Department of Management Science and Statistics

Mission Statement
The mission of the Department of Management Science and Statistics is to offer both undergraduate and graduate educational programs that are of high quality and meet the changing needs of the global community; to provide a supportive learning environment for students; to foster the success of our students in their professional careers; and to create an academic environment that stresses excellence in teaching, intellectual contributions, and service. The Department contributes to the field of knowledge through research and education in the quantitative sciences. Theory and analysis are applied to a variety of interdisciplinary problems to discover new approaches for meeting the challenges of decision making in a global arena of expanding technology and information.

Department Information
The disciplines of Management Science and Statistics are integral to modern decision-making processes. These interdisciplinary fields emphasize the use of quantitative methods and computers for analyzing, understanding, visualizing, and interpreting data. Management Science seeks to provide a rational basis for decision analysis across a broad spectrum of business functions such as production/operations, marketing, finance, human resources, project management, logistics, and supply chain management. Statistical methods provide analytical tools for research in high-technology and biomedical industries, insurance, and government agencies. For students choosing to obtain a Master of Business Administration degree, the Department of Management Science and Statistics offers a concentration in Management Science. The Department also offers a Master of Science degree in Applied Statistics and a Doctor of Philosophy degree in Applied Statistics.

M.S. in Applied Statistics
- M.S. in Applied Statistics (p. 1)
- Ph.D. in Applied Statistics (p. 2)

Master of Science Degree in Applied Statistics
Today more professions are depending on data analysis to assist in making informed decisions. Organizations need individuals with knowledge in statistics and methods to collect, analyze, interpret data, and communicate the results. There is a growing demand for individuals who are well trained in designing experiments, statistical modeling, making predictions and forecasts, and analyzing large complex data sets commonly encountered in various areas of scientific study. For example, statisticians are needed in such areas as biomedical fields and bioinformatics to address drug development and health related issues, in environmental studies to address pollution and contamination. They are also needed to analyze big data encountered in internet traffic, fraud detection, cyber security and national defense. Statisticians are employed by such industries as insurance, health, finance, manufacturing and service. The Master of Science degree in Applied Statistics at UTSA is designed to meet these demands. It includes instruction in a broad range of applied statistical methods and computational tools to prepare students for careers as government, industrial, or academic statisticians, or to pursue doctoral studies in statistics.

Program Admission Requirements
All application materials must be submitted using the University’s online application system and received by the program-specific Fall deadline. Degree-seeking students normally are not admitted for the Spring or Summer semesters due to course-sequence requirements in the program.

In addition to satisfying the University-wide graduate admission requirements, a B.A. or B.S. in statistics, mathematics, engineering, business, or a closely related field is highly recommended as preparation. In particular, three semesters of calculus and a course in matrix theory/linear algebra or their equivalents are required for unconditional admission. A course in probability and/or statistics is preferred but not required. Those students who do not qualify for unconditional admission should anticipate that additional undergraduate and/or graduate coursework may be required to complete the degree. All applicants are required to submit recent scores from the Graduate Record Examination (GRE) aptitude test.

Degree Requirements
Candidates for this degree are required to successfully complete 33 semester credit hours as specified below:

A. All candidates for the Master of Science in Applied Statistics must complete the following 18 semester credit hours of coursework:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA 5093</td>
<td>Introduction to Statistical Inference</td>
<td>3</td>
</tr>
<tr>
<td>STA 5103</td>
<td>Applied Statistics</td>
<td>3</td>
</tr>
<tr>
<td>STA 5503</td>
<td>Mathematical Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>STA 5513</td>
<td>Mathematical Statistics II</td>
<td>3</td>
</tr>
<tr>
<td>STA 6033</td>
<td>Advanced Programming and Data Management in SAS</td>
<td>3</td>
</tr>
<tr>
<td>STA 6233</td>
<td>Advanced Statistical Programming Using SAS</td>
<td>3</td>
</tr>
</tbody>
</table>

B. A candidate for the Master of Science degree in Applied Statistics must complete 9 semester credit hours of coursework chosen from one or a combination of the following focus areas:

Biostatistics:
- STA 6133 Simulation and Statistical Computing
- STA 6413 Nonparametric Statistics
- STA 6813 Multivariate Analysis
- STA 6833 Design and Analysis of Experiments
- STA 6853 Categorical Data Analysis
- STA 6863 Spatial Statistics
- STA 6903 Survival Analysis
- STA 6913 Bioinformatics: Microarray and Proteomics Data Analysis
- STA 6923 Advanced Statistical Learning/Data Mining

Industrial Statistics:
- STA 5803 Process Control and Acceptance Sampling
- STA 6013 Regression Analysis
- STA 6113 Applied Bayesian Statistics
- STA 6133 Simulation and Statistical Computing
- STA 6833 Design and Analysis of Experiments
- STA 6843 Response Surface Methodology
Department of Management Science and Statistics

Management Science:
- MS 5023 Decision Analysis and Production Management
- MS 5453 Management and Control of Quality
- MS 5463 Lean Operations and Six Sigma
- STA 6013 Regression Analysis
- STA 6133 Simulation and Statistical Computing

Financial Modeling:
- ECO 6103 Econometrics and Business Forecasting
- FIN 6313 Modeling of Financial Decision Making
- STA 6013 Regression Analysis
- STA 6113 Applied Bayesian Statistics
- STA 6133 Simulation and Statistical Computing
- STA 6253 Time Series Analysis and Applications

Big Data and Analytics
- MS 5333 Introduction to Business Analytics
- MS 5323 Statistical Methods for Business Analytics
- MS 5353 Demand and Forecasting Management
- STA 6013 Regression Analysis
- STA 6253 Time Series Analysis and Applications
- STA 6813 Multivariate Analysis
- STA 6923 Advanced Statistical Learning/Data Mining

General Applied Statistics
- Any 9 hours of 5000/6000-level courses in Statistics or other disciplines as approved by the Graduate Advisor.

Doctor of Philosophy Degree in Applied Statistics

In this age of advanced technology, there is an increasing demand for individuals with expertise in designing experiments and analyzing large complex data sets via the latest advances in computing technology. In particular, there is a real need for professionals with a Ph.D. in Applied Statistics. Statisticians are in high demand in various areas of scientific study. For example, in biomedical field, they are needed to develop methods for evaluating the efficacy and safety of new medications/drugs, surgeries, and other treatments. In the Bioinformatics area they address topics such as gene therapy, genomic research, and disease mapping. In environmental studies, statisticians are needed to detect exposure of human population to particulate matter based on air quality, to identify polluted areas based on soil samples, and to model areal data. Statisticians are also needed to analyze big data, especially in areas of fraud detection, cyber security, and defense related issues. Statisticians are being recruited in a variety of industries, including insurance and finance institutions, manufacturing and service businesses. Thus, the Ph.D. in Applied Statistics combines theory with applications to prepare students to pursue careers in academia, research organizations, government, and private industry.

Program Admission Requirements

In addition to satisfying the University-wide graduate admission requirements, a B.A., B.S., M.A. or M.S. in mathematics, statistics, or a closely related field is required. Students who have not taken mathematical statistics courses at the undergraduate level may be required to complete the equivalent courses in the appropriate background areas before taking graduate courses. The admission requirements consist of:

- A cumulative grade point average of 3.3 or higher in the last 60 hours of coursework.
- A Graduate Record Examination (GRE) score from a recent (no more than five years prior to the application date) administration of the exam.
- Official transcripts of all undergraduate and graduate coursework completed.
- Three letters of recommendation from academic or professional sources familiar with the applicant’s background.
- A curriculum vita and a statement of experiences, interests, and goals.
- International students from non-English speaking countries must also submit a score of at least 550 on the Test of English as a Foreign Language (TOEFL). TOEFL scores may not be more than two years old.
- Applicants may be asked to appear before the admissions committee for a personal interview.

Degree Requirements

Candidates for this degree are required to successfully complete a minimum of 87 semester credit hours of graduate coursework as specified below:

A. Foundation Courses

All candidates entering the program with only a bachelor’s degree or with a non-quantitative masters’ degree must complete the following 18 semester credit hours of coursework:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
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<td>STA 5513</td>
<td>Mathematical Statistics II</td>
<td>3</td>
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<tr>
<td>STA 6033</td>
<td>Advanced Programming and Data Management in SAS</td>
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</tr>
<tr>
<td>STA 6233</td>
<td>Advanced Statistical Programming Using SAS Software</td>
<td>3</td>
</tr>
</tbody>
</table>

B. All candidates entering the program with a bachelor’s degree must complete 12 semester credit hours of 5000/6000-level Statistics courses approved by the Graduate Advisor.

C. All candidates must complete the following 15 semester credit hours of advanced coursework:

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<tr>
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<th>Course Name</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>STA 6133</td>
<td>Simulation and Statistical Computing</td>
<td>3</td>
</tr>
<tr>
<td>STA 6713</td>
<td>Linear Models</td>
<td>3</td>
</tr>
<tr>
<td>STA 6993</td>
<td>Statistical Consulting</td>
<td>3</td>
</tr>
<tr>
<td>STA 7503</td>
<td>Advanced Inference I</td>
<td>3</td>
</tr>
<tr>
<td>STA 7513</td>
<td>Advanced Inference II</td>
<td>3</td>
</tr>
</tbody>
</table>
D. All candidates for the Ph.D. degree in Applied Statistics must complete 6 semester credit hours of approved graduate courses with numbers 6000 or higher within the Department of Management Science and Statistics.

E. All candidates for the Ph.D. degree in Applied Statistics must complete at least 6 semester credit hours of approved graduate elective courses.

F. All candidates for the Ph.D. in Applied Statistics must complete a minimum of 15 semester credit hours of Doctoral Research.

G. All candidates for the Ph.D. in Applied Statistics must complete a minimum of 15 semester credit hours of Doctoral Dissertation.

Total Credit Hours 87

All students in the program will be required to complete a degree plan specifying the courses they will complete. This degree plan must be approved by the Ph.D. Program Committee before the end of the second semester of enrollment.

Applicants with a master’s degree in statistics or a related field may apply up to 30 hours of previously earned graduate credits toward the doctoral degree. Each student’s transcript will be evaluated by the Ph.D. Program Committee and credit will be designated on a course-by-course basis to satisfy the foundation requirements of the degree.

### Advancement to Candidacy

Advancement to candidacy requires a student to complete University and Applied Statistics program requirements. After completing the required coursework, all candidates for the Ph.D. degree must pass written qualifying examinations and oral defense of dissertation proposal before being admitted to candidacy for the degree. However, those who do not pass the qualifying examination at the Ph.D. level may qualify for the M.S. degree by passing the Masters’ comprehensive examination. The written examinations are administered by the graduate faculty in the specialization area. Written examinations are scheduled once a year, whereas the oral proposal defense is administered at the discretion of the student’s Dissertation Committee. The oral defense is for the purpose of eliminating any questions of competency related to substantive written exams and serves as a hearing for the student’s dissertation proposal. Students will be provided no more than two attempts to pass the written qualifying examination and two attempts to pass the oral proposal defense examination. Majority approval of the dissertation examination committee is required to pass the oral proposal defense. Results of the written and oral qualifying examinations must be reported to the Dean of the Graduate School.

### Dissertation

Candidates must demonstrate the ability to conduct independent research by completing and defending an original dissertation. The research topic is determined by the student in consultation with his or her supervising professor. A Dissertation Committee selected by the student and supervising professor, guides and critiques the candidate’s research. The completed dissertation must be formally presented to and approved by the Dissertation Committee.

Following an open presentation of the dissertation findings, the Dissertation Committee conducts a closed meeting to determine the adequacy of the research and any further requirements for completion of the dissertation. Results of the meeting must be reported to the Dean of the College and to the Dean of the Graduate School.

Awarding of the degree is based on the approval of the Dissertation Committee, and the approval of the Dean of the College. The UTSA Dean of the Graduate School certifies the completion of all University-wide requirements.

### Graduate Certificate in Operations and Supply Chain Management

The Graduate Certificate in Operations and Supply Chain Management is a 12-semester-credit-hour program offered by the Department of Management Science and Statistics. The Graduate Certificate in Operations and Supply Chain Management (OSCM) is designed to provide specialized training to help expand students’ area of expertise, learn about new developments in their fields, augment their professional skills and provide credentials that help advance their careers. It certifies to employers that students awarded the certificate have completed coursework that help them understand a myriad of issues, challenges, problems, and decision tools that relate to the internal and external flow of materials and requisite knowledge. Production/operations management, logistics management, and procurement topics are included to resolve the myriad of complex problems. Moreover, this certificate program will help students discover cutting edge techniques and best practices to leverage their operations and supply chain complexities to achieve competitive advantage.

The operations and supply chain management certificate program provides specialized skills in supply chain management for

- Students who seek foundational knowledge of supply chain complexities as well as a strong understanding of how companies leverage their supply chains to achieve competitive advantage
- Experienced professionals who wish to update their knowledge of current thinking and best practices through interaction with faculty
- Working professionals who want to supplement their undergraduate or graduate degree with graduate courses in supply chain management.

Supply chain management is a broad career field where professionals are involved in every function of global commerce, including marketing, procurement, production and service operations, logistics, inventory management, etc. The certificate program provides students with a thorough understanding of integrated supply chain and operations activities while emphasizing skills in problem solving, communication, and teamwork.

To earn a Graduate Certificate in Operations and Supply Chain Management, students must complete 12 semester credit hours from the following courses, one of which is required:

<table>
<thead>
<tr>
<th>A. Required course:</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 5413</td>
<td>Integrated Global Supply Chain Management</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Select three courses from the following:</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 5343</td>
<td>Logistics Systems Management</td>
</tr>
<tr>
<td>MS 5353</td>
<td>Demand and Forecasting Management</td>
</tr>
<tr>
<td>MS 5393</td>
<td>Topics in Production/Operations Management</td>
</tr>
<tr>
<td>MS 5423</td>
<td>Service Management and Operations</td>
</tr>
<tr>
<td>MS 5433</td>
<td>Effective Project Management</td>
</tr>
<tr>
<td>MS 5453</td>
<td>Management and Control of Quality</td>
</tr>
<tr>
<td>MS 5463</td>
<td>Lean Operations and Six Sigma</td>
</tr>
</tbody>
</table>
Total Credit Hours
12

Applicants for the Operations and Supply Chain Management certificate program who are currently enrolled in a graduate degree program at UTSA have already met University requirements for admission. Thus, no formal application process is necessary. The applicant should contact the Certificate Program Advisor and complete a form requesting permission to enter and complete the certificate program. If the request is approved, the form will be signed by the Certificate Program Advisor and the Dean of the College of Business.

Applicants who are not currently enrolled in a graduate degree program at UTSA will be required to apply for admission to UTSA (non-degree seeking) graduate student and to indicate their intent to seek admission into a certificate program. Applicants will be required to meet University admission requirements for special graduate students. If admitted as a special graduate student, the applicant should contact the Certificate Program Advisor and complete a form requesting permission to enter and complete the certificate program. The form will be signed by the Certificate Program Advisor and the Dean of the College of Business. A copy of this form will be sent to the Graduate School.

If it is determined by the Certificate Program Advisor that an applicant requires prerequisite background courses to adequately prepare for the courses included in the certificate program, this will be noted in the applicant’s file. The applicant will be notified that the prerequisite courses must be taken before enrolling in certificate program coursework.

Any applicant who is admitted into a certificate program without being currently enrolled in a graduate degree program is considered to be a special graduate student. If the applicant wishes to be admitted into a degree program, they will be required to apply to that program as a degree-seeking student. Admittance into or completion of a certificate program is not considered to be qualification for entry into a graduate degree program. Applicants who are admitted into a certificate program while also pursuing a graduate degree will be classified as degree-seeking students.