guaranteed televised games will decline for FBS schools. Typically these schools play four non-conference homes games.

NCAA will overhaul its governance structure. The alliance of the three conferences will create a voting block within the NCAA that will influence TV scheduling and the college football playoff. Eventually 40-50 schools will operate on a higher tier, and we would remain on the second tier, but we have to continue to be aggressive on our facilities plan.

Trustee Karbowiak asked about the impact on revenue due to these changes. Athletics Director Massaro answered that revenue potential is there if we get into a better affiliation with CFP and better individual TV contracts. Group of Five conferences looking to align similar to the ACC/Big 10/Pac-12 alignment. President McPhee added that the presidents of Conference USA schools meet monthly and are looking at alliances that would enhance the TV contracts.

Massaro added that due to COVID, financial planning has been in turmoil. Some programs have high debt due to facilities payments and empty stadiums. There may be an intermediate step in six months for us to be able to plan, but we have lots of optimism for how it will settle.

New Business

Trustee Freeman wanted to ask questions based upon information provided by President McPhee. Committee Chair Wright declined to add another agenda item, so Trustee Freeman requested that it be on the Board of Trustees agenda instead.

Adjournment

Committee Chair Wright adjourned the meeting at 10:20 a.m.

Respectfully submitted,

Academic Affairs, Student Life, and Athletics Committee

Middle Tennessee State University
Board of Trustees

Academic Affairs, Student Life, and Athletics Committee

Action Item

DATE: November 9, 2021

SUBJECT: **Approval of New Academic Degree Program**
M.S., Data Science

PRESENTER: Mark Byrnes
Provost

BACKGROUND INFORMATION:

University Policy 251, Approval of Academic Programs, Units, and Modifications, states all academic actions that require review and approval by THEC must be approved by the Board of Trustees.

A Proposal for a Master of Science in Data Science is attached for approval.

Revised Expedited New Academic Program Proposal (ENAPP) Master of Science in Data Science

Submitted to the
Tennessee Higher Education Commission

by
Middle Tennessee State University

September 2021

Revised Expedited New Academic Program Proposal
M.S. in Data Science
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Section I: Expedited Letter of Notification (ELON)

The most current version of the ELON must appear as the first section of the ENAPP, followed by the institution's response to the ELON evaluation. The included ELON must incorporate responses to any concerns outlined in the THEC ELON evaluation and information included should align with subsequent sections of the ENAPP, as appropriate.

Revised Letter of Notification to Develop a New Academic Program
Master of Science in Data Science

Submitted to the
Tennessee Higher Education Commission

by
Middle Tennessee State University

September 2021

October 28, 2020

Mike Krause
Executive Director
Tennessee Higher Education Commission
312 Rosa Parks Avenue, 9th Floor
Nashville, TN 37243

Re: Master of Science in Data Science

Dear Director Krause,

Consistent with THEC Policy A1.6 (section 1.6.4A) which states, "a formal request must be submitted to the THEC Executive Director by the President/Chancellor of the institution or system office for a new academic program to be considered for the Expedited Academic Approval Process and should include justification as to why the program should be considered for expedited academic program approval," I am submitting this letter as my request for the proposed Master of Science in Data Science program at MTSU to be considered under the new expedited approval process.

The proposed Master of Science in Data Science program directly aligns with the criteria set forth by THEC in the Expedited Academic Programs Approval Process document in which data science is defined as a "highly specialized multidisciplinary program in STEM." Additionally, the MTSU Board of Trustees provided support for the development of the program at its September 15, 2020 meeting.

We look forward to working with your office in the development of the New Academic Program Proposal and implementation of this degree.

Sincerely,

Sidney A. McPhee
President

cc: Betty Dandridge-Johnson

Overview

Institution Name

Middle Tennessee State University

Proposed Academic Program

Master of Science in Data Science

Degree Designation

Master of Science (M.S.)

Proposed CIP Code and CIP Code Title

30.7001 Data Science, General

Definition: A program that focuses on the analysis of large scale data sources from the interdisciplinary perspectives of applied statistics, computer science, data storage, data representation, data modeling, mathematics, and statistics. Includes instruction in computer algorithms, computer programming, data management, data mining, information policy, information retrieval, mathematical modeling, quantitative analysis, statistics, trend spotting, and visual analytics.

Academic Program Liaison (APL) name and contact information

Dr. Nita Brooks
Interim Vice Provost for Academic Programs
Middle Tennessee State University
Cope Administration Building, Rm. 111
Murfreesboro, TN 37132
Office: (615) 494-7611
Email: nita.Brooks@mtsu.edu

Implementation Timeline

Proposed dates for the external judgment site visit

April 2021

Estimated date of submission of the external review report to THEC and the institution (within 30 days following the site visit)

June 2021

Estimated date of institution's response to external review (within 30 days of receiving the external reviewer's report)

June 2021

Proposed date (month and year) of the institutional governing board's meeting to consider the proposed academic program for approval

December 2021

Proposed date (month and year) of the Tennessee Higher Education Commission meeting to consider the proposed academic program for approval

January 2022

Proposed implementation date (semester and year) when students will enroll in the proposed academic program

May 2022

Background and Overview

Background narrative

Provide a short narrative, describing the circumstances that initiated the need and development of the proposed academic program.

In May 2018, the MTSU Data Science Institute was created and since that time it has developed key partnerships with private and public entities and received external research funding in excess of $1 million. Through an interdisciplinary approach to data science, several departments and colleges have developed a Bachelor of Science in Data Science and a Graduate Certificate in Data Science. These new programs and the Institute, along with the PhD. in Computational Science positions MTSU to continue to lead in data science. As Mike Krause, Executive Director of THEC, stated at the February 18, 2020 announcement of the Data Science Initiative at MTSU, "Data science is one of our most high-need fields and clearly indicates that MTSU has had their finger on the pulse of our employers. This is a perfect example of MTSU anticipating what the future of work will be and responding accordingly. We could not be more supportive and look forward to what comes next for this program."[1]

Since that announcement on February 18th, registration for the new undergraduate program in Data Science is already at 27 declared majors and 15 minors (data as of September 25th

[1] "MTSU unveils Tennessee Data Initiative." https://mtsunews.com/tennessee-data-science-initiative-kickoff/

and are above projections for the 1st year). The graduate certificate began accepting students for fall enrollment in May 2020 and reached enrollment capacity of 25 students within 6 weeks.

The next logical step for MTSU is to create the Master of Science in Data Science program.

Provide a general overview of the program, including a description of the nature of the proposed program, total credit hours, and modalities of course delivery.

We propose a program of study leading to a Master of Science in Data Science. The area of data science continues to grow in popularity, as many of the emerging fields include big data concepts, analytics, and machine learning, and MTSU has been leading the way in the state of Tennessee for research and education in data science.

Following an interdisciplinary approach, the program will focus on practical and in-depth applications of data, programming, data cleansing and mining, big data concepts, statistics and business intelligence, and predictive analytics and machine learning (including artificial intelligence). We feel that this new program would be an excellent extension of the B.S. in Data Science and the Graduate Certificate in Data Science, and a perfect complement to the Ph.D. in Computational Science. This degree would include faculty and staff from the departments of Math, Computer Science, Economics and Finance, and Information Systems and Analytics, as well as many other departments that embrace data science.

The program will consist of a total of 36 credit hours and is planned as an on-ground program; some courses will be delivered in an online format. The plan is to eventually include an online option; however, the initial program will require at least some in-person courses and will not be able to be completed as an online degree.

Justification for Consideration of Expedited Policy

Provide clear evidence that the proposed program is in high demand in the region and the state.

The proposed program exactly matches the second criteria listed in the THEC High-Demand Program Criteria (page one of Expedited New Academic Programs Approval Process – Checklist) which states "Selected highly specialized multidisciplinary programs in STEM, such as Data Science (CIP Code 30.70)."

The Master Plan update 2020 highlights the future workforce needs for Tennessee, focusing on the demand for skills directly related to those developed in a data science graduate program. The Master Plan update states "THEC will work with institutions to increase the number of degrees produced in Computer Science and Data Analytics by 20% (N = 260) annually over the next five years."[2] The proposed Master of Science in Data Science degree

[2] "Enabling the Competitive Edge: Tennessee Higher Education in the New Economy: Master Plan Update 2020." https://www.tn.gov/thec/about-thec-tsac/master-plan/master-plan.html

at MTSU serves as an intersection between computer science and data analytics, directly tying to the demand highlighted in the report.

The demand from Tennessee businesses and students is discussed in detail in the *Community and Industry Partnerships* and the *Student Interest* sections.

Existing Programs of Study at the Institution

If the proposed program is emerging from an existing minor or certificate program, provide the previous three years of enrollment and graduation data for the existing program.

Fall 2020 is the first year of the MTSU Data Science undergraduate program. Registration for the undergraduate program is already at 27 declared majors and 15 minors (data as of September 25th, which is above the projection for the 1st year).

The Data Science Graduate Certificate began accepting students for fall enrollment in May 2020 and reached enrollment capacity of 25 students within 6 weeks. Surveys of MTSU graduate certificate students support a high level of demand for a Master of Science in Data Science. Survey results are discussed in detail in the *Student Interest* section of this document.

Community and Industry Partnerships

Provide a minimum of two letters of support from regional, community, and/or workforce partners in the ELON appendix. Letters should be dated and appear on letterhead.

Six letters were provided in support of the proposed program (see Appendix A). The letters present strong support for a Master of Science in Data Science program at MTSU while highlighting the demand for graduate degrees in data science. Speaking to the demand for graduate degrees in data science, Megan A McGee of HCA Healthcare states "One struggle in the current data science job market is that there are many candidates interested in data science, but few have demonstrated the scientific rigor needed for our data science positions. A Master of Science degree in Data Science will provide well-defined and in-depth training in data science." Furthermore, Lindsey M. Clark of Healthcare Bluebook states "As the tech sector flourishes in West, Middle, and East Tennessee, creating opportunities to provide students with congruent training to meet the demands of businesses is instrumental to our state's economy and technology growth." K Beth Duffield from Rutherford County Chamber of Commerce notes that "Based on the number of job openings and the projected job openings specifically for business and data analysts in the next 5-10 years, there is great opportunity and need for additional programming." The letter of support from Laine Hiera, director of data engineering at Bridgestone Americas, highlights the demand for job candidates with graduate degrees in data science, while also emphasizing the company's "growing demand for data science within our team and with a high growth demand for the foreseeable future." The letter also emphasizes how there is a gap in knowledge in job candidates that could be filled by the proposed MTSU graduate

program. Specifically, Laine notes that "providing this advanced degree is needed to achieve a complete pipeline for data science education."

The letters also recognize the ideal fit for MTSU to have a Master of Science in Data Science given the current data science program pipeline at the university. For example, Zach Gemigani, CEO of Juice Analytics states "I've been committed to building a stronger analytics community in the middle Tennessee region. I see an opportunity to make our region a hub for data and analytics solution providers and data-driven enterprises. The MTSU Data Science Institute is a foundational piece of this data community. The MTSU leadership recognizes the need to grow the talent from K-12 students through a PhD program, and the Master's Degree is a necessary part of that vision."

Lastly, the letters offer research support for the proposed program. Bridgestone offers their support by offering to work directly with students on real-world problems and with real-world data. This type of educational and research support will ensure that students gain both academic and practical experience throughout the MTSU graduate program. Furthermore, company data and projects indirectly provide financial support by offsetting the need for subscription datasets. Relatedly, Gary Wilson from the State of Tennessee Department of Human Services offers their support to work with MTSU on student projects. Specifically, they state "this program also gives our organization the option of working directly with the students on real world projects that will allow them to gain insight into how to address, define, and solve a problem using data." This educational, financial, and research support is greatly appreciated and will allow our students to obtain a well-rounded education in data science while also offsetting the need for subscription datasets.

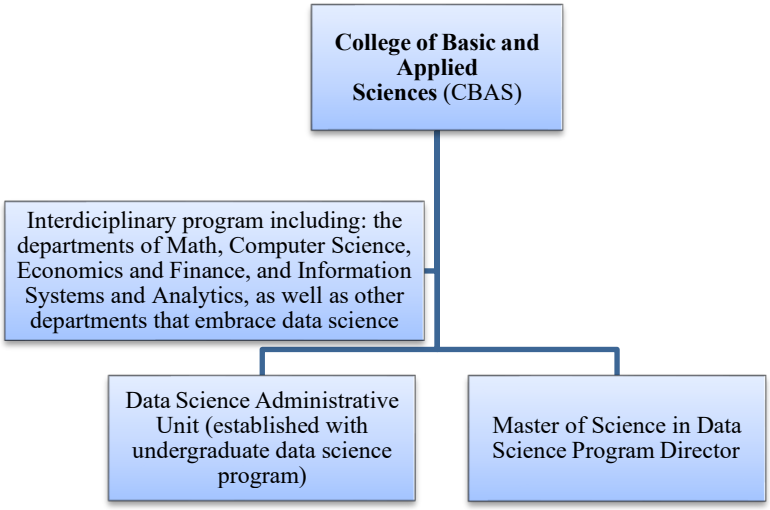
Accreditation

Middle Tennessee State University is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award baccalaureate, masters, and doctorate degrees. Currently, there is no specific accreditation for data science.

Administrative Structure

Provide an organizational chart that includes the college, department, administrative unit, and program director for the proposed academic program.

The Data Science graduate program will be an interdisciplinary program including faculty from the College of Business as well as the College of Basic and Applied Sciences. Faculty will remain part of their home departments while teaching courses in this program. There will be a program director and they will share the administrative staff from the undergraduate Data Science program. The program director will report to the Dean of the College of Basic and Applied Sciences. Any new faculty hired will be assigned to a specific department, such as Information Systems & Analytics, Computer Science, Math, or Economics and Finance.



Enrollment and Graduation Projections

Using the Projected Enrollments and Graduates table, provide initial projections for the first five years of enrollment and graduates. Enrollment projections should be realistic and based on demonstrable student demand. Attrition calculations should be based on the average rates of similar programs or overall institutional attrition rates.

Attrition rate applied is 12% based on the attrition experience by the MTSU Graduate certificate where 3 students left of the 25 enrolled.

Table 1 - Projected Enrollments and Graduates

Projected Enrollments and Graduates				
Year	**Academic Year**	**Projected Total Fall Enrollment**	**Projected Attrition**	**Projected Graduates**
1	2022-2023	8*	1	0
2	2023-2024	20	2	7
3	2024-2025	21	2	18
4	2025-2026	22	3	19
5	2026-2027	28	3	19

Institutional Alignment and Demand

Alignment with State Master Plan and institutional mission profile

Explain how the proposed program aligns with the THEC Master Plan and institutional mission statement or profile.

The Master Plan for Tennessee Postsecondary Education 2015-2025 calls for statewide

strategic development of higher education programs. While emphasizing undergraduate programs, the Master Plan does note that "the state continues to acknowledge the critical need for academic programs of distinction at the graduate and professional level to fully address Tennessee's economic development, workforce, and research needs."

The Master Plan update 2020 highlights the future workforce needs for Tennessee. The report emphasizes current and future demand for skills directly related to those developed in a data science graduate program. The Master Plan update states "THEC will work with institutions to increase the number of degrees produced in Computer Science and Data Analytics by 20% (N = 260) annually over the next five years." The proposed Master of Science in Data Science degree at MTSU serves as an intersection between computer science and data analytics, directly tying to the demand highlighted in the report.

The Master Plan 2020 also emphasizes the findings of the THEC Future of Work task force. This task force investigated the employment needs of Tennessee, with great focus placed on computer science and data analytics. The key findings of the task force included the need for individuals to learn artificial intelligence and automation, computer science, and data analytics. The task force also emphasized the need for individuals to be able to think critically and communicate effectively on these subject areas. A Master of Science in Data Science degree provides an ideal opportunity to advance the knowledge of Tennesseans and equip them with the skills needed to meet the evolving needs from employers in the state.

The proposed MTSU Master of Science in Data Science program meets the Master Plan update 2020 and the institutional mission in the following ways:

- *Creates a master's degree program and associated curriculum that directly serves the demand needs identified by the THEC Future of Work task force: data science*.

The Master of Science in Data Science from Middle Tennessee State University combines computer science and data analytics into a graduate program that allows individuals to meet the demand for data science skills from businesses in Tennessee.

- *Provides Tennesseans with the opportunity to learn the advanced skills needed for careers in data science and to be part of a growing and sustained workforce.*

Based on projections of job growth from 2019 - 2029 for data scientists and associated occupations, the growth rate is much faster than average at 31% with median annual salary of $94,280.[3] Additionally, related occupations such as Computer and Information Research Scientists and Statisticians will grow 15% (median salary of $122,840)[4] and 33% (median salary of $92,030)[5] respectively. The demand and pay will continue to be attractive to

[3] Bureau of Labor Statistics: Data for Occupations Not Covered in Detail. https://www.bls.gov/ooh/about/data-for-occupations-not-covered-in-detail.htm
[4] Bureau of Labor Statistics: Computer and Information Research Scientists. https://www.bls.gov/ooh/computer-and-information-technology/computer-and-information-research-scientists.htm
[5] Bureau of Labor Statistics: Statisticians. https://www.bls.gov/ooh/math/mathematicians-and-statisticians.htm

prospective individuals looking to enter a technology related career.

The proposed data science degree also aligns with the mission of Middle Tennessee State University as expressed in the goals of the university's Academic Master Plan, which looks to

1. advance academic quality through excellence in teaching, scholarship, and service and the celebration of MTSU's strengths;
2. promote student success and individual responsibility for accomplishments through a community dedicated to student-centered learning; and
3. develop purposeful and sustainable partnering relationships and outreach.

- *MTSU will advance academic quality through excellence in teaching, scholarship, and service and the celebration of MTSU's strengths.*

A Master of Science in Data Science provides the opportunity to build on the foundation provided by the undergraduate program in data science. Following the undergraduate degree, the master's program applies an interdisciplinary approach to education that includes courses and faculty from several departments. The diversity of faculty and programs is a strength of MTSU and by combining these resources into a master's degree, it leverages the strengths of MTSU by bringing the best of all areas together.

Furthermore, graduate assistantships and data-focused projects outside of the classroom (such as those in partnership with the MTSU Data Science Initiative), provide students with the opportunity to advance the scholarship and service of MTSU. Research projects are planned to include potential academic articles as well as community and business focused service projects.

- *MTSU will promote student success and flexibility to best service the student's learning goals.*

Through an interdisciplinary approach to the curriculum, students will have the opportunity to select electives that best fit their expected interests. It is not assumed that data science fits into one industry, such as healthcare or finance. It instead embraces the need to analyze data in every industry, thus giving students the opportunity to be exposed to more than a discipline of data science.

- *MTSU will develop purposeful and sustainable partnering relationships and outreach.*

With the creation of Data Science Institute at MTSU, which focuses on research and external partnerships, this degree will be a feeder system for getting students actively involved with external projects and research. This will include opportunities for consulting, research grants, data hackathons, and analysis of data for the good of the community.

Student Interest

Provide compelling evidence of student interest in the proposed program. Types of evidence vary and may include, enrollment in related concentrations or minors; representative student and alumni surveys; and national, statewide, and professional employment forecasts and surveys.

While not required for the ELON, a feasibility study (see Appendix B) was completed to assess student interest in a Master of Science in Data Science program at MTSU. The entire feasibility study completed by the MTSU Business and Economic Research Center is attached at the end of the document. We highlight portions of the feasibility study here as evidence of student interest.

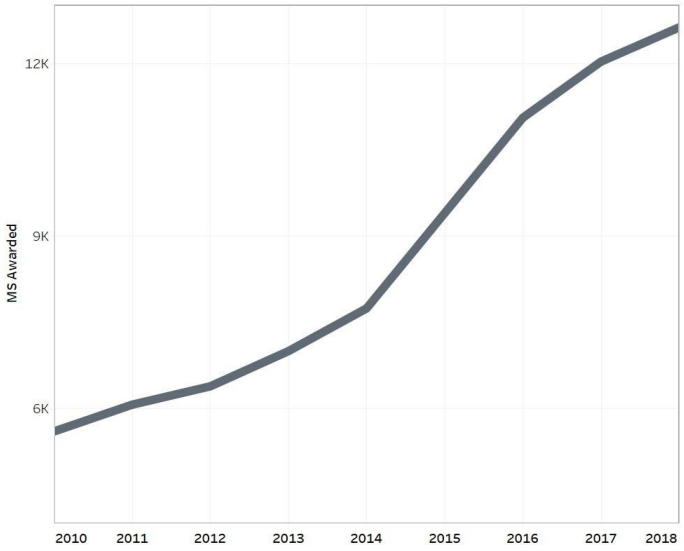
National and State Enrollment

The National Center for Educational Statistic's CIP code for data science only came into existence in 2020 and few institutions have as yet changed their programs to match the new classification. We thus make use of the CIP codes with which data science master's programs currently identify themselves. Figure 1 shows the trend in degrees awarded in the combined seven CIP codes used by almost all data science programs.[6] The rapid increase in degrees awarded is apparent. Note that the upward trend has steepened after 2014.

The University of California system is a rare instance where students in master's programs have been explicitly tracked over time. Figure 2 provides a time-series of master's enrollments in the California system since 1999. Looking at a Tennessee institution, UT Knoxville Master's in Business Analytics similarly demonstrates the sharp rise in student interest in this area (see Figure 3).

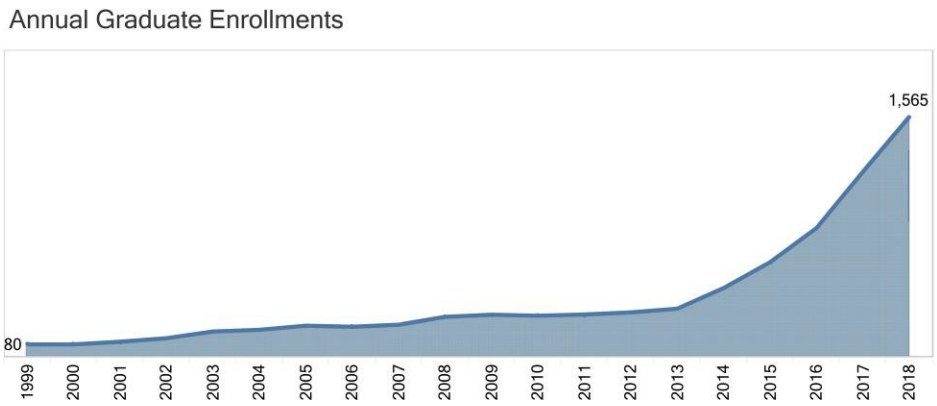
[6]CIP codes include 11.0104 (Informatics), 11.0401 (Informational Science/studies), 11.0501 (Computer System Analysis/Analytics), 11.0802 (Data Modeling/Warehousing and Database Administration), 27.0501 (Statistics, General), 27.0503 (Mathematics and Statistics), and 30.3001 (Computational Science)

Figure 1: Trend in Master's Degrees Awarded in Data Science Fields



Source: National Center for Education Statistics, IPEDS data. https://nces.ed.gov/ipeds/use-thedata

Figure 2: The University of California System's Degree Growth



Source: The University of California, Institutional Research and Academic Planning, "Disciplinary Trends in Graduate Degree Program Proposals," 1999-2018. https://www.ucop.edu/search/?q=disciplinary+trends

Figure 3: M.S. in Business Analytics Awarded at UT/ Knoxville

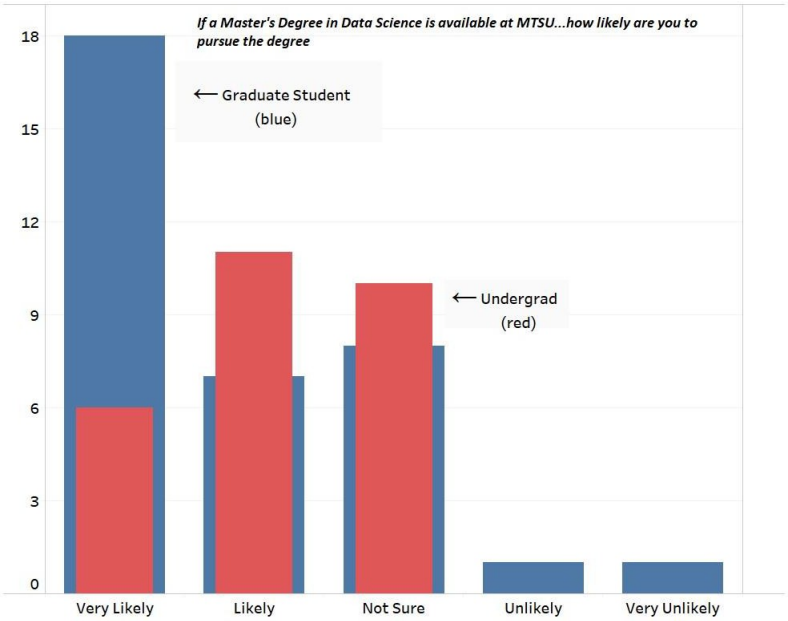
Source: University of Tennessee Enrollment Report, https://sas.utk.edu/SASVisualAnalyticsViewer/VisualAnalyticsViewer_guest.jsp?reportName=Self-Service+Enrollment+Report&reportPath=/World/World+Reports/FB/

MTSU Student Interest

MTSU began both an undergraduate major in data science and a graduate certificate in data science in fall 2020. Registration for the undergraduate program is already at 27 declared majors and 15 minors (data as of September 25th and are above projections for the 1st year). The Data Science Graduate Certificate began accepting students for fall enrollment in May 2020 and reached enrollment capacity of 25 students within 6 weeks.

To further confirm student interest at MTSU, 65 students were surveyed under the current rather difficult circumstances. Thirty-six are graduate students across a wide number of programs (Natural science, Liberal Arts, Business, etc.), including eighteen in the graduate data science certificate program. Twenty-nine are undergraduates, mostly in computer science or data science.

Figure 4: MTSU Student Survey



As can be seen, the overwhelming number of both groups of students expressed interest in a potential master's program. Remarkably few indicated that they had no interest. Specifically, 18 graduate students and 6 undergraduate students (a total of 24 students) selected "very likely" when asked how likely they are to pursue a Master's Degree in Data Science at MTSU. The students were also asked to express an opinion about the importance of having a Master of Science in Data Science program at MTSU. When asked the question of "how important is it to have a Master's Degree in Data Science for students at MTSU?" 100% of graduate students responded important or very important. For the undergraduates 17% selected "not sure" while the remaining respondents indicated "important" or very "important."

Employer Demand

It is likely no surprise that data scientists are in high demand. The website Quanthub estimates there are three data science job postings for every person searching for one.[7] In 2018, *The LinkedIn Workforce Report* found an astounding shortage of 151,717 people with "data science skills."[8] A 2016 McKinsey report eclipses even this number, projecting a shortfall that could reach 250,000.[9] The cofounder of LinkedIn, at a Wharton seminar, claimed that five of the top fastest growing jobs in the U.S. are in data science or machine learning.[10] In 2019 the job search site Glassdoor listed data

[7] "The Data Scientist Shortage in 2020," https://quanthub.com/data-scientist-shortage-2020/. Accessed October 8, 2020.
[8] https://news.linkedin.com/2018/8/linkedin-workforce-report-august-2018. Accessed October 8, 2020.
[9] Mckinsey Global Institute, December 2016. *The Age of Analytics: Competing in a Data Driven World*.
[10] "What's Driving the Demand for Data Scientists," March 2019. https://knowledge.wharton.upenn.edu/article/whats-driving-demand-data-scientist/. Accessed October 8, 2020.

science as its "Best Job in America" and in 2020 placed it third.[11] Its competitor, careercast.com, also listed data science as the top job in 2019, projecting nineteen percent growth.[12] The third site, Indeed.com, listed it in eighth place, with the rate of job listings on its website having grown 77.57 percent from 2016-2019.[13] Finally, the World Economic Forum claims that data science has "the highest number of opportunities of any listed profession."[14] In brief, outside analysts are in strong agreement about the exceptional employment opportunities in this area.

Table 1: Employment Trends in Data Analysis

Occupation	US Growth % 2018-2028	BLS Growth Category	TN Growth % 2016-2026	TN Annual Job Openings
Management Analysts	14	"Much Faster Than Average"	27	960
Market Research Analysts	18	"Much Faster Than Average"	35	1100
Computer and Information Research Scientists	15	"Much Faster Than Average"	25	20
Financial Quantitative Analysts	5	"Faster Than Average"	16	190
Business Intelligence Analysts	10	"Faster Than Average"	21	320
Operations Research Analysts	26	"Much Faster Than Average"	46	210
Statisticians	31	"Much Faster Than Average"	36	80
Economists	14	"Much Faster Than Average"	11	10

Source: Bureau of Labor Statistics, *Occupational Employment Statistics: Occupation Profiles*. https://www.bls.gov/oes/current/oes_stru.htm; O*Net Online, https://www.onetonline.org/

The Bureau of Labor's employment statistics confirm this picture. Again, there is no exact occupational code for data science. To get around this, we took the Bureau of Labor Statistics SOC codes that correspond to the skill set most associated with data science.[15] We show those codes and their employment prospects in Table 1. The table shows U.S. and Tennessee job growth and the BLS growth category of the occupation. Note that for each occupation, expected job growth in Tennessee exceeds the national rate.

[11] "50 Best Jobs in America for 2020." https://www.glassdoor.com/List/Best-Jobs-in-AmericaLST_KQ0,20.htm. Accessed October 8, 2020.
[12] "The 2019 Jobs Rated Report." https://www.careercast.com/jobs-rated/2019-jobs-rated-report. Its 2020 report has not yet been released. Accessed October 8, 2020.
[13] "The Best Jobs of 2020,"https://www.indeed.com/lead/best-jobs-2020?aceid. Accessed October 8, 2020.
[14] World Economic Forum. January 2020. "Jobs of Tomorrow." www3.weforum.org/docs/WEF_Jobs_of_Tomorrow_2020.pdf. Accessed October 8, 2020.
[15] Looking at programs, the common denominators are work in Python, SQL, data visualization such as Tableau, machine learning programs, and frequently R.

Local Job Opportunities

On October 8, 2020 the job aggregator Monster.com showed 95 data scientist jobs open in Tennessee. Sixty of those jobs were in the Nashville area.[16] "Google Jobs" showed 98 openings within 60 miles of Murfreesboro.[17] Many of these jobs have been unfilled for several weeks. These numbers are far higher than for other occupations in the area.

It is abundantly clear that this is a growing field with many employment opportunities. Those who predict job trends, the U.S. Department of Labor Statistics and job search websites, all agree on the large number of jobs available for those with a master's in data science.

Existing programs offered at public and private Tennessee universities

List all academic programs with the same or similar CIP code offered at public and private universities in Tennessee along with the number degrees awarded for the last three years of available data.

For students seeking a graduate degree in data science, there currently are three approved M.S. degrees available in this state. Two private universities in the Middle Tennessee area provide Master of Science in Data Science programs. Vanderbilt University began its program last year. Its first class has thirty-one students, and it is a highly competitive program. Lipscomb University has the other operating program in Tennessee. While these programs are in the same region as MTSU, private institutions are often cost prohibitive for some students. The University of Memphis recently gained approval for a Master of Science in Data Science degree. Tennessee State University is proposing to add a fourth; however, their program will be exclusively online. The proposed MTSU program is planned to provide students with an on-ground program, while offering select courses in an online format. Additionally, the program at MTSU builds on the existing data science programs currently provided: the Bachelor of Science in Data Science and the Graduate Certificate in Data Science; furthermore, the MTSU program represents an interdisciplinary effort combining faculty and graduate courses from several departments.

The National Center for Educational Statistics reports that in 2018, 11,628 master's degrees were awarded nationally in the CIPs programs used for data science programs. Fifty-one of those were in Tennessee. A MTSU program would be the second public on-ground master's program in this discipline.

The sizable growth in student interest and the relative lack of existing programs to meet it within Tennessee seems evident. The MTSU survey, detailed in the *Student Interest* section, confirms

[16] https://www.monster.com/?WT.srch=1&WT.mc_n=olm_tm_srch_ggl_Brand_Monster.comExactSitelink JobSearch&gclsrc=aw.ds&&gclid=Cj0KCQjw8fr7BRDSARIsAK0Qqr7L7ZDorBpldAu0b2OVy_SuhGQb3TsJCAX8Yasp7PYquyVOc_D5mVgaAhFiEALw_wcB&gclsrc=aw.ds. Accessed October 8, 2020.

[17] https://www.google.com/search?client=firefox-b-1-d&sxsrf=ALeKk03eLG3lQlaDFDlTnqQNWuIaqrf_1g%3A1602195106336&ei=oo5_X9CMFIrp_QbsnovIBA&q=google+jobs+%22data+science%22&oq

that our students are in line with the national trend of growing interest and demand for graduate programs in data science.

Looking at related graduate programs, the University of Tennessee at Knoxville (UTK) offers a Master of Science in Business Analytics degree and the University of Memphis offers a Master of Science in Bioinformatics degree. The proposed Master of Science in Data Science program at MTSU differs from these programs in that it is an interdisciplinary program that consists of a combination of computer science, business analytics, and statistics. It is important to note that both Austin Peay State University, the University of Memphis, and MTSU offer a certificate program in data science. The MTSU certificate program would allow for a direct transition into the Master of Science in Data Science. All of these programs are characterized by a relatively low number of hours in data science per se. Students are typically required to take between 12 and 18 hours of graduate data science courses. Unfortunately, the employment recruitment agency Burch Works found 94 percent of sampled data scientists to hold at least an M.S. degree.

Sources

"50 Best Jobs in America for 2020." https://www.glassdoor.com/List/Best-Jobs-in-AmericaLST_KQ0,20.htm. Accessed October 8, 2020.

August LinkedIn Workforce Report: Data Science Skills are in High Demand Across Industries https://news.linkedin.com/2018/8/linkedin-workforce-report-august-2018. Accessed October 8, 2020.

Bureau of Labor Statistics: Data for Occupations Not Covered in Detail. https://www.bls.gov/ooh/about/data-for-occupations-not-covered-in-detail.htm

Bureau of Labor Statistics: Computer and Information Research Scientists. https://www.bls.gov/ooh/computer-and-information-technology/computer-and-information-research-scientists.htm

Bureau of Labor Statistics: Statisticians. https://www.bls.gov/ooh/math/mathematicians-and-statisticians.htm

"Enabling the Competitive Edge: Tennessee Higher Education in the New Economy: Master Plan Update 2020." https://www.tn.gov/thec/about-thec-tsac/master-plan/master-plan.html.

Google Job Search https://www.google.com/search?client=firefox-b-1-d&sxsrf=ALeKk03eLG3lQlaDFDlTnqQNWuIaqrf_1g%3A1602195106336&ei=oo5_X9CMFIrp_QbsnovIBA&q=google+jobs+%22data+science%22&oq

Looking at programs, the common denominators are work in Python, SQL, data visualization such as Tableau, machine learning programs, and frequently R.

Mckinsey Global Institute, December 2016. *The Age of Analytics: Competing in a Data Driven World*.

Monster.com Job Search https://www.monster.com/?WT.srch=1&WT.mc_n=olm_tm_srch_ggl_Brand_Monster.comExactSitelinkJobSearch&gclsrc=aw.ds&&gclid=Cj0KCQjw8fr7BRDSARIsAK0Qqr7L7ZDorBpldAu0b2OVy_SuhGQb3. Accessed October 8, 2020.

"MTSU Unveils Tennessee Data Initiative." https://mtsunews.com/tennessee-data-science-initiative-kickoff/. Accessed October 27, 2020.

National Center for Education Statistics, IPEDS data. https://nces.ed.gov/ipeds/use-thedata

"The 2019 Jobs Rated Report." https://www.careercast.com/jobs-rated/2019-jobs-rated-report. Its 2020 report has not yet been released. Accessed October 8, 2020.

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The University of California, Institutional Research and Academic Planning, "Disciplinary Trends in Graduate Degree Program Proposals," 1999-2018. https://www.ucop.edu/search/?q=disciplinary+trends

University of Tennessee Enrollment Report, https://sas.utk.edu/SASVisualAnalyticsViewer/VisualAnalyticsViewer_guest.jsp?reportName=SelfService+Enrollment+Report&reportPath=/World/World+Reports/FB/

"What's Driving the Demand for Data Scientists," March 2019. https://knowledge.wharton.upenn.edu/article/whats-driving-demand-data-scientist/. Accessed October 8, 2020.

World Economic Forum. January 2020. "Jobs of Tomorrow." http://www3.weforum.org/docs/WEF_Jobs_of_Tomorrow_2020.pdf. Accessed October 8, 2020.

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MIDDLE TENNESSEE STATE UNIVERSITY

December 14, 2020

Julie Roberts
Associate Chief Academic Officer
Tennessee Higher Education Commission
312 Rosa Parks Avenue, 9th Floor
Nashville, TN 37243

Dear Julie,

Thank you for the quick and detailed response to the expedited letter of notification submitted for the proposed Master of Science in Data Science degree at MTSU. We are excited about the possibility of creating this program to support the needs of an expanding workforce in Tennessee. Below you will find a summary of our responses to the items noted in your review. A copy of the revised letter of notification reflecting the edits is provided as required in Section I of the Expedited New Academic Program Proposal.

Overall Comments:

- *Incorporate the letter from Dr. McPhee into the ELON document.*
    - **Response:** The letter from Dr. McPhee has been added to the revised ELON document. (page 3)

Background Narrative:

- *Will an online option be considered in the future?*
    - **Response:** If approved, the program will begin with a mixture of on-ground and online courses, but an online option would be desired in the future. The following text was added to the document.

      The program will consist of a total of 36 credit hours and is planned as an on-ground program; some courses will be delivered in an online format. The plan is to eventually include an online option; however, the initial program will require at least some in-person courses and will not be able to be completed as an online degree. (page 6)

Community and Industry Partnerships:

- *Letters of support do not indicate employment, financial, research support, etc. Please provide additional letters which indicate how partners will directly support the proposed program.*

    - **Response:** In addition to the four original letters of support, we have received two more that specifically address the issues mentioned in your comment. These letters were provided by Bridgestone Americas and the State of Tennessee Department of Human Services. The following was added to the document to reflect the statements of support offered in the letters.

      The letter of support from Laine Hiera, director of data engineering at Bridgestone Americas, highlights the demand for job candidates with graduate degrees in data science, while also emphasizing the company's "growing demand for data science within our team and with a high growth demand for the foreseeable future." The letter also emphasizes how there is a gap in knowledge in job candidates that could be filled by the proposed MTSU graduate program. Specifically, Laine notes that "providing this advanced degree is needed to achieve a complete pipeline for data science education."

      Lastly, the letters offer research support for the proposed program. Bridgestone offers their support by offering to work directly with MTSU students on real-world problems and with real-world data. This type of educational and research support will ensure that students gain both academic and practical experience throughout the MTSU graduate program. Furthermore, company data and projects indirectly provide financial support by offsetting the need for subscription datasets. Relatedly, Gary Wilson from the State of Tennessee Department of Human Services offers their support to work with MTSU on student projects. Specifically, they state "this program also gives our organization the option of working directly with the students on real world projects that will allow them to gain insight into how to address, define, and solve a problem using data." This educational, financial, and research support is greatly appreciated and will allow our students to obtain a well-rounded education in data science while also offsetting the need for subscription datasets. (pages 7-8)

Accreditation:

- *Please address this section.*

    - **Response:** Thank you for noting this omission. A statement about accreditation was added to the revised document.

      Middle Tennessee State University is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award baccalaureate, masters, and doctorate degrees. Currently, there is no specific accreditation for data science. (page 8)

Administrative Structure:

- *What department will the proposed program report to?*
    - **Response:** The data science program will be housed in the College of Basic and Applied Sciences. The program director will report directly to the Dean. As an interdisciplinary program, faculty participate from numerous departments on campus. The following paragraph was added to the document as further explanation of the administrative structure.

      The Data Science graduate program will be an interdisciplinary program including faculty from the College of Business as well as the College of Basic and Applied Sciences. Faculty will remain part of their home departments while teaching courses in this program. There will be a program director and they will share the administrative staff from the undergraduate Data Science program. The director will report to the Dean of the College of Basic and Applied Sciences. Any new faculty that is hired will be assigned to a specific department, such as Information Systems & Analytics, Computer Science, Math, or Economics and Finance. (page 8)

Student Interest:

- *Figure 4 is unclear did 18 students respond "very likely" or was it 24? Please clarify.*
    - **Response:** We apologize for the confusion. The text was edited to clarify that the total number was twenty-four. There were eighteen undergraduate and six graduate students selecting "very likely" as their answer to the question.
      Specifically, 18 graduate students and 6 undergraduate students (a total of 24 students) selected "very likely" when asked how likely they are to pursue a Master's Degree in Data Science at MTSU. (page 15)

Thank you again for the opportunity to provide additional information about this exciting new degree program and a revised ELON. We look forward to receiving feedback on the Expedited New Academic Program Proposal.

Sincerely,

Mark Byrnes

Mark Byrnes
University Provost

Section II: Curriculum

Provide an adequately structured curriculum that (a) meets the stated objectives of the academic program, and (b) reflects breadth, depth, theory, and practice appropriate to the discipline and the level of the degree. The curriculum should be compatible with disciplinary accreditation and meet the criteria for the general education core, as well as articulation and transfer, where applicable.

Catalog description

Provide the catalog description for the proposed program.

Data Science is an interdisciplinary field that covers the use of data to make decisions, gain insight, and develop knowledge. Data scientists combine skills from computer science, statistics, business analytics, and other complementary fields. Students start with identifying a research question followed by understanding the data available to address the question, preparing and displaying of data, and modeling the data to evaluate the issue. Finally, students will deploy the models they created and communicate the process and results. The program consists of courses that provide a practical understanding of data science as well as electives that allow students the ability to focus on areas within data science in which they have an interest. Cases and the capstone topics seminar allow students to apply data science methods, such as supervised and unsupervised learning, in a real-world setting and will ensure that they have a portfolio of work to show prospective employers.

Program learning outcomes

Provide the program learning outcomes for the proposed program. Outcomes should reflect the specific knowledge and skills expected for students to acquire as part of their educational experience in the proposed program.

The proposed Master of Science in Data Science curriculum is designed to produce graduates with the skills and knowledge required to apply data science techniques and theory to real-world datasets and research problems. Upon completion of the program of study, students will be able to

- Identify data-driven business questions.
- Appropriately identify data science methods and techniques to solve data-driven problems.
- Apply the knowledge and skills needed to perform data science techniques from areas such as statistics, computational programming, and business.
- Appraise ethical issues associated with data science applications.
- Effectively communicate quantitative analyses and conclusions.
- Demonstrate the ability to work with individuals and groups on data driven solutions

The proposed M.S. in Data Science is part of a larger vision of Data Science at MTSU. The larger vision is to prepare students at all levels of education—from B.S. to Ph.D.—to be real-world ready when they graduate. Job responsibilities and expectations are going to be different (and ever changing) with different levels of education. We want our data science programs (including the M.S. in Data Science) to be focused on preparing students for the world in which they are going to work after leaving MTSU. Our focus on cross-college collaborations such as

those with History, Business, and Journalism will provide students with practical applications—that is, real-world, original case studies to practice their skills.

Student learning outcomes
Outline the student learning outcomes for the proposed program. Outcomes should clearly state the specific and measurable outcomes students will display to verify learning has occurred. Every student learning outcome must directly align with and/or relate to one or more program learning outcomes.

1. Students will develop the knowledge and skills necessary to analyze and solve real-world data problems.

Measurements:

- Throughout the program of study students will be required to complete course problems that require proficiency in identifying the data-driven questions and applying data science skills and models to answer that question.
- Students will take a required statistics course and utilize statistical knowledge throughout the program.
- Students will learn and apply business domain knowledge in DATA 6300, DATA 6310, DATA 6320, and DATA 6330.
- In the capstone course, DATA 6900, students will complete projects that require them to identify and apply the appropriate data methods to answer the data-driven question.

Associated program learning outcomes:

- Identify data-driven business questions.
- Appropriately identify data science methods and techniques to solve data-driven problems.
- Apply the knowledge and skills needed to perform data science techniques from areas such as statistics, computational programming, and business.

2. Students will be able to appraise ethical considerations associated with data-driven problems.

Measurements:

- Throughout program of study and specifically in DATA 6550, students will demonstrate their ability to be conscious of real-world considerations such as data ethics.

Associated program learning outcomes:

- Appraise ethical issues associated with data science applications.

3. Students will be able to effectively present data-driven problems and communicate possible methods and models to solve data-driven problems.

Measurements:

- Throughout program of study students will be required to complete both written and oral presentations to demonstrate effective communication skills of the data-driven problem, methods, and results.
- In the capstone course, DATA 6900, and the cases course, DATA 6500, students will be required to complete both written and oral presentations of their data-driven projects. The projects and presentation will demonstrate their ability to effectively communicate their process and conclusions.

Associated program learning outcomes:

- Effectively communicate quantitative analyses and conclusions

4. Students will be able to successfully work in groups to solve data-driven problems and communicate their solutions.

Measurements:

- In the cases course, DATA 6500, students will be required to complete both written and oral presentations of their data-driven cases in groups. The cases and presentations will demonstrate the ability of the students to work together to solve the data-driven problems.

Associated program learning outcomes:

- Effectively communicate quantitative analyses and conclusions
- Demonstrate the ability to work with individuals and groups on data driven solutions

5. Students will be proficient in the computer programming required to solve data-driven problems.

Measurements:

- Throughout program of study students will demonstrate their ability use various computer programming methods to solve data-driven problems and cases.
- In the capstone course, DATA 6900, and the cases course, DATA 6500, students will apply their computer programming knowledge covered in earlier courses to solve their data-based projects and cases.

Associated program learning outcomes:

- Apply the knowledge and skills needed to perform data science techniques from areas such as statistics, computational programming, and business.

Academic program requirements
Include the required number of semester credit hours (SCH), courses, (course prefix and number, title, SCH) and any special requirements including thesis, internships, practicum, etc.

There are thirty-six (36) credit hours required for the program. There are no additional special requirements.

Overall Program Structure

Prefix	Number	Title	SCH
DATA	6300	Data Understanding	3
DATA	6310	Data Exploration	3
DATA	6320	Predictive Modeling	3
DATA	6330	Model Optimization	3
STAT	6020	Applied Statistics	3
DATA	6500	Cases in Data Science	3
DATA	6550	Data Ethics and Responsibility	3
DATA	6990	Topics Seminar in Data Science	3
Elective Courses for remaining 12 credit hours (Elective Courses are provided in Appendix 1)			12

Existing and new courses
List existing and new courses for the proposed academic program including a catalog description and credit hours for each course.

Existing Courses:

The DATA courses were created as part of the MTSU Graduate Certificate and serve as the foundation for the Master of Science in Data Science program.

Prefix	Number	Title	Catalog description	Credit Hours
DATA	6300	Data Understanding	Applications used to understand the problem-solving process for data science. Data collection and cleansing techniques used to visualize and summarize the data in order to prepare it for modeling for various data types through statistical analysis with Python programming.	3
DATA	6310	Data Exploration	Data science techniques to explore numerical and text data. Unsupervised learning and NLP applications used to explore data to understand its impact and use to make data-driven decisions.	3
DATA	6320	Predictive Modeling	Develop models to predict outcomes through the use of supervised learning techniques. Applications in regression and classification modeling used to develop data driven problem solving to	3

			predict and support decisions and analysis.	
DATA	6330	Model Optimization and Deployment	The optimization and deployment of machine learning models. Techniques for fine-tuning parameters for developing the best model for the presented business problems. Applications through internal and cloud infrastructures also used to identify optimal techniques for deployment of models to operationalize into production.	3
STAT	6020	Applied Statistical Methods	Introductory probability/statistics course or permission of instructor. Contemporary and medical research methodology for biostatistics. Descriptive and inferential statistics including parametric and nonparametric hypothesis testing methods, sample size, statistical significance and power, survival curve analysis, relative risk, odds ratios, chi square modeling, and analysis of variance. Data will be analyzed using statistical software	3

In addition to the required courses, there are several existing courses that will serve as elective options in the program. Given the many areas in which students may want to focus to gain expertise and meet career goals, the program will offer students a variety of elective courses spanning several departments. A full list of existing elective courses is provided in Appendix C.

New Courses:

Four new courses will be created for the proposed program. Three of the courses (DATA 6500, DATA 6550, and DATA 6990) are required. DATA 6500 and 6990 are designed to enhance student learning by applying appropriate techniques to the examination of different datasets from various types of organizations and to provide the opportunity to apply knowledge and skills to complete full-scale data science projects. Additionally, DATA 6500 is designed to integrate the techniques covered in the first year of courses and to apply them to real-world cases; DATA 6990 serves as the capstone course for the program. This course is designed to combine not only the foundational DATA courses but also the various elective courses that the students have taken. The course centers around full-scale projects and oral presentations focusing on the expertise gained by the students throughout the graduate program. DATA 6550 examines the issues and challenges faced when working with data including ethics and data governance. The fourth course, DATA 6700, is an elective course designed to provide students with the opportunity to intensively study a data science discipline under direct faculty supervision.

Prefix	Number	Title	Catalog Description	Credit Hours
DATA	6500	Cases in Data Science (Required Course)	A case course that applies data science techniques to various real-world problems and scenarios. Topics include supervised learning, unsupervised learning, databases, SQL, NoSQL, cloud computing, and data ethics.	3
DATA	6550	Data Ethics and Responsibility (Required Course)	Examines issues and challenges associated with working with data, which includes ethics and bias, as well as data governance and regulatory requirements. This course will also look into practical issues that should be considered prior to modeling and data selection and the need to understand the ramifications after model deployment such as the feedback loop, change in model assumptions, and the predictive power of data modeling.	3
DATA	6700	Independent Study in Data Science (Data Science Elective)	Assigned research or projects in the data science discipline under direct faculty supervision. Topics for intensive study are chosen in joint consultation between student and instructor. Aggregate credits allowable toward a degree may not exceed 3 hours	1 to 3
DATA	6990	Topics Seminar in Data Science (Required Course)	Capstone course. Application of various data science skills with an emphasis on full-scale projects and oral presentations of data collection, analysis, and findings.	3

Program of study

Provide a sample program of study for students completing the program full-time. The sample program of study should include all courses by semester and term for students to complete the proposed program.

Fall Year 1			
Prefix	**Number**	**Title**	**Credit Hours**
DATA	6300	Data Understanding	3
DATA	6310	Data Exploration	3
STAT	6020	Applied Statistics	3
Spring Year 1			
DATA	6320	Predictive Modeling	3
DATA	6330	Model Optimization	3
DATA	6500	Cases in Data Science	3
Fall Year 2			
STAT	5700	Analysis of Large-Scale Data Sets	3
CSCI	6100	Analysis of Algorithms	3
DATA	6550	Data Ethics and Responsibility	3
Spring Year 2			
DATA	6990	Topics Seminar in Data Science	3
CSCI	5850	Neural Nets	3
CSCI	6560	Selected Topics in Database	3
Total Credit Hours			36

The M.S. in Data Science is not a cohort program, and the structure allows students to begin the program in any semester. Courses will be offered in a combination of 7-week and 15-week semesters. BIA and DATA courses are structured in 7-week terms, while CSCI, STAT, ECON, and ASCI are traditionally in 15-week terms.

Assessment and evaluation

Identify who will be responsible for conducting program assessments and evaluations.

The program director will have responsibility for coordinating program assessments. In addition to the program director, a graduate data science faculty committee will be formed consisting of MTSU faculty that teach in the program as well as the program director. This committee will review program assessment and evaluations and implement any necessary changes.

Provide the schedule for program assessments or evaluations including program valuations associated with Quality Assurance Funding, institutional program review, student evaluations, faculty review, accreditation, and employer evaluation. Include copies of relevant documents, rubrics, or other materials in the appendices of the ENAPP.

The Master of Science in Data Science program will conduct regular scheduled external reviews of this program in accordance with university and THEC policies. In order to complete these

evaluations, the program director will work with the MTSU office of Institutional Effectiveness, Planning, and Research (IEPR), which is responsible for overseeing external program reviews. IEPR conducts the following institutional surveys which will provide broad feedback about overall institution perceptions: Faculty Survey of Student Engagement, Alumni Survey, Graduating Student Survey, Job Placement Survey, and the Adult Learner Survey. References to these items may be obtained on the MTSU website.[1]

In addition to the institutional surveys, MTSU conducts student evaluations of faculty and the courses at the end of each semester. These evaluations will be provided to the program director. An example of the questions included in the MTSU course evaluation survey are provided in Appendix D.

To gauge student learning, DATA 6990 serves as the capstone for the program and a final opportunity to assess student learning. Projects and presentations will be evaluated by faculty based on a rubric that measures content knowledge, problem solving ability, communication, and professionalism. See the example rubric provided in Appendix E.

Student retention and graduation rates will be monitored by the program director.

Employment of graduates will be tracked and analyzed by the program director through a program-specific survey. This information will identify program strengths, student placements, as well as potential growth opportunities for future placement efforts.

The program director will work with the MTSU Data Science Institute and employers of students that complete the Master of Science in Data Science program to assess that market skills required of hires are being met by the information covered in the program.

Section III: Students

Academic standards

Clearly state the admission, retention, and graduation standards, which should align with institutional or governing board policy.

Master of Science in Data Science admission, retention, and graduation standards include the established requirements of MTSU. The university requirements for graduate admission be found at https://www.mtsu.edu/graduate/apply.php. The university policies for retention and graduation standards can be found at http://catalog.mtsu.edu/mime/media/31/3476/2020-21_GraduateCatalog.pdf (pages 31-32 for retention and pages 38-39 for graduation).

The Master of Science in Data Science program has the following additional admission requirements:

- A bachelor's degree from an accredited institution with a minimum cumulative GPA of 2.75
- A resume or curriculum vitae

[1] Please see https://www.mtsu.edu/iepr/ for additional details on the review process provided by the MTSU Office of Institutional Effectiveness, Planning and Research (IEPR)

- Satisfactory scores from the Graduate Record Examination (GRE) or the Graduate Management Admission Test (GMAT). The GRE/ GMAT requirement may be waived for applicants meeting any of the following conditions:
    - an earned bachelor's degree from a regionally accredited college or university with a GPA of 3.00 or higher;
    - an earned graduate or professional degree from a regionally accredited college or university.

Marketing and recruitment

Provide a plan that outlines how the proposed program will market and recruit a diverse population of students including underserved and historically underrepresented students and is aligned with the proposed implementation timeline.

Our focus is on doing the very best we can to prepare MTSU students for their chosen path, whether that be to achieve additional academic credentials or to move into the highly competitive data science workforce. The vision for the M.S. program in Data Science is to focus on two different student populations: 1) those interested in continuing their education in a Ph.D. program, and 2) those interested in obtaining the skills needed to be competitive in the workforce immediately upon graduation. Given the close relationship between the M.S. and Ph.D. program (faculty/staff/graduate students) and the large number of flexible elective courses already available, we feel confident that those students focused on obtaining a Ph.D. will be well prepared. In a similar fashion, for those students focused on employment after graduation, we are purposefully engaging industry experts to help in the development of courses, to participate on panel discussions, and to teach courses. Our students will be well versed in the academic vision of data science and prepared for an ever-changing workforce environment. Additionally, the M.S. in Data Science will ensure students have a strong foundation in 1) predictive modeling and 2) the real-world applications of data science. This combination was developed based on numerous conversations with external advisors and industry experts to ensure that our students will be well-prepared to enter the workforce as effective and versatile data scientists. With a focus on these two areas (as reflected by mandatory courses in the curriculum), combined with a high diversity of elective courses, our program will be known for producing graduates that are job-ready immediately upon graduation.

The Data Science Certificate program is one of the ideal pipelines for students to enter the Master of Science in Data Science program. Our student survey found that 15 out of 18 current graduate certificate students selected “very likely” or “likely” when asked if they would pursue a master’s degree in data science at MTSU, indicating a strong level of interest. As such, students in this program will be provided information about the graduate program and curriculum. Relatedly, MTSU PhD students may be interested in the master’s program. Our survey found 11 out of 18 current PhD students selected “very likely” or “likely” when asked if they would pursue a master’s degree in data science as part of their PhD curriculum. The program director will work with the various PhD programs to share information about the new graduate degree. This program is also a perfect complement to many undergraduate programs at MTSU; therefore, the program director will work closely with the Division of Marketing and Communications as well as advisors to ensure current students are aware of the new graduate opportunity. Finally, working professionals that are looking to advance their knowledge to further their careers may be interested in the proposed graduate program. The program director plans to work closely with the Data Science Institute, which has established business connections both within Tennessee and throughout the country. Joint work and promotion will enhance marketing of the new program.

To achieve the above stated goals, the program director will

- Work with the MTSU Division of Marketing and Communications to craft press releases.
- Work with Creative Marketing Solutions at MTSU to develop web page, video, and print materials.
- Create brochures and banners for recruiting events.
- Meet with College of Graduate Studies recruiters to provide information on the new degree.
- Develop and implement social media platforms and online marketing strategy.

The program director will also work with organizations within the community, specifically the Nashville Technology Council, to promote the data science offerings at MTSU. Through these partnerships, initiatives to promote to underrepresented students will be a priority. Specific examples of organizations with which the program will collaborate include Blacks in Technology and Women in Technology of Tennessee (WiTT).

Student support services
Provide an overview of student support services that will be available to students in the proposed program (e.g., academic advising, tutoring, internship placement, career counseling, or others).

The program director serves as the primary academic advisor and career counselor for the graduate students in the program. In addition, several MTSU offices are designated to support both academic and career concerns of graduate students. The MTSU Career Development Center offers career advising, professional development guides, internships, and job search support, as well as career fairs. The College of Graduate Studies offers academic and campus resources for prospective, current, and graduating students in MTSU graduate programs. This office also provides orientation materials as well as commencement information. Graduate assistants will also be available to tutor new students as they progress through the program.

Additionally, the Data Science Institute is a support mechanism that provides opportunities for research and project experience but more importantly, it provides necessary outreach to businesses and the community. The need for projects and data, as well as connections to data scientists, is possible through the Data Science Institute. A recent example of this collaboration can be seen with the DATA 6330 course. It includes a semester long project that requires data and a meaningful project to provide the best experience for the student. The Data Science Institute provided a connection to the Second Harvest Food Bank providing students direct access to their Director of IT and Director of Operations. Students were also able to access their facility to see how their analysis of the organization's data would make a difference.

In collaboration with the Data Science Institute, there will be advisory functions available to support the academic degrees in data science. Internally, there is an advisory group comprised of deans from the College of Business, College of Graduate Studies, and the College of Basic and Applied Sciences. Additionally, there will be an external advisory group comprised of key community education partners. Other collaboration and affiliation roles may be possible using faculty fellows (faculty with direct affiliation with the Data Science Institute) and professors of practice (industry professionals working with data science to teach, mentor, and advise students).

Describe how the proposed program will ensure student success for all students, especially underserved and historically underrepresented students.

The program director will serve as a resource to ensure that students are progressing through the program. DATA 6300, 6310, 6320, and 6330 all end with a "data dive" where students work together on real-world data which will help to ensure the learning goals are being met and to determine how students are progressing through the program Lastly, the program director and faculty will meet with students regularly to answer questions and provide an opportunity for students to interact and network outside of the classroom. Additionally, students will have access to robust tutoring resources from existing departments. We anticipate, as the program progresses, using graduate assistants to provide specific tutoring support for DATA courses.

As mentioned in the Marketing and Recruitment section, the program director and faculty will work with organizations within the community and through these partnerships, initiatives to support to underrepresented students will be a priority. Graduate assistantships provide financial support for qualified applicants and underserved students.

Section IV: Instructional and Administrative Resources

Faculty resources
Current and anticipated faculty resources should ensure a program of high quality. The number and qualification of faculty should meet existing institutional standards and should be consistent with external standards.

Current faculty
Using the - Current Faculty Roster table, list the name, highest degree, rank, and primary department, full-time or part-time status, and percent of time to be devoted to the proposed program. If the proposed academic program is at the graduate level, designate graduate faculty status with an asterisk (*).

Please identify the faculty member who will have direct administrative responsibilities for the proposed program as "PD" after the faculty member's name.

There are currently several faculty at MTSU that teach in the area of data science or that teach electives which will be used in the proposed program. These individuals are listed in Table 1; the percentage of time provided is a general estimate representing participation in the program. We anticipate participation by these and similar faculty in the disciplines listed as well as expanded participation by faculty in other colleges on campus in support of the master's in data science. Our vision is to have a robust set of faculty from across campus interacting with our students both in and out of the classroom. Given that data is now infused across all business sectors and academic disciplines, our goal is to ensure students have firsthand experiences with a variety of faculty utilizing data science tools in their research. Previous discussions with faculty across different colleges and departments focused on their interest in classroom activities related to data science (e.g., potential class instructors, guest lecturers, panel discussions), as well as collaborations with students outside of the classroom. Examples of such out-of-classroom engagements included connecting with students through formal (e.g., Honor's College Theses) and informal (e.g., Data Dives, Data Hackathons, Deep Racer Events) projects. A specific set of potential project ideas involving faculty from the humanities included the use of natural language processing to aide in the interpretation of controversial news articles or historical documents. These projects would focus on the use of data science tools that would both increase the speed of processing written/typed text and allow for comparative analysis across a large number of documents.

Table 1 - Current Faculty Roster

Current Faculty Roster					
Faculty Name	**Highest Degree**	**Rank**	**Primary Department**	**Full-time or Part-time**	**% of Time Devoted to Program**
Qiang Wu (Program Director)	PhD	Professor*	Information Systems & Analytics	Full	20%
Lisa Green	PhD	Associate Professor*	Mathematical Sciences	Full	10%
Cen Li	PhD	Professor*	Computer Science	Full	10%
Ryan Otter	PhD	Professor*	Biology	Full	*
Josh Phillips	PhD	Associate Professor*	Computer Science	Full	10%
Zhijiang Dong	PhD	Professor*	Computer Science	Full	10%
Jaishree Ranganathan	PhD	Assistant Professor*	Computer Science	Full	20%
Ramchandra Rimal	PhD	Assistant Professor*	Mathematical Sciences	Full	20%
Sara Shirley	PhD	Assistant Professor*	Economics & Finance	Full	10%
Jeff Stark	PhD	Assistant Professor*	Economics & Finance	Full	10%
Scott Seipel	PhD	Associate Professor*	Information Systems & Analytics	Full	*
John Wallin	PhD	Professor*	Physics & Astronomy	Full	10%

- 10% equates to 1 class per year
- 20% equates to 1 class per semester
- * is for faculty that currently teach in the Graduate Certificate in Data Science, no additional expectations are expected for these faculty
- Not listed are faculty that will have less than 10% commitment and do not teach in the Graduate Certificate in Data Science

Anticipated faculty

- *Using the - Anticipated Faculty and Instructional Staff table, list the additional faculty likely needed during the next five years for successful implementation of the proposed program. For each proposed faculty hire, provide full-time or part-time status, anticipated salary (excluding benefits), anticipated start date, and any pertinent comments.*

MTSU currently offers many of the graduate courses required in the program and has qualified faculty to instruct and lead the program. Although there is expertise on campus to offer the needed classes, we do expect that additional faculty will be needed to offer additional sections of classes. We anticipate two new faculty hires. These full-time faculty positions are essential to

ensure qualified faculty coverage of the graduate courses and to support the overall quality and success of the program. One full-time faculty member is projected to start in the first full year of the program (Fall 2022). The second full-time faculty member is planned to be hired in year 5 of the program. The later start date for this faculty coincides with the expected increase in enrollment in the program over time.

The Master of Science in Data Science does not plan to use adjunct faculty to teach graduate courses; however, adjunct faculty will be used to cover introductory undergraduate courses and to provide release time for graduate faculty to participate in the graduate program. Existing graduate courses may require additional sections because of the introduction of the proposed program. The program director for the Master of Science in Data Science is expected to receive a course release in the fall and spring semesters as well as a summer stipend.

Table 2 - Anticipated Faculty and Instructional Staff

Anticipated Faculty and Instructional Staff				
Faculty Rank or Job Title	**Full-time or Part-time**	**Anticipated Salary**	**Anticipated Start Date**	**Comments**
Assistant Professor	Full-time	**$120,000**	Fall 2022	This faculty member is important to cover the minimum required courses needed to support the new graduate program. Expertise in data science will allow for the new faculty to teach any of the required data science courses.
Assistant Professor	Full-time	**$80,000**	Fall 2026	As the program grows, an additional full-time faculty is required to ensure the program has the necessary full-time graduate faculty to support the program. Expertise in data science will allow for the new faculty to teach any of the required data science courses.
Adjunct Faulty	Part-time	**$4,800**	Fall 2022	This adjunct faculty member would cover two undergraduate courses (one in fall and one in spring), releasing time for the program director.
Adjunct Faulty	Part-time	**$4800**	Fall 2022	This adjunct faculty member would cover two undergraduate courses (one in fall and one in spring), releasing time for a full-time faculty to teach in the graduate program.
Adjunct Faulty	Part-time	**$4,800**	Fall 2022	This adjunct faculty member would cover two undergraduate courses (one in fall and one in spring), releasing time for a full-time faculty to teach in the graduate program.

Non-Instructional staff

Using the - Anticipated Non-Instructional Staff table, list the additional Non-Instructional Staff needed during the next five years for successful implementation of the proposed program. For each proposed non-instructional hire, provide full-time or part-time status, anticipated salary (excluding benefits), anticipated start date, and any pertinent comments.

We do not anticipate using new non-instructional staff.

Table 3 - Anticipated Non-Instructional Staff

Anticipated Non-Instructional Staff				
Job Title	**Full-time or Part-time**	**Anticipated Salary**	**Anticipated Start Date**	**Comments**
N/A				

Section V: Institutional Capacity to Deliver Proposed Program

In assessing institutional capacity to deliver the proposed program, provide a narrative explanation of existing and needed resources. Additionally, provide the cost projections for one-time and recurring expenditures in the Estimated Costs to Deliver the Proposed Program table below. ***Please note:*** *the narrative must align with the projected costs provided in the Estimated Costs to Deliver the Proposed Program table.*

Accreditation

Describe any costs associated with regional and/or programmatic accreditation during the planning and first five years for successful implementation of the academic program.

Middle Tennessee State University is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award baccalaureate, masters, and doctorate degrees. Given that data science is a relatively new academic field, there is not currently a discipline-specific accreditation for these programs.

Consultants

Provide a summary of anticipated consultant needs and associated costs during the planning and first five years for successful implementation of the academic program.

An external reviewer is required as part of the THEC evaluation process. The reviewer was paid a $1500 honorarium for the work. Additional consultants will not be needed for the implementation of this program.

Equipment

Assess the adequacy of the existing equipment available for the proposed academic program. Include physical equipment, computer facilities, special classrooms, etc.

The proposed graduate program will utilize existing computer classrooms and campus computer labs. As the classrooms and computer labs already exist, no new physical equipment, computer facilities, or special classrooms are needed. Furthermore, a data-driven degree does provides the opportunity to use open-source resources and cloud computing which will support the program;

the MTSU Data Science Institute has access to cloud computing that may be utilized for research and student projects as well.

Describe additional equipment needed during the planning and first five years for successful implementation of the academic program.

Computer and office equipment will be required for each new full-time faculty hire. This one-time cost covers all the technology needs for the new faculty hired to teach in the program. Coinciding with the new faculty hires, these one-time expenses will occur in year one and year five and will be equal to $5,000 each.

Information technology
Describe current information technology resources available to support the program.

Existing classroom and laboratory facilities are adequate to implement this proposed degree program, and no additional laboratory or space needs are required. The program will also have access to additional technology such as cloud computing resources and a network cluster through the Data Science Institute.

Describe additional information technology acquisitions needed during the planning and first five years for successful implementation of the academic program.

No additional information technology acquisitions are needed.

Library resources
Provide an overview of the current library resources available to support the proposed program. This might include a summary or listing of the appropriate monographs, serials, databases, and online resources that are held by the campus or college libraries to support the proposed program.

We require no additional library resources to support this program. The library currently provides journals, datasets, and other material relevant to the data science field. Furthermore, the MTSU Data Science Institute provides business partners and datasets which will be used in conjunction with the master's degree in data science and potentially with student and faculty research projects.

Describe additional library acquisitions needed during the planning and first five years for successful implementation of the academic program.

No additional library resources are needed.

Marketing
Outline any anticipated costs associated with the marketing for the proposed program during the planning and first five years.

As discussed in the Marketing and Recruitment section, a variety of marketing platforms will be used to advertise the Master of Science in Data Science degree. Aspects that have an associated

cost include:

- Work with MTSU Division of Marketing and Communications to craft press releases.
- Work with Creative Marketing Solutions at MTSU to develop web page, video, and print materials.
- Create brochures and banner for recruiting events.
- Develop and implement social media platforms and online marketing strategy.

The annual anticipated marketing budget is:

Marketing Costs	**Planning Year**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Marketing	$2,500	$2,500	$2,000	$1,500	$1,500	$1,500
Sub-Total Marketing	$2,500	$2,500	$2,000	$1,500	$1,500	$1,500

Facilities
Describe facilities that will support of the proposed program. For existing space and facilities, briefly describe the type(s) of space and facilities (e.g., a listing of the number and types of classrooms or labs, student offices or spaces, etc.).

There are two new graduate DATA courses that will be offered on campus in computer-based classrooms: DATA 6500 and DATA 6990. The courses will be offered in the evening to accommodate working professionals when there is also less demand on classroom space. MTSU has 64 student computer classrooms on campus that may be used for these courses.[2] The four existing DATA courses and the new independent study course (DATA 6700) do not require facilities as they will be offered as online or remote delivery courses.

The data science undergraduate program obtained space in the Midgett Building on the MTSU campus. This space will support both the undergraduate and graduate program. It has room for the administrative assistant (funded through the undergraduate program) as well as space for graduate assistants.

For new or renovated facilities, clearly outline them and include the amount and type of space, costs identified, and source(s) of funds to cover costs.

The program is not using any new or renovated space.

Travel
Provide a summary of anticipated travel expenses during the planning and first five years.

Travel is fixed at $7,500 per year. This includes funds to support program administration and recruitment. It also includes funds for faculty to attend discipline-related conferences ensuring they are informed of the most recent developments in both academic and industry topics. MTSU is planning to participate in the 2021 Academic Data Science Alliance prior to the projected start of the program. The goal is to keep our faculty and leadership engaged in data science and committed to advancement of the discipline.

[2] The classroom information may be found at https://www.mtsu.edu/usm/classpage.php

Other resources

Describe other support resources available to support the program. Describe additional support resources that may be needed during the planning and the first five years for successful implementation of the academic program.

Graduate assistants are an integral part of a master's program and assist graduate faculty with research and classes. Graduate assistants in their second year of the program may also serve as tutors for students in their first year of the program. The graduate students significantly benefit from graduate assistant positions, both financially and through the experience gained working with the faculty member. Furthermore, potential graduate teaching assistants gain additional experience within the classroom setting. As mentioned previously, this program plans to recruit and support underserved students. The assistantship positions may provide some students with the opportunity to pursue this degree when they otherwise may not be able to afford it.

MTSU offers graduate assistant positions with both 9-month and 12-month contracts. To allow for flexibility with the graduate assistants, we are asking for a combination of graduate assistantships, with the number of positions increasing after year 2 as the program and enrollment increase. After year 5, the number of graduate assistantships would remain fixed at the year 5 level.

Graduate Assistants	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Number of 12-month GA	1	1	1	2	3
Number of 9-month GA	2	2	3	3	3
Salary	$22,977	$22,977	$29,877	$39,054	$48,231
Tuition and Fees	$32,775	$32,775	$43,125	$55,200	$67,275
Sub-Total Graduate Assistants	$55,752	$55,752	$73,002	$94,254	$115,506

Table 4 - 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**
Accreditation						
Consultants	$1,500					
Equipment		$5,000				$5,000
Information Technology						
Library						

Marketing						
Facilities						
Travel						
Other						
Total One-Time Expenditures	$1,500	$5,000				$5,000
Recurring Expenditures						
Category	**Planning**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Accreditation						
Consultants						
Equipment						
Information Technology						
Library						
Marketing	$2,500	$2,500	$2,000	$1,500	$1,500	$1,500
Facilities						
Travel		$7,500	$7,500	$7,500	$7,500	$7,500
Other: Graduate Assistants		$55,752	$55,752	$73,002	$94,254	$115,506
Total Recurring Expenditures	$2,500	$65,752	$65,252	$82,002	$103,254	$124,506
Grand Total (One-Time and Recurring)	$4,000	$70,752	$65,252	$82,002	$103,254	$129,506

Appendices

Appendix A

RUTHERFORD COUNTY
chamber commerce
TENNESSEE

October 8, 2020

Charlie H. Apigian, PhD.
Interim Director of the Data Science Institute
Professor of Information Systems & Analytics
Jones College of Business
Middle Tennessee State University
MTSU Box45
Murfreesboro, TN 37132

Dear Dr. Apigian,

I am writing in strong support of the development of a Master of Science in Data Science degree at Middle Tennessee State University.

Rutherford Works, the Economic and Workforce Development division of the Rutherford County Chamber of Commerce, has been working with our local employers for the past four years to help identify technical skills gaps and, with our educational partners help, to develop educational solutions which train students of all ages for the high wage, high demand jobs currently available in our community. We term this work Pathways Development. Information Technology is one of our high 5 (wage, growth, employment) industry sectors. Based on the number of job openings and the projected job openings specifically for business and data analysts in the next 5-10 years, there is great opportunity and need for additional programming.

The addition of a master's level program to the newly created undergraduate degree in data science makes perfect sense in our continued work to expand career pathways that have multiple entry and exit points for students. This data science pathway is relevant to not only IT employers but to our other critical business sectors including construction, health care, manufacturing, and supply chain management. Effectively using the data businesses collect to impact KP ls is becoming a critical business function and the demand for talent to fill these positions is only going to increase. MTSU is poised to be the go-to university in Tennessee and perhaps the country for this talent.

In my capacity leading the Rutherford Works Workforce Development strategic imperatives, I look forward to working with MTSU to continue to develop new programs of study that provide opportunity for our students and provide a well-trained workforce for our employers.

Sincerely,

K. Beth Duffield
Senior Vice President, Education and Workforce Development
Rutherford County Chamber of Commerce

Healthcare Bluebook

October 12, 2020

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

To Whom it May Concern,

The motivation for businesses in the state of Tennessee and nationally to glean value from data is growing dramatically even in the backdrop of a pandemic, with Data Science cited as the top job by both LinkedIn and Glassdoor. Further, the U.S. Bureau of Labor Statistics cites mean annual salaries in excess of $100,000. These taken together point to an exciting time of growth for Data Science across our state's industries, and as such, the ability for our schools, colleges, and universities to prepare our students for data-focused careers is increasingly critical.

Since its inception in 2018, the Data Science Institute at Middle Tennessee State University (MTSU) has been positioned as both a state and national leader in Data Science education, having strategically developed programs across a wide spectrum, from K-12 initiatives to a B.S. degree in Data Science to partnering with the Ph.D. in Computational Science program to develop a Data Science concentration. Under the passionate leadership of Drs. Charles Apigian and Ryan Otter, Data Science education at MTSU is widely recognized as a sought-after program that strives and succeeds in offering relevant training and curriculum for an ever-changing landscape of Data Science across industries.

To complete their educational pipeline, I am writing in support of the development of a Master of Data Science program at MTSU. Master's level education is an integral part of the educational pipeline that feeds technology jobs and subsequently grows our workforce. As I have witnessed in the healthcare sector, jobs that are created across our state require a broad skill set from fundamental skills, to more advanced research and hypothesis testing skills. Masters education fills a critical gap between B.S. and Ph.D. degrees and provides students with advanced training in a cost- and time-effective manner. As the tech sector flourishes in West, Middle, and East Tennessee, creating opportunities to provide students with congruent training to meet the demands of businesses is instrumental to our state's economy and technology growth. MTSU has my full support in this endeavor with time, expertise, and/or other resources that I can offer in assistance.

Sincerely,

Lindsey M. Clark, Ph.D.
Senior Data Scientist
Healthcare Bluebook

juiceanalytics
www.juiceanalytics.com | 209 10th Avenue South, Suite 450, Nashville TN 37201

October 4, 2020

Zach Gemignani
CEO and co-founder, Juice Analytics
209 10th Avenue South, Suite 450
Nashville TN 37201
(202) 251-7750

Charlie H. Apigian, PhD.
Interim Director of the Data Science Institute
Professor of Information Systems & Analytics
Jones College of Business
Middle Tennessee State University
MTSU Box 45, Business and Aerospace N337
(615) 898-2375

Dear Professor Apigian,

I am writing this letter to express my support for the Master of Science Degree in Data Science at MTSU.

I am the co-founder and CEO of Juice Analytics, a Nashville-based data visualization software company. We work with clients locally and nationally who are using data to empower their businesses. As a result, we have developed an understanding of the needs of enterprises in their use of data science and analytics. There are a couple critical elements that employers need that I believe are well supported by the proposed Master of Science Degree in Data Science:

- The MTSU data science leadership team appreciates the value of communicating data. Data Science students need to learn how to present the results of their analysis to decision-makers in a way that encourages engagement and action.
- Similarly, the curriculum of the program emphasizes practical experience in connecting data science to business problems. You are encouraging building contextual knowledge that can be applied to data science problem solving.

Over last six years, I've been committed to building a stronger analytics community in the middle Tennessee region. I see an opportunity to make our region a hub for data and analytics solution providers and data-driven enterprises. The MTSU Data Science Institute is a foundational piece of this data community. The MTSU leadership recognizes the need to

grow the talent from K-12 students through a PhD program, and the Masters Degree is a necessary part of that vision.

Thank you for supporting this vision.

Best regards,

Zach Gemignani
CEO, Juice Analytics

Megan A. McGee, FSA
Director, Data Science
Clinical Operations Group

October 4, 2020

Charlie H. Apigian, PhD.
Director of the Data Science Institute
Professor of Information Systems & Analytics
Jones College of Business
Middle Tennessee State University
MTSU Box 45, Business and Aerospace N337

Dear Charlie H. Apigian, PhD.,

I am writing to recommend that Middle Tennessee State University offer a Master of Science degree in Data Science. As the Director, Data Science at HCA Healthcare, I am responsible for the hiring and development of the data science team. One struggle in the current data science job market is that there are many candidates interested in data science, but few have demonstrated the scientific rigor needed for our data science positions.

A Master of Science degree in Data Science will provide well-defined and in-depth training in data science. This type of program will teach students both the theory and applications of data science. In addition, with candidates from varied backgrounds switching to data science, a Master of Science would address gaps in knowledge, producing candidates with well-rounded and advanced knowledge in math and statistics, programming, and analytics. Providing this advanced degree is needed to achieve a complete pipeline for data science education.

I strongly support the offering of a Master of Science degree in Data Science by Middle Tennessee State University.

Sincerely,

Megan A. McGee, Director, Data Science, HCA Healthcare

1 Park Plaza
Nashville, TN 37203
HCAhealthcare.com

To Whom It May Concern,

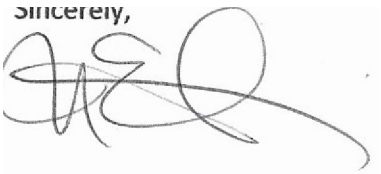
I recommend Middle Tennessee State University offers a Master of Science degree in Data Science. As the Director of Data Engineering at Bridgestone Americas there is a growing demand for data science within our team and with a high growth demand for the foreseeable future.

While there are many candidates interested in data science in the current job market, few have demonstrated the scientific rigor needed for our data science positions. A Master of Science degree in Data Science will provide well-defined and in-depth training in data science. This type of program will teach students both the theory and applications of data science. In addition, with candidates from varied backgrounds switching to data science, a Master of Science would address gaps in knowledge, producing candidates with well-rounded and advanced knowledge in math and statistics, programming, and analytics. Providing this advanced degree is needed to achieve a complete pipeline for data science education.

This program also gives our organization the option of working directly with the students on real world projects that will allow them to gain insight into how to addres_s, define, and solve a problem using data.

I strongly support the offering of a Master of Science degree in Data Science by Middle Tennessee State University.

Sincerely,



Laine Hiera
Director of Data Engineering
Bridgestone Americas

HRIDGESTOHE

Solutions for your journey

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DEPARTMENT OF HUMAN SERVICES
JAMES K. POLK BUILDING
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TTY: 1-800-270-1349
www.tn.gov/humanservices

BILL LEE
GOVERNOR

TONY MATHEWS
COMMISSIONER

From: Assistant Commissioner Gary Wilson, Department of Human Services (TDHS), QISS

To: Dr. Charles Apigian, Middle Tennessee State University

Re: Letter of Support for MTSU Master of Science in Data Science Program

To whom it may concern,

I am writing to recommend that Middle Tennessee State University offer a Master of Science degree in Data Science. As the Assistant Commissioner of Quality Improvement and Strategic Solutions at TDHS, I know of the growing need for data science for our team and for the future of the development of data scientists.

TDHS is willing to aid in this endeavor by offering support for a Master of Science degree in Data Science at MTSU and being willing to work with MTSU on possible student projects. Providing this advanced degree is needed to achieve a complete pipeline for data science education. This program also gives our organization the option of working directly with the students on real world projects that will allow them to gain insight into how to address, define, and solve a problem using data.

I strongly support the offering of a Master of Science degree in Data Science by Middle Tennessee State University.

Best,

TN Department of Human Services

Gary Wilson | Assistant Commissioner
Quality Improvement and Strategic Solutions
James K. Polk Building, 17th Floor
505 Deaderick St, Nashville, TN 37243
p. 615-770-6936 c. 615-772-4317
gary.wilson@tn.gov
tn.gov/humanservices

FEASIBILITY STUDY

M.S. in Data Science

OCTOBER 2020

MIDDLE TENNESSEE STATE UNIVERSITY

JONES COLLEGE OF BUSINESS

Business and Economic Research Center

We evaluate the feasibility of offering a Master's of Science degree in Data science at MTSU. We look at likely student demand to enter such a program, and then at the employment prospects for those leaving with a degree.

Student Interest

We assess student interest in a data science master's program using several measures. We first look at the trend in the number of master's degrees awarded in the fields most similar to it. Then we examine the trend in the number of data science programs. Finally, we make use of a survey delivered to MTSU students to evaluate campus interest in this proposal.

The field of data science is new enough that the number of degrees being awarded in it is not yet being tracked. (The National Center for Educational Statistic's CIP code for data science only came into existence in 2020. Few institutions have as yet re-enumerated their programs to match the new classification.) We thus make use of the CIP codes with which data science master's programs currently identify themselves. Figure 1 shows the trend in degrees awarded in the combined seven CIP codes used by almost all data science programs. (See Appendix 1 for the list of codes.)

The rapid increase in degrees awarded is apparent. Note that the upward trend has steepened after 2014. The University of California system is a rare instance where students in data science master's programs have been explicitly tracked over time. Its most recent disciplinary-trends planning document anticipates substantial growth in data science.[1]

The document provides a time-series of master's enrollments in its system since 1999. The trend it displays mirrors that of Figure 1, with a similar inflection point (2013).

Only one Tennessee institution has had a program very related to data science for any length of time. But the experience the UT Knoxville Master's in Business Analytics similarly demonstrates the sharp rise in student interest in this area (see Figure 3).

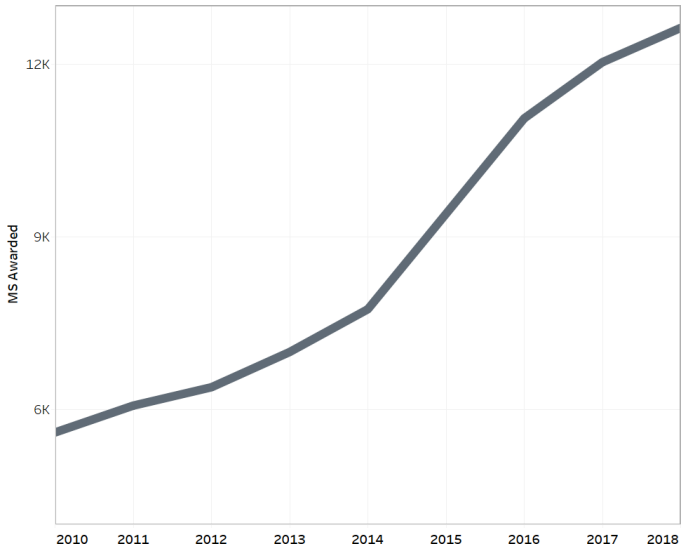
The rise of data science is also confirmed by the increase in master's programs across the United States. New York University began the world's first such program only in 2013.[2] There are now about sixty such programs, an annual growth of over eight a year. To these, we can add over twenty other colleges or universities that offer master's programs that have concentrations in data science and another forty with graduate certificates in this field.[3] A broader list of programs that includes Data Analytics shows that almost one hundred master's programs have been initiated in well less than a

[1]University of California, Office of the President. Institutional Research and Academic Planning, *2018-2023 Five-Year Planning Perspectives*. https://www.ucop.edu/institutional-research-academic-planning/content-analysis/academic-planning/five-year-planning-perspectives.html. Accessed October 8, 2020.

[2]https://www.kdnuggets.com/2014/06/nyu-data-science-program-overview.html

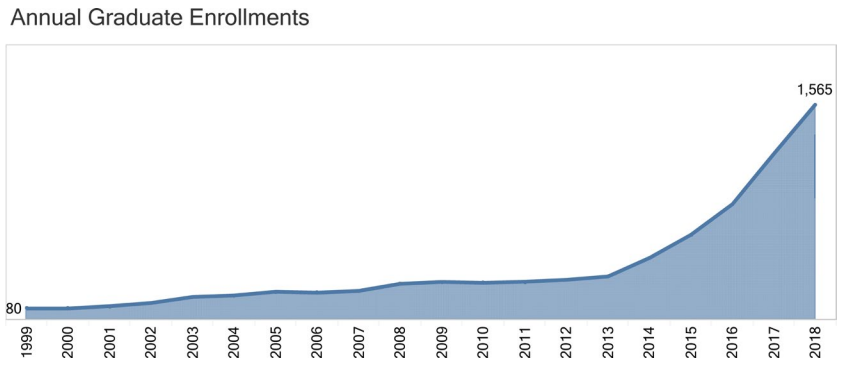
[3]These counts come from "Master's in Data Science" https://www.mastersindatascience.org/schools/ and "Skooville https://skoolville.com/blog/us-universities-master-of-science-in-data-science/. Both consulted October, 8, 2020. These two sources have very similar but not exactly the same lists of programs.

Figure 1: Trend in Master's Degrees Awarded in Data Science Fields



Source: National Center for Education Statistics, IPEDS data. https://nces.ed.gov/ipeds/use-the-data

Figure 2: The University of California System's Degree Growth



Source: The University of California, Institutional Research and Academic Planning, "Disciplinary Trends in Graduate Degree Program Proposals," 1999-2018. https://www.ucop.edu/search/?q=disciplinary+trends

Figure 3: M.S. in Business Analytics Awarded at UT/ Knoxville

Source: University of Tennessee Enrollment Report, https://sas.utk.edu/SASVisualAnalyticsViewer/VisualAnalyticsViewer_guest.jsp?reportName=Self-Service+Enrollment+Report&reportPath=/World/World+Reports/FB/

decade.[4] The growth in programs is, if anything, accelerating. The California 2018-23 five-year plan, referred to above, expects six of its campuses to inaugurate data science master's programs over this period.

MTSU Student Interest

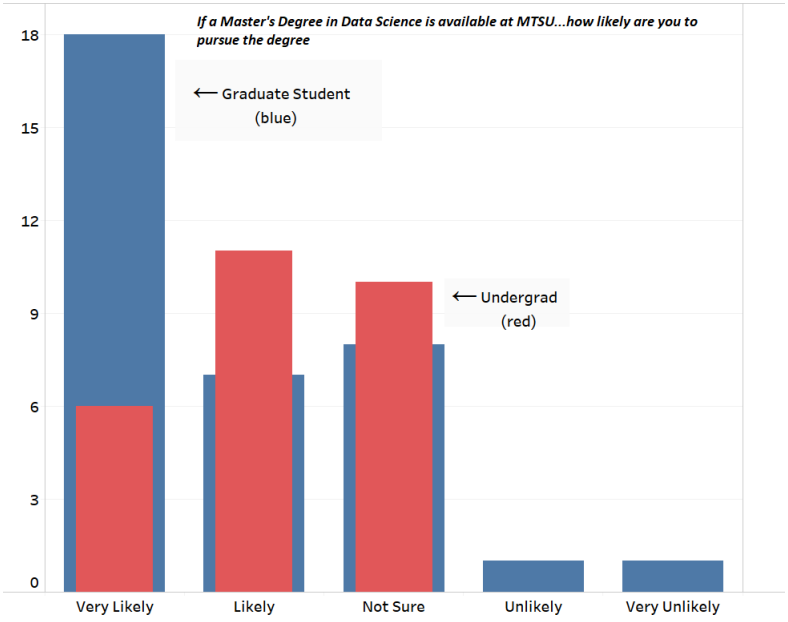
MTSU began both an undergraduate major and a graduate certificate program in fall 2020. The initial semester saw 24 students choose this major and 22 students enter the certificate p rogram. Both numbers signal evident student interest in data science. Note that enrollment in the latter program was substantially larger than at the two other mid-state graduate certificate programs that were inaugurated recently.[5]

To further confirm student interest at MTSU, 65 students were surveyed under the current rather difficult c ircumstances. Thirty-six are graduate students across a wide number of programs (Natural science, Liberal Arts, Business, etc.), including eighteen earning the Graduate Data Science Certificate. Twenty-nine are undergraduates, mostly in computer science or data science.

[4]from "Master's in Data Science" *op cit* and Ilan Reinstein, "Best Masters in Data Science and Analytics in US/Canada" and Gregory Piatetsky "Best Online Masters in Data Science and Analytics," both at KD Nuggets, https://www.kdnuggets.com/2017/11/best-masters-data-science-analytics-us-canada.html/2. Accessed October 7, 2020.

[5]APSU and UT/Chattanooga. Based upon their enrollment dashboards. https://www.apsu.edu/dsir/institutional-data.php; https://new.utc.edu/academic-affairs/planning-evaluation-and-institutional-research/institutional-dashboards/enrollment

Figure 4: MTSU Student Survey



As can be seen, the overwhelming number of both groups of students expressed interest in a potential master's program. Remarkably few indicated that they had no interest.

Tennessee Alternatives

Options for Tennesseeans wishing to pursue a graduate degree in this field are limited. A number of institutions do offer Graduate Certificates in Data Science, and both Trevecca Nazerene and the University of Tennessee/Chattanooga offer master's in other disciplines with a data science or data analytics concentration. All of these programs are characterized by a relatively low number of hours in data science *per se*. Students are typically required to take between 12 and 18 hours of graduate data science courses. Unfortunately, the employment recruitment agency Burch Works found 94 percent of sampled data scientists to hold at least an M.S. degree.[6] For students seeking that level of training, there currently are but three approved M.S. degrees available in this state. Vanderbilt University began its program last year. Its first class has thirty-one students. It is a highly competitive program. Lipscomb University has the operating

[6]"Salaries of Data Scientists and Predictive Analytics Professionals. August, 2020. https://www.google.com/search?client=firefox-b-1-d&q=The+Burch+Works+Study+%E2%80%9CSalaries+of+Data+Scientists+and+Predictive+Analytics+Professionals%2C+August+2020. Accessed October 8, 2020.

other state program in Tennessee, while the University of Memphis has recently gained approval for an MS degree as well. Tennessee State University is proposing to add a fourth, however it will be exclusively online. We see the dearth of state programs in the statistics. The National Center for Educational Statistics reports that in 2018, 11,628 master's degrees were awarded nationally in the CIPs programs used for data science programs. Fifty-one of those were in Tennessee.[7] An MTSU program would be the only the second public on-ground master's program in this discipline.

The sizable growth in student interest and the relative lack of existing programs to meet it within Tennessee seems evident. The MTSU survey confirms that our students are in line with the national trend. There is every reason to expect a new master's program in this field to attract applications similar to those of its other data science programs.

Employer Demand

It is likely no surprise that data scientists are in high demand. The website Quanthub estimates there are three data science job postings for every person searching for one.[8] In 2018, The LinkedIn Workforce Report found an astounding shortage of 151,717 people with "data science skills."[9] A 2016 McKinsey report eclipses even this number, projecting a shortfall that could reach 250,000.[10] The cofounder of LinkedIn, at a Wharton seminar, claimed that five of the top fastest growing jobs in the U.S. are in data science or machine learning.[11] In 2019 the job search site Glassdoor listed data science as its "Best Job in America" and in 2020 placed it third.[12] Its competitor, careercast.com, also listed data science as the top job in 2019, projecting nineteen precent growth.[13] The third site, Indeed.com, listed it in eighth place, with the rate of job listings on its website having grown 77.57 percent from 2016-2019.[14] Finally, the World Economic Forum claims that data science has "the highest number of opportunities of any listed profession."[15] In brief, outside analysts are in strong agreement about the exceptional employment opportunities in this area.

[7]National Center for Education Statistics, IPEDS data. https://nces.ed.gov/ipeds/use-the-data

[8]"The Data Scientist Shortage in 2020," https://quanthub.com/data-scientist-shortage-2020/. Accessed October 8, 2020.

[9]https://news.linkedin.com/2018/8/linkedin-workforce-report-august-2018. Accessed October 8, 2020.

[10]Mckinsey Global Institute, December 2016. *The Age of Analytics: Competing in a Data Driven World.*

[11]"What's Driving the Demand for Data Scientists," March 2019. https://knowledge.wharton.upenn.edu/article/whats-driving-demand-data-scientist/. Accessed October 8, 2020.

[12]"50 Best Jobs in America for 2020." https://www.glassdoor.com/List/Best-Jobs-in-America-LST_KQ0,20.htm. Accessed October 8, 2020.

[13]"The 2019 Jobs Rated Report." https://www.careercast.com/jobs-rated/2019-jobs-rated-report. Its 2020 report has not yet been released. Accessed October 8, 2020.

[14]"The Best Jobs of 2020,"https://www.indeed.com/lead/best-jobs-2020?aceid. Accessed October 8, 2020.

15World Economic Forum. January 2020. "Jobs of Tomorrow." www3.weforum.org/docs/WEF_Jobs_ofomorrow_020.pdf. Accessed October 8, 2020.

Table 1: Employment Trends in Data Analysis

Occupation	US Growth % 2018-2028	BLS Growth Category	TN Growth % 2016-2026	TN Annual Job Openings
Management Analysts	14	"Much Faster Than Average"	27	960
Market Research Analysts	18	"Much Faster Than Average"	35	1100
Computer and Information Research Scientists	15	"Much Faster Than Average"	25	20
Financial Quantitative Analysts	5	"Faster Than Average"	16	190
Business Intelligence Analysts	10	"Faster Than Average"	21	320
Operations Research Analysts	26	"Much Faster Than Average"	46	210
Statisticians	31	"Much Faster Than Average"	36	80
Economists	14	"Much Faster Than Average"	11	10

Source: Bureau of Labor Statistics, *Occupational Employment Statistics: Occupation Profiles*. https://www.bls.gov/oes/current/oes_stru.htm; O*Net Online, https://www.onetonline.org/

National Government Data

The Bureau of Labor's employment statistics confirm this p icture. Again, there is no exact occupational code for data science. To get around this, we took the Bureau of Labor Statistics SOC codes that correspond to the skill set most associated with data science.[16] We show those codes and their employment prospects in the accompanying table. The table shows U.S. and Tennessee job growth and the BLS growth category of the occupation. Note that for each occupation, expected job growth in Tennessee exceeds the national rate.

In addition, virtually all of the specific skills associated with data science are designated "hot technologies" by O*Net Online (a service of the Department of Labor)[17] These are skills that O*Net registers very frequently in job ads.

Local Job Opportunities

On October 8, 2020 the job aggregator Monster.com showed 95 data scientist jobs open in Tennessee. Sixty of those jobs were in the Nashville area.[18] "Google Jobs" showed 98 openings within 60 miles of Murfreesboro.[19] Many of these jobs have been unfilled

[16]Looking at programs, the common denominators are work in Python, SQL, data visualization such as Tableau, machine learning programs, and frequently R.

[17]https://www.onetonline.org/search/hot_tech/#list_P

[18]https://www.monster.com/?WT.srch=1&WT.mc_n=olm_tm_srch_ggl_Brand_Monster.comExactSitelinkJobSearch&gclsrc=aw.ds&&gclid=Cj0KCQjw8fr7BRDSARIsAK0Qqr7L7ZDorBpldAu0b2OVy_SuhGQb3TsJCAX8Yasp7PYquyVOc_D5mVgaAhFiEALw_wcB&gclsrc=aw.ds. Accessed October 8, 2020.

[19]https://www.google.com/search?client=firefox-b-1-d&sxsrf=ALeKk03eLG3lQlaDFDlTnqQNWuIaqrf_1g%3A1602195106336&ei=oo5_X9CMFIrp_QbsnoBA&q=google+jobs+%22data+science%22&oq

for several weeks. These numbers are far higher than for other occupations in the area.

That this is a growing field with many employment opportunities is abundently clear. Those who predict job trends, the actual U.S. Department of Labor Statistics, and job search websites all agree on the large number of jobs available for those with a master's in data science.

Conclusion

Data science appears to be an occupation with unusually strong employment growth for the foreseeable future. Not surprisingly, given this job market, national student interest in data science master's programs is rising substantially. A survey of MTSU students supports the belief that in this regard our region is no different. Given the few master's programs available in Tennessee, and their limiting characteristics (of the two private, both have substantial tuition and one seeks a national student body, of the two public, one will be available only on line while the other is at some distance), there is every reason to believe that an MTSU program would attract a substantial enrollment and would easily place its graduates into very good jobs.

=google+jobs+%22data+science%22&gs_lcp=CgZwc3ktYWIQAzIJCAAQyQMQFhAeOgQIABBHOgU
IABCxAzoCCAA6CAgAEMkDEJECOgcIABAUEIcCOggIABCxAxCDAToFCAAQyQM6BggAEBYQHlC
ESViPa2C-bWgAcAJ4AIABUogBtQeSAQIxNZgBAKABAaoBB2d3cy13aXrIAQjAAQE&sclient=psy-ab
&ved=0ahUKEwjQ5bHxgabsAhWKdN8KHWzPAkkQ4dUDCAw&uact=5. Accessed October 8, 2020.

APPENDIX

Following are the Classification o f I nstructional P rograms (CIP) c odes u sed i n this study.

Code	***Degree***
11.0104	Informatics
11.0401	Information Science/Studies
11.0501	Computer System Analysis/Analyst
11.0802	Data Modeling/Warehousing and Database Administration
27.0501	Statistics, General
27.0503	Mathematics and Statistics
30.3001	Computational Science

Appendix C

Planned Electives for the Proposed M.S. in Data Science

Prefix	Number	Title	Catalog description	Credit Hours
ACSI	6110	Predictive Analytics	Topics include generalized linear models, logistic regression, discriminant analysis, support vector machines, ridge regression, lasso, sparse modeling, variable selection, model selection, and other selected topics from computational statistics, machine learning, and data mining.	3
BIA	6905	Applied Business Analytics	An applied approach to the understanding, development, and application of prescriptive and data analytic tools to model and analyze business data. A hands-on focus utilized with both commonly used spreadsheet software and specialized business intelligence software for the student to develop skills for self-service business analytics.	3
BIA	6910	Business Intelligence	A more advanced look at the application of business intelligence tools to solving business problems. Coverage will include the development and deployment of sophisticated reporting and dashboard systems to monitor and manage operations. Industry-standard business intelligence software utilized.	3
COMS	6100	Fundamentals of Computational Science	Foundational overview of the mathematical and scientific underpinnings of computational science. Introduces the principles of finding computer solutions to contemporary science challenges. Offers preparation for core and elective courses in the Ph.D. program in Computational Science by reviewing essential mathematical methods and basic science principles drawn from biology, chemistry, and physics. Special topics include techniques of high-performance computing and applications, parallel systems, and theory of computation, case studies in computational chemistry, physics, and mathematical biology.	3

COMS	6500	Fundamentals of Scientific Computing	Fundamentals of problem-solving approaches in computational science, including computer arithmetic and error analysis, linear and nonlinear equations, least squares, interpolation, numerical differentiation and integration, optimization, random number generations and Monte Carlo simulation. Students will gain computational experience by analyzing case studies using modern software packages such as MATLAB.	4
CSCI	5300	Data Communication and Networks	Computer network architectures, protocol hierarchies, and the open systems interconnection model. Modeling, analysis, design, and management of hardware and software on a computer network.	3
CSCI	5350	Introduction to Artificial Intelligence	Principles and applications of artificial intelligence. Principles include search strategies, knowledge representation, reasoning, and machine learning. Applications include expert systems and natural language understanding.	3
CSCI	5560	Database Management Systems	The relational and object models of database design along with relational algebras, data independence, functional dependencies, inference rules, normal forms, schema design, modeling languages, query languages, and current literature.	3
CSCI	5850	Neural Nets	Various neural net architectures, theory, and applications, including models such as Perceptron, back propagation, Kohonen, ART, and associative memory. Learning and conditioning methods also studied.	3

CSCI	6020	Data Abstraction and Programming Fundamentals	Advanced introduction to data abstraction, problem solving, and programming. Programming language concepts, recursion, program development, algorithm design and analysis, data abstraction, objects and fundamental data structures such as stacks, queues, and trees. Three hours lecture and two hours lab.	4
CSCI	6050	Computer Systems Fundamentals	Advanced introduction to computer systems. Data representations, computer arithmetic, machine-level representations of programs, program optimization, memory hierarchy, linking, exceptional control flow, virtual memory and memory management, basic network concepts, and basic concurrent concepts and programming. Three hours lecture and two hours lab.	4
CSCI	6100	Analysis of Algorithms	Topics include the analysis and design of algorithms; efficiency of algorithms; design approaches including divide and conquer, dynamic programming, the greedy approach, and backtracking; P and NP; and algorithms in many areas of computing.	3
CSCI	6300	Networks	Computer communications, network architectures, protocol hierarchies, and the open systems interconnection model. Modeling, analysis, and specification of hardware and software on a computer network. Wide area networks and local area networks including rings, buses, and contention networks.	3
CSCI	6330	Parallel Processing Concepts	Parallel processing and programming in a parallel environment. Topics include classification of parallel architectures, actual parallel architectures, design and implementation of parallel programs, and parallel software engineering.	3

CSCI	6350	Selected Topics in Artificial Intelligence	In-depth study of the principal areas of the field: artificial intelligence programming, problem-solving methods, knowledge representation methods, deduction and reasoning, and applications such as natural language processing and expert systems. Repeatable up to 6 hours.	3
CSCI	6430	Selected Topics in Parallel Processing	An in-depth investigation of one or more topics in parallel processing. Topic(s) to be selected by the professor. Possible topics include parallel algorithms, parallel programming languages, parallel programming tools, parallel software engineering, parallel architectures, parallel applications, and parallel VLSI. Repeatable up to 6 hours.	3
CSCI	6560	Selected Topics in Database	An in-depth investigation of one or more topics in database. Topic(s) to be selected by the professor. Possible topics include object-oriented database systems, distributed database systems, client-server database systems, deductive databases, multimedia databases, and database theory (concurrency, query optimization, recovery, security).	3
CSCI	7350	Data Mining	Introduction to concepts, theories, techniques, issues, and applications of data mining. Data preprocessing, association rule analysis, classification analysis, cluster and outlier analysis, deviation detection, statistical modeling, consideration of emergent technologies.	3
CSCI	7300	Scientific Visualization and Databases	Introduction to the concepts, theories, and applications of database and visualization methodologies for scientific data. Relational database design along with relational algebras, data independent, functional dependencies, inference rules, normal forms, schema design, modeling language, and query languages discussed. Methods corresponding to the visualization of scalar, vector, and tensor fields as well as multifield problem discussed.	3

			Database and visualization discussed in the context of scientific applications.	
ECON	6070	Econometrics II	Emphasizes methods of time series analysis, including Box-Jenkins methods, general-to-specific modeling, volatility models, vector autoregressions, unit roots and cointegration, unobserved component and state space models, and neural networks. Integrates practical applications in various computing environments including SAS, RATS, and MATLAB.	3
MATH	6300	Optimization	Constrained and unconstrained optimization problems, including the generalized least squares problem and Eigenvalue problems. Methods include orthogonalization, conjugate gradient, and quasi-Newton algorithms.	3
PGEO	5490	Remote Sensing	Various vehicles of remote sensing such as radar, satellite imagery, and infrared data. Use of data in preparation of maps and applications to land use and environmental problems examined. Selection of data from either a numeric or image remote sensing system, interpreting, and developing a report from the interpretations. Three hours lecture and one two-hour laboratory per week.	4
PGEO	5511	Advanced Remote Sensing	Lecture and laboratory in the study of advanced topics in remote sensing, including but not limited to, active sensors (LiDAR and RADAR), hyperspectral, and spectroscopy. Three hours lecture/laboratory per week.	3
PGEO	5530	Geographic Information Systems	Lecture and laboratory work relative to computer-manipulated geographic data base. Laboratory work will involve experience in practical application of a geographic information system (GIS) to problem-solving. Student will take appropriate data and compile an environmental impact statement (EIS). Three hours lecture and two hours laboratory per week.	4

PGEO	5560	Intermediate Geographic Information Systems	Lecture and laboratory work related to the principles and applications of geographic information systems (GIS). Continued training in GIS analysis including raster analysis, spatial analysis, network analysis, and geocoding. Data management including data editing, geodatabase design, and creation also examined. Other topics include resource management, demographic, and civic application. Three hours lecture per week.	3
PGEO	6050	Programming for Geospatial Database Applications	Development of custom/tailored GIS-based computer programming to analyze geospatial datasets for making inferences about the Earth's natural and human systems. Extend commercially available geographic information systems software packages through the development of novel computer programs to perform GIS tasks such as spatial analysis, data transformation, map generation, and geospatial database integration.	3
STAT	5700	Analysis of Large-Scale Data Sets	The analysis and applications of large-scale data sets. Scalable machine learning and data mining applications in a practical clinical environment. Statistical software used in the application of these techniques.	3
STAT	7400	Computational Statistics	Statistical visualization and other computationally intensive methods. The role of computation as a fundamental tool of discovery in data analysis, statistical inference, and development of statistical theory and methods. Monte Carlo studies in statistics, computational inference, tools for identification of structure in data, numerical methods in statistics, estimation of functions (orthogonal polynomials, splines, etc.), statistical models, graphical methods, data fitting and data mining, and machine learning techniques.	3

MTSU Course Evaluation

Please indicate your level of agreement with the following statements:

Quantitative Questions (choice of Strongly Disagree, Moderately Disagree, Neither Agree nor Disagree, Moderately Agree, Strongly Agree):

The instructor created an environment that helped students learn.

The course material was delivered in a clear and organized manner.

The instructor gave assignments related to the goals of the course.

The evaluation methods adequately assessed student academic performance.

The instructor was knowledgeable about the subject.

The course enhanced students' ability to think critically about the subject.

The instructor engaged the class and provided opportunities for student participation/contributions appropriate for class size/type.

The instructor cared about student learning.

The instructor was willing to answer questions during or outside of class.

In general, the instructor was an effective teacher.

The qualitative questions for the survey include:

Please identify what you consider to be the strengths of the course and/or instructor:

Please identify the area(s) where you think the course could be improved:

Appendix E

Data Science Capstone Rubric

Student Name_____

CRITERIA	Poor	Acceptable	Good	Excellent
Is the presentation well-organized, professional, and easy to understand?	8	12	16	20
Did the student clearly summarize the objective of the project?	4	6	8	10
Did the student properly discuss data sources, data cleansing steps, and provide examples of data visualization?	4	6	8	10
Did the student clearly explain how they used various data science skills and explain why they did what they did?	8	12	16	20
Did the student clearly articulate the conclusions that can be made from their analysis?	4	6	8	10
Did the student properly address potential data ethics	4	6	8	10

problems and how to address them?				
Does the student's model/code work efficiently and effectively?	8	12	16	20

Additional Comments:

Total Grade:

Middle Tennessee State University
Board of Trustees

Academic Affairs, Student Life, and Athletics Committee

Action Item

DATE: November 9, 2021

SUBJECT: **Approval of Expedited Tenure**

PRESENTER: Mark Byrnes
Provost

BACKGROUND INFORMATION:

The University may find it necessary to expedite tenure review in order to recruit high-quality faculty for administrative positions. Departmental input regarding tenure for an administrator is necessary since tenure is awarded in a specific department. [Policy 204 Tenure]

The following faculty member has been reviewed for tenure by her department chair, department and college committees, and college dean according to MTSU Policy 204 Tenure and the respective college and department policies. The President and University Provost recommend that tenure be granted effective February 1, 2022.

Name	Department	Rank
Amy Aldridge Sanford	Communication Studies	Professor

Middle Tennessee State University
Board of Trustees

Academic Affairs, Student Life, and Athletics Committee

Action Item

DATE:	November 9, 2021
SUBJECT:	**Approval of Policy Revision Policy 301 Admissions**
PRESENTER:	Mark Byrnes Provost

BACKGROUND INFORMATION:

The proposed revisions update the policy to align with revised T.C.A. § 49-7-101.

MIDDLE TENNESSEE STATE UNIVERSITY.

301 Admissions

Approved by Board of Trustees
Effective Date: ~~March 31, 2020~~ _____, 2021
Responsible Division: Academic Affairs
Responsible Office: University Provost
Responsible Officer: Vice Provost for Academic Programs

I. Purpose

The following policy and procedures are adopted, pursuant to the authority granted by T.C.A. § 49-7-101, as the consistent admission policy of Middle Tennessee State University (MTSU or the University). MTSU shall also develop specific criteria and procedures consistent with this policy for the admission of students. Admission decisions shall be made without regard to race, color, religion, ethnic or national origin, sex, sexual orientation, gender identity/expression, disability status, age or status as a covered veteran and shall fully comply with Executive Order 11246, as amended; the Rehabilitation Act of 1973, as amended; Americans with Disabilities Act of 1990, as amended; the Vietnam Era Veterans Readjustment Act of 1974, as amended; the Age Discrimination Act of 1975; the Pregnancy Discrimination Act; applicable state statutes, and all regulations promulgated pursuant thereto.

II. Definitions

A. Adequate insurance coverage. The student's coverage meets or exceeds the level of coverage provided to participants under the University's Student/Scholar Health & Accident Insurance Plan.

B. Audit. A student who audits a course enrolls without expectation of receiving academic credit for the course.

C. Dual enrollment. The enrollment of a high school student in one or more specified college course(s), for which the student will be awarded both high school and college credit.

D. Joint enrollment. The enrollment of a high school student in one or more college course(s), for which the student will earn only college credit.

III. Policy Development

A. Publication of policy, criteria, and procedures for admission. MTSU shall include its approved admission policy, along with specific criteria and procedures, in its catalog http://www.mtsu.edu/ucat/index.php and other appropriate publications.

B. Policy Revision. Any subsequent change to the approved admission policy shall, prior to implementation, be submitted to the MTSU Board of Trustees (Board) for review and approval.

IV. Medical or Health Information

A. All applicants for admission shall provide health information that, at a minimum, establishes the applicant's compliance with rules promulgated by the Tennessee Department of Health regarding requirements for immunization against certain diseases prior to attendance at a higher education institution, and, compliance with the latest standards for immunization for meningococcal disease as set forth by the recommended immunization schedule issued by the Center for Disease Control Advisory Committee on Immunization Practices.

B. Prior to full-time attendance, all students must provide documentation that illustrates receipt of the required immunizations.

C. New, incoming students who live in on-campus student housing must comply with the latest standards for immunization for meningococcal disease as set forth by the recommended immunization schedule issued by the Center for Disease Control Advisory Committee on Immunization Practices.

D. Once a student is enrolled full-time at any Tennessee Board of Regents institution, the student shall be deemed as satisfying the requirement for immunizations, and upon transfer to MTSU, will have the requirement for documentation of immunizations waived.

V. Provisions for Admission at MTSU

A. General Provisions

1. MTSU shall, in the admission or readmission process, assign each student a residency classification. Minimum criteria for the admission of residents of states other than Tennessee may exceed the minimum criteria established for residents of the state. Policy 501 Residency Classification.

2. Admission of International Non-Immigrant Applicants

a. Criteria for admission:

(1) Educational Level. The educational level attained must be comparable to that required of U.S. applicants.

(2) Proof of English Language Proficiency for Non-Native English Language Speakers. In order to determine an applicant's level of proficiency in the English language, MTSU shall require that applicants, whose native language is not English, to submit scores earned on the Test of English Language Proficiency (TOEFL), the academic version of the International English Language Testing System (IELTS), or one of the other recognized comparable standardized examinations. Courses completed at another U. S. institution may be used in lieu of standardized examination scores.

(3) Financial Statement. In order to determine the international student's ability to pay registration fees, non-resident fees, living, and other expenses, MTSU shall require international applicants to supply evidence of financial capability.

(4) Immigration Service Regulations. MTSU shall adhere to all U.S. Citizenship and Immigration Service regulations in the admission, enrollment, and readmission of international non-immigrant applicants.

(5) Certification of Freedom from Tuberculosis. All international non-immigrant students applying for admission pursuant to a student visa shall submit within thirty (30) days from the first day of classes a certificate from a licensed physician or other qualified medical authority verifying freedom from tuberculosis. Failure to submit such certification shall result in denial of admission or continued enrollment. In the event that a student has tuberculosis or has potential tuberculosis requiring medical treatment, continued enrollment will be conditioned upon the determination by a licensed physician that further enrollment is not a risk to others and upon the student's compliance with any prescribed medical treatment program.

(6) Medical and Hospitalization Insurance. International non-immigrant applicants with J, F, or M visas must have and maintain medical and hospitalization insurance as a condition of admission and continued enrollment at the University. Applicants with J visas must also carry adequate medical and hospitalization insurance for spouses and dependents. MTSU may require similar insurance coverage of all other international non-immigrant applicants.

b. MTSU shall establish a process for:

(1) Informing applicants for admission of the insurance coverage required and of its approximate cost;

(2) Informing applicants of the documents that will be acceptable as proof of medical and hospitalization coverage; and

(3) Automatically enrolling applicants in a Student/Scholar Health and Accident Insurance Plan for those international non-immigrant students who do not otherwise have adequate coverage. Enrollment shall take place not later than at the time of class registration, and the cost of the coverage shall be added to the student's registration fees.

3. Admission to Specialized or Limited-Enrollment Programs

   a. MTSU shall develop specific criteria and procedures for admission of students to programs or courses with enrollment limitations and/or specialized curricula.

   b. Such limitations should be based upon selective criteria appropriate to the program or course which apply equally to all prospective students, provided that preference for admission be given to residents of the State of Tennessee. T.C.A. § 49-7-138.

   c. A number of factors such as accreditation and professional certification standards, limited clinical and classroom space, faculty availability, and a concern for appropriate student progress influence the selective admissions process to certain academic programs.

      (1) Students must meet the application criteria, be reviewed and accepted for admission, and make satisfactory progress to be admitted and continue in these academic programs.

      (2) MTSU may vary in its admission requirements based on analysis of student success characteristics.

      (3) Admission and progression policies related to selective programs shall reflect the likelihood of being admitted to the major at the earliest possible point and may contain information on grade point average, standardized test scores, and grade expectations in specified high school courses indicative of success in the field.

   d. Admission and progression policies for specialized and limited enrollment programs shall be clearly displayed in all materials to prospective applicants.

4. Admission to Nursing and Allied Health Programs. MTSU shall require that all persons admitted to nursing or allied health programs:

    a. Provide evidence through a health verification form, that at a minimum, establish the applicant's compliance with the rules promulgated by the Tennessee Department of Health regarding requirements for immunization against certain diseases, including the Hepatitis B vaccine, and other communicable diseases.

    b. Be, with reasonable accommodation, physically and mentally capable of performing the essential functions of the program as defined in writing by the institution.

5. Advanced Standing and Placement. MTSU may develop criteria and procedures for granting admission with advanced placement or standing based on examination, experiential learning, and active duty in the armed services, credit earned in armed services schools, and credit earned through non-collegiate sponsored instruction consistent with Policy 308 Awarding of Credits Earned Through Extra-Institutional Learning.

6. Readmission. MTSU shall develop criteria and procedures for the readmission of students. These criteria and procedures shall be consistent with Policy 314 Undergraduate Academic Retention Standards.

7. Application Fee. MTSU may, with prior approval of the Board, charge a one-time, non-refundable application fee.

B. Undergraduate Degree Admission

1. Admission of First-Time Freshmen

    a. Applicants for degree admission as first-time freshmen shall be admitted using the following ~~four (4)~~ criteria:

        (1) High School Graduation. Except as provided for below, applicants for degree admission as first-time freshmen must provide an official transcript showing graduation from high school. The transcript of graduates of Tennessee public high schools must include a notation indicating that the student passed all required proficiency examinations.

        (2) High School Diploma or Equivalency. Applicants for degree admission as first-time freshmen may present either the 2014 GED© test or the HiSET™ in lieu of a high school diploma provided that their GED© test or the HiSET™ score meets or exceeds the minimum score set by the University.

(3) Standardized Examination Scores

(a) Applicants for admission as first-time freshmen who are 20 years of age or younger must present Enhanced ACT or SAT scores.

(b) MTSU will use the scores for admission in keeping with recommended best practices, advisement, and as a component in the placement decision.

(4) High School Course Requirements. MTSU accepts the curriculum requirements as set by the Tennessee Department of Education with the implementation of the Tennessee Diploma Project of 2009. Admission will be granted to freshmen applicants who hold a recognized high school diploma that includes a distribution of college preparatory courses, such as those required in the core elements of the Tennessee High School Diploma. These courses include the following:

(a) four (4) Credits of English.
(b) four (4) Credits of Math, including Algebra I and II, Geometry, and a fourth higher level math class.
(c) three (3) Credits of Science, including Biology, Chemistry or Physics, and a third Lab Course.
(d) three (3) Credits of Social Studies, including United States History* and Geography, World History and Geography, U.S. Government and Civics, and Economics.
*T.C.A. § 49-7-110 requires the completion of six (6) semester credit hours of American History by any individual in any non-exempted area of study to be granted a baccalaureate degree of any kind from any institution of higher learning or community college supported or maintained by the State. Persons in exempted fields of study need not fulfill this requirement if they successfully completed a course in American History in high school. Any student has the option, at the student's request, to substitute three (3) semester hours of Tennessee History for the American History requirement.
(e) 1.5 Credits of Physical Education and Wellness.
(f) two (2) Credits of a Single Foreign Language.
(g) 0.5 Credits of Personal Finance.
(h) one (1) Credit of Fine Arts.
(i) three (3) Credits of Electives consisting of Math and Science, Career and Technical Education, Fine Arts, Humanities, Advanced Placement (AP), or International Baccalaureate (IB).

Applicants who graduated prior to the adoption of the Tennessee Diploma Project curriculum who hold a high school diploma are exempt from the diploma requirements.

(5) Associate Degree. Applicants for first time admission who have received an associate degree from a regionally accredited institution of higher education are not required to submit a high school transcript or GED certificate.

(6) Out-of-State Applicants. Applicants who are residents of states other than Tennessee are subject to the same admission requirements as in-state applicants.

2. Early Admission of First-Time Freshmen

   a. MTSU shall develop procedures for the admission of applicants who have completed their junior year in high school.

   b. The minimum requirements for admission of applicants in this category shall be the following:

      (1) High School GPA. Applicants must have completed the 9th, 10th, and 11th grades with a minimum grade point average of 3.2 based on a 4.0 scale or the equivalent.

      (2) Standardized Examination Score. Applicants must have an Enhanced ACT composite score of at least 22 or a comparable score on Accuplacer or other diagnostic tests that the University may adopt in the future.

      (3) Prescribed Courses. Applicants must provide a written statement from their high school principal specifying the college courses that will be substituted for the remaining high school courses needed for high school graduation.

      (4) Endorsements. Applicants shall provide written endorsements from their high school counselors and from their parents or guardians.

3. Admission of Transfer Students. MTSU shall establish criteria and procedures for the admission of transfer students that are consistent with the following criteria:

   a. The applicant must provide official transcripts of credits attempted from all institutions of higher education previously attended.

   b. The applicant's grade point average on transferable courses must be at least equal to that which MTSU requires for the readmission of its own students.

Applicants who do not meet MTSU's standards may be admitted on scholastic probation or other appropriate condition.

c. MTSU shall develop and publish criteria and procedures regarding the awarding of transfer credit from collegiate and non-collegiate institutions, credit by examination, military and other formal training, experiential learning, and academic fresh start. Such criteria and procedures must, at a minimum, be consistent with national standards of good practice, and the requirements of appropriate accrediting bodies, and consistent with Policy 308 Awarding of Credits Earned through Extra-Institutional Learning and Policy 314 Undergraduate Academic Retention Standards.

4. Admission of Non-Degree Students to Degree Admission Status

a. MTSU shall develop criteria and procedures for granting degree admission to non-degree students.

b. To be eligible for Degree Admission status, non-degree students, as defined below, must meet all the applicable provisions of Section II.B. above.

C. Graduate and Professional Degree Admission

1. MTSU shall develop procedures and specific criteria for admitting applicants to graduate and professional degree programs. Such criteria and procedures shall, as a minimum, be consistent with national standards of good practice and the requirements of appropriate accrediting bodies.

2. Admission

a. MTSU shall set a minimum undergraduate grade point average (GPA) that an applicant should have earned in order to be considered for admission.

(1) Departments may set higher minimum standards for admission.

(2) Departments may also stipulate a minimum GPA to be achieved in the desired major during the final year or two (2) of the undergraduate studies.

b. MTSU may determine to offer varying degrees of admission, i.e., full, conditional, or provisional.

c. Official Transcripts

(1) MTSU shall require official transcripts (undergraduate and graduate) issued directly by all institutions attended to be submitted either upon application or acceptance.

(2) MTSU may determine whether or not to accept three (3) year undergraduate degrees in keeping with the international education reform, i.e., Bologna process or to make exception for students seeking political or social asylum prior to the completion of undergraduate work.

d. Standardized Examination Scores

(1) MTSU may request dates and scores for one or more assessment tests such as the GRE, GMAT, the MAT, the IELTS and/or TOEFL.

(2) Scores should be submitted directly from the testing organization and not the student within the time limitations of use set by the testing organizations.

e. Proof of English Competency

(1) All students for whom English is not the first language, with the possible exception of individuals who have completed a prior degree at an accredited institution in an English-speaking nation, must provide proof of English proficiency.

(2) MTSU may administer additional assessments for oral and written competencies for applicants and accepted students for whom English is not the first language if they have been offered graduate assistantships where they will be required to teach.

(3) Departments shall provide assistance to those students awarded assistantships to improve their English language proficiency if the assessment shows deficiencies prior to placing those applicants or students in the classroom.

f. Required Materials for Graduate Degree Application. Regardless of the standards set by the individual academic units, all applications should include at a minimum the following components:

(1) An application form.

(2) Transcripts of all previous academic work from which an undergraduate GPA may be calculated (certified translations for non-English transcripts may be required).

(3) Proof of English competency for international students for whom English is not their first language, with the possible exception of those who have completed a degree at an accredited institution in an English-speaking country.

3. Admission of Undergraduates to Graduate Courses. MTSU may grant permission to undergraduate students with exceptional academic backgrounds to undertake graduate coursework as part of their undergraduate experience.

4. Admission of Transfer Graduate Students

   a. Students applying for transfer from another graduate institution should submit the same admission materials as the typical first-time graduate applicant. If granted admission, the student should be informed of the number of hours which will be transferrable.

   b. MTSU shall establish criteria and procedures for the admission of transfer graduate students that are consistent with the following criteria:

      (1) The applicant must provide transcripts of credits attempted from all institutions of higher learning previously attended.

      (2) The applicant's grade point average (GPA) on transferrable courses must be at least equal to that which MTSU requires for the readmission of its own students. Applicants who do not meet the institution's standards may be admitted on scholastic probation or other appropriate conditions.

      (3) MTSU shall develop procedures and publish criteria regarding the awarding of transfer credit from other universities or colleges, credit by examination, military and other formal training, and experiential learning as well as criteria for Academic Fresh Start. Such policies and procedures must, as a minimum, be consistent with national standards of good practice and the requirements of appropriate accrediting bodies.

D. Non-Degree Admission for Undergraduate and Graduate Applicants

1. MTSU shall develop criteria and procedures for admitting undergraduate and graduate applicants who wish to take credit courses, but who either do not qualify for or do not wish to apply for degree admission.

2. Criteria and procedures shall include any conditions of enrollment and any term or overall credit-hour limitations.

3. Applicants who are eligible for non-degree admission include:

    a. Persons Not Previously Enrolled in College

        (1) High School Graduates
        (2) Persons twenty-one (21) years of age or older who have not earned a high school diploma and are not currently enrolled in high school.
        (3) Persons eighteen (18) years of age or older who have not earned a high school diploma or are not currently enrolled in high school and wish to enroll in HSE preparatory courses only.
        (4) High school students who meet the following criteria as specified in T.C.A. § 49-6-3111:

            (a) Academically talented/gifted students enrolled in 9th, 10th, 11th, or 12th grade in public or private high schools in Tennessee may, with the recommendation and approval of the high school principal and appropriate higher education institution personnel, enroll in and receive regular college degree credit from a Tennessee postsecondary institution if such a student has a grade point average equivalent to 3.2 on a 4.0 maximum basis and if such placement is a part of the student's planned Individual Education Program (IEP) as established by the multi-disciplinary team process.
            (b) High school students who are in their freshman year of high school. Such students may be admitted for either joint enrollment or dual enrollment or both. For the purposes of this policy, the terms joint and dual enrollment are defined in the Definitions section. Dual Enrollment students must meet the following eligibility criteria:

                - The student must be enrolled as a 9th, 10th, 11th, or 12th grade student in a Tennessee public or nonpublic secondary school or in a home education program.
                - The student may enroll in a specific course based on the course's specific placement requirements as determined by the University.
                - The student must enroll in dual enrollment courses in the general education core, Tennessee Pathways leading to a degree, Career and Technical Program of study leading to an academic award, or middle college or equivalent program.
                - The student must provide secondary institution permission/approval. Additionally, a minor (under eighteen [18] years of age) must provide parental/guardian permission/approval.

    b. Persons with College Credit but Not a Degree

(1) Persons who earned credits but not a degree at another college and are eligible for readmission to the last institution attended.
(2) Those who do not meet the readmission standards of the last institution attended may be admitted on scholastic probation or other established condition.

c. Persons with a College Degree or Certificate

(1) Persons who have a degree or certificate equivalent to the highest degree or certificate offered by the University in a particular field but who wish to take additional courses.
(2) Persons who do not qualify for or do not wish to apply for graduate degree admission.

E. Audit Admission. MTSU shall develop criteria and procedures for the admission of persons wishing only to audit courses. The same registration procedure applies as for credit courses and, unless Provision F. below applies, the same fees will be charged as for credit courses. Admission may be limited or denied based on the availability of space in the individual classroom.

F. Admission of Disabled, Elderly, and State Retirees Pursuant to T.C.A. § 49-7-113. In accordance with T.C.A. § 49-7-113, certain disabled, elderly persons, and state service retirees are eligible to enroll in courses at MTSU on an audit or for-credit basis without paying tuition charges, maintenance fees, student activity fees, or registration fees. Eligibility criteria and applicable fees are provided in Policy 643 Educational Assistance: Veterans' Dependents, State Retirees, Disabled, and Elderly Persons Programs. Admission may be limited or denied based on the availability of space in the individual classroom.

G. Admission of Non-Degree Students to Degree Admission Status. MTSU shall develop criteria and procedures for granting degree seeking admission status to non-degree students at both the undergraduate and graduate levels.

H. Continuous Enrollment and Residency Requirements Upon Admission for Graduate Programs

1. MTSU may require continuous enrollment within select or all graduate programs.

2. MTSU may establish periods of required residency for students seeking admission and enrolling in select graduate programs. Residency requirements should be clearly described in application materials and on the institutional program website.

I. Admission to Select Graduate Programs

1. Accreditation and professional certification standards, limited clinical and classroom space, faculty availability, and a concern for appropriate student progress influence the selective admission process to MTSU graduate programs.

2. Students must meet the application criteria, be reviewed and accepted for admission, and make satisfactory progress to be continued in all graduate programs.

3. MTSU and individual graduate programs may vary in the defined requirements for satisfactory progress as based on their analysis of student success characteristics.

Forms: none.

Revisions: June 5, 2017 (original); March 31, 2020; _____, 2021.

Last Reviewed: ~~March~~ _____, 2021 ~~2020~~.

References: Policies 308 Awarding of Credits Earned through Extra-Institutional Learning; 314 Undergraduate Academic Retention Standards; 501 Residency Classification; 643 Educational Assistance: Veterans' Dependents, State Retirees, Disabled, and Elderly Persons Programs; T.C.A. §§ 49-6-3111; 49-7-101; 49-7-110; 49-7-113; 49-7-138; Executive Order 11246; Rehabilitation Act of 1973; Americans with Disabilities Act of 1990; Vietnam Era Veterans Readjustment Act of 1974; Age Discrimination Act of 1975; Pregnancy Discrimination Act; Tennessee Diploma Project of 2009.

Middle Tennessee State University
Board of Trustees

Academic Affairs, Student Life, and Athletics Committee

Information Item

DATE: November 9, 2021

SUBJECT: **Performance Metrics**

PRESENTER: Mark Byrnes
Provost

BACKGROUND INFORMATION:

An update of the Performance Metrics Dashboard.

MIDDLE TENNESSEE STATE UNIVERSITY

MTSU PERFORMANCE METRICS

MTSU BY THE NUMBERS

Updated October 20, 2021

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FLUID

APPLICATION/ADMISSION ACTIVITY

	YTD	YOY	3-yr Goal
Freshmen applications received in Fall 2021	11,338	-7.56%	1%/year
Freshmen admitted in Fall 2021 **Note: The number of admitted students withdrawing submitted applications was down by 512 students, a decrease of 27%.*	7,820	-9.58%	1%/year
Transfer applications received in Fall 2021	3,723	-5.10%	1%/year
Transfer students admitted in Fall 2021	2,765	-2.23%	1%/year
Graduate applications received in Fall 2021	2,276	-21.3%	33%
Graduate students enrolled in Fall 2021	2,964	+2.5%	33%

ATHLETICS FUNDRAISING

	FY 2020	FY 2021	
BRAA giving	$1,043,029	$1,048,029	$2M by 2023
Total giving	$1,452,399	$2,124,935	$3M by 2023

ATHLETICS ATTENDANCE

	2019	2020
Football attendance	14,253	5,833*
Men's basketball attendance	3,453	903*
Women's basketball attendance	3,571	291*

**COVID restrictions*

MARKERS

ENROLLMENT

	Fall 2019	Fall 2020	Fall 2021	3-yr Goal
Full-time equivalent enrollment	17,755	17,900	16,805	1%/year
Total headcount	21,721	22,080	20,857	1%/year
Freshmen enrolled	3,259	3,075	2,738	1%/year
Transfers students enrolled	2,048	1,879	1,752	1%/year
Avg. ACT score of entering class	23.34	23.23	22.87	N/A
Avg. high school GPA of entering class	3.54	3.59	3.64	N/A

ACADEMICS

	AY 2018–19	AY 2019–20	AY 2020–21	5-yr Goal
Six-year graduation rate	53.4%	57.4%	59.2%	60% by 2025
Degrees awarded				
Bachelor's	4,047	4,039	3,916	N/A
Master's/Education Specialist	789	783	722	N/A
Doctoral	47	56	46	N/A
Research, Service, Sponsored Programs **Note: Data comes from THEC and is not yet available.*	$10,386,271	$10,308,370	*	$11,219,300

	Fall 2019	Fall 2020	Fall 2021	5-yr Goal
Freshman retention	75.1%	78.4%	74.1%	80% by 2025
Graduate retention	83.9%	85.8%	82.0%	87%

TUITION AND DEBT

Undergraduate tuition (12 credit hours)	FY 2020	FY 2021	FY2022
MTSU	$3,600	$3,600	$3,672
University of Tennessee	$5,666	$5,666	$5,666
University of Memphis	$4,104	$4,104	$4,176
Graduate tuition (9 credit hours)			
MTSU	$4,473	$4,473	$4,698
University of Tennessee	$5,734	$5,734	$5,734
University of Memphis	$4,608	$4,608	$4,689
% of Pell-eligible students	**Fall 2018**	**Fall 2019**	**Fall 2020**
MTSU	48.0%	43.6%	49.1%
University of Tennessee	29.1%	27.5%	29.4%
University of Memphis	48.5%	45.5%	50.0%
	May 2019	**May 2020**	**May 2021**
Avg. debt of undergraduates at graduation	$23,759	$24,305	$23,256
Avg. % of undergraduates with debt at graduation	57%	56%	53%

ATHLETICS

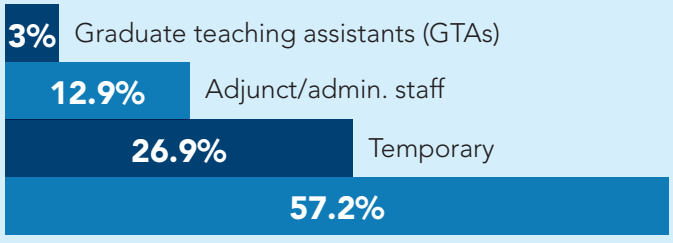
	Cohort 2011	Cohort 2012	Cohort 2013	3-yr Goal
Graduation Success Rate	89%	92%	93%	
Academic Progress Rate	989	987	N/A	
Total revenues	**FY 2019**	**FY 2020**	**FY 2021**	
MTSU	$35.8M	$34.8M	$31.2M	
Conference USA (Rice didn't release info)	$35.05M	$35.05M	N/A	
Institutional support (% of total)				
MTSU	34%	34%	34%	
Conference USA (Rice didn't release info)	26%	28%	N/A	
Private support (% of total)				
MTSU	5%	5%	3%	
Conference USA (Rice didn't release info)	11%	10%	N/A	

ADVANCEMENT

	FY 2019	FY 2020	FY 2021
Total annual support	$10,090,667	$10,797,630	$11,063,633
CASE/VSE benchmark	$6,872,000	N/A	N/A
Number of donors	7,873	7,607	6,701

	1-year	10-year	20-year
Investment return as of June 30, 2020	32.4%	8.4%	7.0%

Credit hours taught by faculty type



1021-0039 - AA/EEO/disability/vet

Middle Tennessee State University
Board of Trustees

Academic Affairs, Student Life, and Athletics Committee

Information Item

DATE: November 9, 2021

SUBJECT: **Enrollment Update**

PRESENTER: Deb Sells
Vice President for Student Affairs and
Vice Provost for Enrollment and Academic Services

BACKGROUND INFORMATION:

Deb Sells, Vice President for Student Affairs and Vice Provost for Enrollment and Academic Services, will provide an update on undergraduate enrollment.

Middle Tennessee State University
Board of Trustees

Academic Affairs, Student Life, and Athletics Committee

Information Item

DATE:	November 9, 2021
SUBJECT:	**Athletics Update**
PRESENTER:	Chris Massaro Athletics Director

BACKGROUND INFORMATION:

Athletics Director Chris Massaro will provide an update on Middle Tennessee Athletics.