



Overview of Data Sciences @ UTEP, Department of Mathematical Sciences:

History and Setting

The Department of Mathematical Sciences, consisting of nearly 30 tenure and tenure-track faculty, contribute to interdisciplinary data-intensive research projects at UTEP and with external partners. Notable faculty accomplishments of the productive faculty include the publication of high impact peer reviewed manuscripts and annual research expenditures that exceed \$2m. The faculty have significant expertise in the areas of algebra and combinatorics, fixed point theory, statistics, bioinformatics, computational science, topology, data science and applied mathematics. UTEP consistently ranks in the top ten by Diverse Issues in Higher Education for Mathematics and Statistics degrees conferred to Hispanic undergraduate and master's degree students.

An exciting development for the Department is the recent approval of a new Data Science doctoral program that will commence in spring 2021. Additionally, the department houses a long-standing statistical consulting laboratory (now called the Data Analytics Lab) initially funded by the NIH Border Biomedical Research Center (BBRC). This lab works collaboratively with biomedical focused research projects across campus and with multiple external partners, assisting in grant preparations and analysis. In addition to these established lines of collaboration, we saw an opportunity with data science to strengthen these existing ties and develop new lines for faculty and student engagement in data-intensive research across campus.

With the advent of these new opportunities, we began developing data science academic programs about 5 years ago. First, we developed a graduate certificate in Big Data Analytics. This certificate was designed to be inclusive of students from a variety of graduate programs and academic backgrounds. Entry into the program was simple and accessible: add the certificate to a current graduate degree plan and have taken an applied statistics and/or calculus course. Currently, over 50 students from various academic units are enrolled. As we saw the need for even higher-level training in data science, we began developing the newly approved doctoral program in data science within the department. This was a far bigger effort than the development of the Big Data Analytics certificate and involved about 3 years of planning and work. The program is a doctoral program involving coursework focused on the essential mathematics, statistics and computing in the data sciences. The degree also incorporates training in collaborative data-intensive research through the UTEP Data Analytics Lab and the lab provides opportunities for the doctoral students to collaborate with others on campus and external organizations. We are building partnerships with regional groups to support

students through contract funding and establish collaborative research relationships with outside groups. The doctoral program is open to anyone with a technical background and the program has enough flexibility to ensure that a student who lacks any one of the essential domains of mathematics, statistics and computing can focus on developing needed skills. This doctoral program was just approved this summer and will launch fully in Fall 2021. Finally, we also have options for data science concentration or minor in the mathematical sciences department. These were developed recently to modernize the traditional statistics concentrations and minors we had offered in the past and update the coursework to make students more marketable and meet industry needs.

Support

All of the UG and Graduate Data Science programs were developed with support from UTEP and College of Science. With the beginning of the doctoral program, we have additional state funds that will assist in program development. Most students in the data science graduate programs are funded through either teaching assistantships or through research assistantships associated with individual faculty funded projects. In 2018, the College received an initial gift of \$100,000 from two College of Science board members who wanted to see these data science programs develop at UTEP. Very recently, another UTEP alumni has recently pledged to support student research through a yearly gift of \$2000 and we anticipate more partnerships via contracts with external organizations to support students. This is particularly important since, though we can offer assistantships to students, we cannot pay tuition for graduate students and it makes it difficult for our already financially disadvantaged students.

Challenges

Our primary challenges have been: 1. establishing working partnerships with other programs on campus that have a stake in data science. There are varying levels of collaboration between academic units and colleges, and at UTEP, we are a very traditionally organized university. Breaking down some of the historical barriers is not easy even though that is our aim; 2. obtaining funding centered on the data science oriented programs. While the lab facilitates funding for many research projects at UTEP by providing support for proposal preparation and research support, we have not been able to obtain funding for our own program. This, in part, was due to a lack of an established research centered program, which is now changing with the 2020-21 academic year (premiering the data science doctorate). We will continue to seek outside funding through government, private and contract support in order to fund student scholarships, interventions for student development, and provide research opportunities.