Ph.D. in Data Science

The PhD program in Data Science will prepare and train individuals who can immediately obtain positions in industry using data to guide decision-making, it can be applied to an array of industries which includes enterprise management, marketing, medical treatment options, scientific research and development services, aerospace product and parts manufacturing, securities, commodity contracts, and financial investment activities. The program is open to individuals from many backgrounds.

Admissions Requirements

Applicants who hold a Bachelor of Science degree or equivalent from any regionally accredited university, or international institutions of comparable stature, will be considered for admission.

We will also consider the following kinds of applications for admission to the PhD program:

- Applicants who hold a degree in a related field in the mathematical and computational sciences (e.g., mathematics, computer sciences, statistics, data science, economics, business analytics, computational biology, computational chemistry, engineering, health sciences) or any technical field, as long as they have completed sufficient courses in mathematics, statistics and computing, as determined by the Doctoral Program Committee
- Applicants who have a Master's degree in these fields, as well as those who have a doctoral degree in another field.
- Applicants must have at least a 3.0 undergraduate major GPA (or equivalent, as determined by the Doctoral Committee; for example, some universities do not assign GPAs).
- Applicants must provide three letters of recommendation from previous professors, supervisors, or others qualified to evaluate the applicant.
- Applicants must submit a statement summarizing her/his research interests and future plans.
- Applicants must provide the Graduate Record Exam (General or Mathematical Sciences).
- Applicants from countries where English is not the first language are required to demonstrate English proficiency. Please consult the graduate school website for required scores.
- Exceptional applicants who do not meet all of these requirements (with the exception of a required score on the TOEFL exam) may be accepted conditionally but must maintain a 3.5 GPA in the first 12 units of instruction. After they have satisfied this requirement, they will be admitted to regular status.
- Both full-time and part-time students will be accepted into the program.
- Students transferring from other graduate programs will be accepted if they meet all requirements listed above; their previous coursework will be credited upon evaluation by the Doctoral Program Committee.

Undergraduate coursework should include at least one semester of calculus and statistics and at least one upper-division course in either mathematics, statistics or computing. Undergraduate preparation in the core fields of mathematics, computing and statistics is highly recommended. Basic computer skills are essential, including word processing, database development and maintenance, and operational knowledge of statistical software or a basic computing software.

Candidacy/Dissertation

The student will be expected to form a doctoral committee before completing 24 credit hours, and present a research proposal to the committee members before completing 40 credit hours. The committee will meet at least once per term with the student, to evaluate progress. If the progress is deemed inadequate, the student will be given one year to remedy the situation. If progress continues to be inadequate, the student will be dismissed from the program. Inadequate progress shall be defined as not completing coursework on schedule, or not completing research objectives, as outlined by the advisor and the student’s committee.

Students will be required to pass a written qualifying exam in Data Science within 6 months of completing the core coursework. If a student fails the exam, he/she may repeat the exam once within a 6-month period. If a student fails the exam the second time, he/she will not be allowed to continue in the program. After consultation with the Doctoral Committee, such a student may be allowed to complete the requirements for a Master's Degree, using the coursework completed as part of the doctoral requirements. Once a student passes the exam she/he will be advanced to candidacy. An oral exam will be required at the end of the third year. This will be focused on the chosen research topic of the candidate and the questions will be provided by the doctoral committee members.

A doctoral dissertation, directed by the major professor and doctoral committee, will be required of all students. A member of the core faculty of the Department of Mathematical Sciences will advise the dissertation with the possibility of an associated faculty member outside of the Department of Mathematical Sciences co-advising. A candidate must successfully defend his/her dissertation orally, in a forum that is open to the public. Each student is expected to submit or publish at least one peer reviewed paper during his or her tenure at UTEP. Students will normally graduate within 4 or 5 years. Current Graduate School regulations mandate that once a student exceeds 90 units, he/she may not be eligible for a state supported assistantship.
# Degree Plan

## Required Core Courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS 6380</td>
<td>Math Found of DS I</td>
<td>3</td>
</tr>
<tr>
<td>DS 6381</td>
<td>Math Found of DS II</td>
<td>3</td>
</tr>
<tr>
<td>DS 6474</td>
<td>Introduction to Data Mining</td>
<td>4</td>
</tr>
<tr>
<td>MATH 6330</td>
<td>Comp Methods of Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>STAT 6385</td>
<td>Statistics in Research</td>
<td>3</td>
</tr>
</tbody>
</table>

## Prescribed Elective Courses:

Take one course from each domain-four total

### Data Science Theory Courses

- DS 6382: Stat. Theory for Big Data
- DS 6384: Linear Models for DS
- DS 6388: Multivariate Stat Meth HD Data

### Data Science Application Courses

- BINF 5354: Post-Genomic Analysis
- DS 6494: Statistical Data Mining
- STAT 6388: Multivariate Data Analysis

### Mathematical Application Courses

- DS 6336: Math Applications in DS
- MATH 6329: Numerical Analysis
- MATH 6335: Techniques in Optimization

### Computing Courses

- CS 6361: Machine Learning
- DS 6339: Data Visualization
- STAT 6329: Statistical Programming
- STAT 6392: Statistical Computing

## Elective Courses:

Take four of this set

- CS 6334: Parallel & Concurrent Program
- CS 6350: Advanced Algorithms
- CS 6362: Data Mining

### Advanced Inference

- MATH 6311: Topics in Applied Mathematics
- MATH 6386: Stochastic Dif Eqns and Ap
- MATH 6343: Numer Solution Part Diff Equat
- MATH 6321: Measure and Probability Th
- STAT 6336: Categorical Data Analysis
- STAT 6370: Special Topics
- STAT 6386: Stochastic Processes
- STAT 6391: Time Series Analysis
- STAT 6393: Survival Analysis
- STAT 6397: Longitudinal Data Analysis
- STAT 6428: Intro to Statistical Analysis

## Required- Other:

- DS 6335: Intro to DS Collaborations
- DS 6390: DS Research Collaborative (Must take 3 times)

Select 9 hours of DS, MATH, STAT graduate courses with advisor approval

## Dissertation

- DS 6398: Dissertation I
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS 6399</td>
<td>Dissertation II</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Hours**: 67-68