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. The Department offers a Master of Science degree in Statistics and Data Science, a Doctor of Philosophy degree in Applied Statistics, a Graduate Certificate in Operations and Supply Chain Management, and a Graduate Certificate in Predictive Analytics and Modeling.

- M.S. in Statistics and Data Science (p. 1)
- Accelerated Master of Science in Statistics and Data Science (p. 2)
- Ph.D. in Applied Statistics (p. 3)

Master of Science Degree in Statistics and Data Science

In today's data-driven world, there is a soaring demand for professionals skilled in both statistics and data science. Organizations across various industries seek individuals adept at collecting, analyzing, and interpreting data, and effectively communicating findings. Statisticians and data scientists play a crucial role in addressing diverse challenges, from drug development and health-related issues in biomedical fields to environmental studies focusing on pollution and contamination. Moreover, they are instrumental in internet traffic management, fraud detection, cyber security, and national defense, providing accurate predictions and insights derived from data mining. Statisticians and data scientists find employment opportunities in sectors such as insurance, healthcare, information technology, finance, biomedical research, manufacturing, and services.

Recognizing the need for professionals capable of designing experiments, making predictions, and analyzing large and complex datasets, the Master of Science degree in Statistics and Data Science at UTSA offers comprehensive training in applied statistical methods, computational tools, data manipulation techniques, and statistical and machine learning methods. This program prepares students for diverse career paths, including roles in government, industry, academia, or further study at the doctoral level in statistics and data science.

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 are only admitted in the Fall semester of each academic year.

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, the Admissions Committee requires applicants to complete Calculus I, II, and III, and a course in Matrix Theory/Linear Algebra prior to applying for the program. However, if necessary, the Linear Algebra/ Matrix Theory course may be taken during the first semester of the program (in addition to degree requirements).

A complete application package will include:

- A completed application form
- Transcripts from all universities attended
- English Language Proficiency Test (If applicable)
- Foreign Credential Evaluation (If applicable)

Graduate admission test scores are no longer required. However, please note that competitive GRE scores may help your chances of admission because, in addition to your GPA, the GRE provides a quantitative metric for the Master of Science degree in Statistics and Data Science Programs Committee to evaluate you as a candidate.

Current résumé, letters of recommendation, and statement of purpose are optional for this program.

Degree Requirements

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

Code	Title	Credit Hours
A. All candidates for the Master of Science in Statistics and Data Science must complete the following 12 semester credit hours of coursework:		**12**
STA 5093	Introduction to Statistical Inference	
STA 5103	Applied Statistics	
STA 5503	Mathematical Statistics I	
STA 5513	Mathematical Statistics II	
B. A candidate for the Master of Science degree in Statistics and Data Science must complete 15 semester credit hours of coursework chosen from one or a combination of the following focus areas:		**15**
Biostatistics:		
STA 6033	SAS Programming and Data Management	
STA 6233	R Programming for Data Science	
STA 6243	Exploratory Data Analysis with Python	
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 6923	Introduction to Statistical Learning
Industrial Statistics:	
MS 5453	Management and Control of Quality
STA 5313	Theory of Sample Surveys with Applications
STA 6013	Regression Analysis
STA 6033	SAS Programming and Data Management
STA 6113	Applied Bayesian Statistics
STA 6133	Simulation and Statistical Computing
STA 6233	R Programming for Data Science
STA 6243	Exploratory Data Analysis with Python
STA 6833	Design and Analysis of Experiments
STA 6843	Computer Aided Optimal Design
Management Science:	
MS 5453	Management and Control of Quality
MS 5463	Lean Operations and Six Sigma
STA 6013	Regression Analysis
STA 6033	SAS Programming and Data Management
STA 6133	Simulation and Statistical Computing
STA 6233	R Programming for Data Science
Financial Modeling:	
ECO 6103	Applied Econometrics I
FIN 6313	Modeling of Financial Decision Making
STA 6013	Regression Analysis
STA 6033	SAS Programming and Data Management
STA 6113	Applied Bayesian Statistics
STA 6133	Simulation and Statistical Computing
STA 6233	R Programming for Data Science
STA 6253	Time Series Analysis and Applications
Big Data and Analytics	
IS 6713	Data Foundations
STA 6013	Regression Analysis
STA 6033	SAS Programming and Data Management
STA 6233	R Programming for Data Science
STA 6243	Exploratory Data Analysis with Python
STA 6253	Time Series Analysis and Applications
STA 6813	Multivariate Analysis
STA 6923	Introduction to Statistical Learning
STA 6933	Advanced Topics in Statistical Learning
General Applied Statistics	
Any 15 hours of 5000- or 6000-level courses in Statistics or other disciplines as approved by the Graduate Advisor of Record.	
C. A candidate for the Master of Science degree in Statistics and Data Science must complete 6 semester credit hours of graduate-level courses in Statistics, Engineering, Biology or other disciplines as approved by the Graduate Advisor of Record.	**6**
D. Comprehensive Examination: Each candidate for the degree is required to pass a comprehensive examination in Statistics that will cover material in the following courses: STA 5093, STA 5103, STA 5503 and STA 5513. The comprehensive examination will be offered once a year during each summer.	
Total Credit Hours	**33**

Accelerated Master of Science in Statistics and Data Science

The Department of Management Science and Statistics and Alvarez College of Business (ACOB) offer an Accelerated Statistics and Data Science Program tailored to UTSA students with exceptional motivation and qualifications. Designed to facilitate a seamless transition into a master's program and provide an expedited admission process, this program allows participants to initiate their graduate studies as early as the senior year of their undergraduate education.

The benefit of the accelerated program is it allows students to complete some graduate courses while still earning their undergraduate degree. In addition, students have the potential to reduce their time until graduation (e.g., students can start completing their graduate-level coursework during their senior year) and save money (e.g., students are not charged an application fee and potentially could double count one course); the program also creates an easier transition into graduate school (i.e., a known admission into graduate school while in their undergraduate education and a constant connection with UTSA faculty and staff).

Program Admission Requirements

Applications to the Accelerated Program in Statistics and Data Science must meet the following criteria[1]: 1) a current UTSA student, 2) completion of 90 semester credit hours in the semester of application, 3) a minimum grade point average of 3.0, and 4) earn a bachelor's degree in a relevant STEM or business domains. Applicants must apply online[2] for the Accelerated Statistics and Data Science Program and will be provided additional information upon submission.

This program is tailored to cater to the following individuals:

- UTSA students who aspire to pursue a bachelor's degree with a strong mathematical (e.g., complete Calculus III and Linear Algebra) background and a Master of Science (M.S.) in Statistics and Data Science. After appropriate consultation and approval from the program advisor, these students could replace some of the required M.S. courses with graduate electives. This would remove unnecessary course repetition and allow students to customize the program to serve their professional needs better.

[1] These are the minimum criteria to be accepted into the Accelerated Program in Statistics and Data Science. After completing the online survey, a Statistics and Data Science faculty member will meet with each student to discuss their degree plan and the required expectations to be accepted into the program.

[2] Completing the survey is the first of two steps of the application process for the Accelerated Program in Statistics and Data Science. It connects students who are interested in the program with Statistics and Data Science faculty members, offers details about the program and the second step of the application process, fosters mentoring connections with Statistics and Data Science faculty members, and ultimately compiles a roster of students eligible for automatic

admission into the M.S. in Statistics and Data Science program through KRWU.

Doctor of Philosophy Degree in Applied Statistics

In this age of advanced technology and big data, there is an increasing demand for individuals with expertise in designing experiments and analyzing large complex data sets via the latest advances in statistical methods and computing technology. In particular, there is a high demand for professionals with a Ph.D. in Applied Statistics to solve real-world problems faced by various areas of scientific study. For example, in the 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 the exposure of the 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 model and analyze big data, especially in areas of fraud detection, cyber security, and defense-related issues. Statisticians are being recruited in academic institutions and a variety of industries, including insurance and finance institutions, manufacturing and service businesses. The Ph.D. in Applied Statistics combines advanced statistical analysis and theory with practical applications to prepare students with these essential skills 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 79 on the Test of English as a Foreign Language (TOEFL) iBT. TOEFL scores may not be more than two years old.
- Evaluated copies of transcripts from foreign countries
- Applicants may be asked to appear before the admissions committee for a personal interview.

Degree Requirements

Candidates with an M.S. in Statistics or a related field are required to successfully complete a minimum of 57 credit hours of course work at the 6000- or 7000-level, starting from item C below. However, those who do not have the foundation courses listed in item A are required to complete these courses in addition to the 57 credit hours required for the degree. Candidates with a bachelor's degree are required to successfully complete a minimum of 87 semester credit hours of graduate coursework as specified below:

Code	Title	Credit Hours
A. Foundation Courses		12
All candidates entering the program with only a bachelor's degree or with a non-quantitative master's degree must complete the following 12 semester credit hours of coursework:		
STA 5093	Introduction to Statistical Inference	
STA 5103	Applied Statistics	
STA 5503	Mathematical Statistics I	
STA 5513	Mathematical Statistics II	
B. All candidates entering the program with a bachelor's degree must complete 18 semester credit hours of 6000- or 7000-level Statistics courses approved by the Graduate Advisor of Record.		18
C. All candidates must complete the following 12 semester credit hours of advanced coursework:		12
STA 6133	Simulation and Statistical Computing	
STA 6713	Linear Models	
STA 7503	Advanced Inference I	
STA 7513	Advanced Inference II	
D. 9 semester credit hours of graduate courses at the 6000-level or higher within the Department of Management Science and Statistics, as approved by the Graduate Advisor of Record.		9
E. A minimum of 6 semester credit hours of graduate elective courses approved by the Graduate Advisor of Record.		6
F. A minimum of 15 semester credit hours of Doctoral Research.		15
G. A minimum of 15 semester credit hours of Doctoral Dissertation.		15
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.

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 the dissertation proposal before being admitted to candidacy for the degree. Unless otherwise approved by the Ph.D. Program Committee, all students should take both parts of the written qualifying examination by the end of the Summer term of their first or second year in the program. Students who do not pass one part of the exam will have to retake the same part of the exam in the immediate next Summer term. The written examinations are administered by the graduate committee members and are scheduled once a year during the Summer term. Those who do not pass the qualifying examination may not continue in the Doctoral Program but may qualify for the M.S. degree. The oral proposal defense is administered at the discretion of the student's Dissertation Committee. It 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. A 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 (p. 4)
- Graduate Certificate in Predictive Analytics and Modeling (p. 5)

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' areas 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, and inventory management. 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.

Certificate Program Requirements

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:

Code	Title	Credit Hours
A. Required course:		3
MS 5413	Integrated Global Supply Chain Management	
B. Select three courses from the following:		9
MS 5023	Decision Analytics for Managers	
MS 5343	Logistics Systems Management	
MS 5363	Pricing and Revenue Management	
MS 5383	Supply Chain Analytics	
MS 5393	Advanced Production and Operations Management	
MS 5423	Service Management and Operations	
MS 5433	Effective Project Management	
MS 5453	Management and Control of Quality	
MS 5463	Lean Operations and Six Sigma	
Total Credit Hours		**12**

Applicants for the Graduate Certificate in Operations and Supply Chain Management 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 as a special graduate (non-degree seeking) 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.

Graduate Certificate in Predictive Analytics and Modeling

The Graduate Certificate in Predictive Analytics and Modeling is a 15-semester-credit-hour program offered by the Department of Management Science and Statistics. This certificate is designed to provide specialized training to enhance students' expertise in the rapidly growing field of predictive analytics, learn about cutting-edge developments, and augment their professional skills. It also offers a credential that helps advance their careers by certifying to employers that the student has completed advanced coursework in data-driven decision-making and statistical modeling techniques.

The coursework equips students with the tools to address a wide range of real-world problems through predictive analytics, enabling them to analyze large data sets, identify patterns, and make informed predictions. Topics covered include statistical learning, machine learning, data mining, and offering solutions for decision-making in diverse industries such as finance, healthcare, marketing, and technology. Moreover, this certificate program will help students discover state-of-the-art techniques and best practices to leverage data for strategic advantage.

The predictive analytics and modeling certificate provides specialized skills for:

- Students seeking foundational knowledge of predictive modeling and data-driven decision-making as well as a strong understanding of how businesses use analytics to gain competitive insights.
- Experienced professionals who wish to update their knowledge of current analytical tools and best practices through interaction with expert faculty.
- Working professionals who want to supplement their undergraduate or graduate degree with specialized courses in predictive analytics and statistical modeling.

Predictive analytics is a versatile and high-demand field where professionals are involved in a variety of functions across industries, including marketing, financial forecasting, operations, healthcare analysis, and technology. This certificate program provides students with a thorough understanding of analytical techniques and data-driven strategies while emphasizing skills in problem-solving, communication, and teamwork.

Certificate Program Requirements

To earn a Graduate Certificate in Predictive Analytics and Modeling, students must complete five courses, totaling 15 semester credit hours. These courses will be offered during Fall and Spring, with some available in the Summer. In the first semester, students will learn foundational concepts in statistical inference, data visualization, and programming. In the second semester, they will expand these skills by focusing on predictive modeling and statistical and machine learning techniques. The certificate can be completed in two semesters, but students also have the flexibility to enroll part-time and extend the completion timeline. Throughout the program, students will apply statistical methods, analytical skills, predictive modeling, and machine learning across a wide array of disciplines.

Code	Title	Credit Hours
Required Courses		**15**
STA 6003	Statistical Methods in Research and Practice I	
STA 6103	Statistical Methods in Research and Practice II	
STA 6233	R Programming for Data Science	
STA 6243	Exploratory Data Analysis with Python	
STA 6543	Predictive Modeling	
Total Credit Hours		**15**

Management Science (MS) Courses

MS 5003. Quantitative Methods for Business Analysis. (3-0) 3 Credit Hours.
This is an introductory course in business data analytics as it applies to managerial decision-making. Topics include, but are not limited to, exploratory data analysis, probability and probability distributions, inferential statistics, chi-square tests, analysis of variance, simple and multiple linear regression, time series data analysis, and forecasting. Computer software is used to illustrate all data analytics techniques. This course has Differential Tuition.

MS 5013. Data Analytics for Managers. (3-0) 3 Credit Hours.
This course provides fundamental statistical data analytics skills for managers who are likely to encounter business challenges that require the application of statistical techniques. Topics covered include a review of statistical principles, the logic of hypothesis testing, and the role of assumptions in statistical analysis. Several statistical techniques will be covered including chi-square tests, analysis of variance (ANOVA) including multiple group comparison tests, correlation, multiple regression including dummy variable regression, time series concepts such as stationarity, and techniques including but not limited to ARIMA models and forecasting. Statistical computer software will be utilized to provide hands-on experience in analyzing data related to real-world business challenges. Emphasis will be placed upon determining the appropriate statistical technique for the problem at hand as well as the correct interpretation of results produced by the statistical tests covered. This course has Differential Tuition.

MS 5023. Decision Analytics for Managers. (3-0) 3 Credit Hours.
Prerequisite: MS 5013 or an equivalent or consent of instructor. This course is a study of the applications of decision analytics techniques used in managerial decision-making. Topics include, but are not limited to, linear programming, distribution network models, project scheduling, inventory management, waiting line models, simulation, decision analysis, and Markov processes. Students will develop spreadsheet models that enable these techniques to utilize the data available to them and apply the results to business decisions. (Formerly titled "Decision Analysis and Production Management".) This course has Differential Tuition.

MS 5323. Statistical Methods for Business Analytics. (3-0) 3 Credit Hours.
Prerequisite: MS 5013 or an equivalent. Introduction to multivariate statistical analysis. Typical topics include multiple regression, multiple analysis of variance, logistic regression, discriminant analysis, conjoint analysis, cluster analysis, and factor analysis. Emphasizes the use of computer statistical packages. This course has Differential Tuition.

MS 5333. Introduction to Business Analytics. (3-0) 3 Credit Hours.
This course introduces the basic concepts of business analytics, principles of data mining, Structured Query Language (SQL), and Big Data. It provides students an opportunity to understand how analytics can help improve decisions throughout an organization's value chain. Presents the most prevalent methods for descriptive (e.g., cluster analysis, association analysis), predictive (e.g., multiple regression, logistic regression, decision tree methods), and prescriptive (e.g., optimization) analytics. This course has Differential Tuition.

MS 5343. Logistics Systems Management. (3-0) 3 Credit Hours.
Study of business logistics: the process of planning, implementing, and controlling the flow and storage of goods or services and related information from point of origin to point of consumption to achieve customer satisfaction. Focuses on the cost and value added to products or services by making them available in the desired condition when and where they are needed. This course has Differential Tuition.

MS 5363. Pricing and Revenue Management. (3-0) 3 Credit Hours.
Revenue Management is about "providing the right product to the right customers at the right time at the right price." The main goal of this course is to apply revenue management practices to appropriate industries successfully. Specifically, the course will provide tools to forecast customer demand successfully, identify pricing and revenue opportunities, understand the impact of constrained capacity, opportunity costs, customer response, demand uncertainty and market segmentation on pricing decisions, and accordingly formulate and solve pricing optimization problems for revenue maximization. The material covered in the course assumes a basic understanding of probability and probability distributions, some knowledge of spreadsheet modeling, and using Excel Solver or similar optimization tools to get a solution. This course has Differential Tuition.

MS 5383. Supply Chain Analytics. (3-0) 3 Credit Hours.
The main goal of this course is to integrate data analytics with supply chain management. The course will introduce data-driven models, skills, and tools for learners to manage supply chains efficiently and effectively. Specifically, the course will provide an overview of supply chain intelligence and analytics applied in the global marketplace through real-world examples and case studies, and help develop critical thinking skills in support of competition and collaboration strategies in supply chain management. Students learn to define the right data set, ask the right set of questions to drive supply chain efficiency and business value, and use the appropriate models and tools to develop data-driven decisions. This course has Differential Tuition.

MS 5393. Advanced Production and Operations Management. (3-0) 3 Credit Hours.
Operations management as a basic function that must be performed in all business firms involves managing the activities and resources necessary to make products and/or provide services. It can be an effective competitive weapon to penetrate into markets worldwide. The course is designed to address the key operations issues in manufacturing and service organizations that have strategic as well as tactical implications. We review the methods required for design, operation, and improvements of the systems that create products or services. Topics covered include Product/Service Design, Process Strategy and Analysis, Quality and Performance, Capacity Planning & Constraint Management, Inventory Management, Forecasting, Operations Planning & Scheduling, and Resource Planning, etc. This course has Differential Tuition.

MS 5413. Integrated Global Supply Chain Management. (3-0) 3 Credit Hours.
Focuses on effective supply chain strategies for organizations that operate globally with emphasis on how to plan and integrate supply chain components into a coordinated system. Specifically, the course seeks to integrate different perspectives from the practices of marketing, logistics, and operations management. The course will introduce key tactics such as risk pooling and inventory placement, integrated planning, and information sharing. One of the key objectives is to understand the relationship between a focal firm and its suppliers and customers. This course has Differential Tuition.

MS 5423. Service Management and Operations. (3-0) 3 Credit Hours.
Focuses on understanding the variety of service industries (both profit and nonprofit) and the growing importance of the service industry to the economy. In addition to the traditional topics of quality, customer satisfaction and value creation, topics include service encounters, service design and development, service productivity, and globalization of services. Tools and techniques for management service operations are also emphasized. This course has Differential Tuition.

MS 5433. Effective Project Management. (3-0) 3 Credit Hours.
Approaches project management from the perspective that the material is applicable to all disciplines and project types. It not only emphasizes individual project execution, but also provides a strategic perspective. It integrates the critical PMBoK elements in the context of cases and projects. The course examines the traditional concepts and techniques of project management for long-term development programs and short-term projects as well as introducing the innovative adaptive and extreme concepts. This course has Differential Tuition.

MS 5453. Management and Control of Quality. (3-0) 3 Credit Hours.
An examination of the fundamental nature of quality assurance, its strategic importance in business and industry, and the economic impact of quality. Theoretical and management issues relating to quality problem solving are emphasized. The contribution of the leaders in modern quality management are discussed. This course has Differential Tuition.

MS 5463. Lean Operations and Six Sigma. (3-0) 3 Credit Hours.
Course provides an introduction to Six Sigma methodologies and is designed to present the fundamentals of Six Sigma and instill an understanding of what is required to build a sustainable Six Sigma structure. Lean tools, such as physical maps, time value, and Kanban are included as well as advanced Six Sigma statistical tools. This course has Differential Tuition.

MS 5493. Procurement and Inventory Management. (3-0) 3 Credit Hours.
A portion of this course focuses on the key issues related to the strategic implications of sourcing of products, the purchasing of goods and services, and the role of purchasing in a supply chain context. It provides students with an understanding of purchasing processes, issues, and best practices. Emphasis areas include supplier quality, relationship management, and global sourcing. Inventory control concepts, techniques, and strategies for effective integration with basic finance, marketing, and manufacturing objectives are topics covered in this course. Models for dependent and independent demand inventory systems, material requirements planning systems, distribution requirements, planning techniques, and the classical reorder point inventory model are also included. This course has Differential Tuition.

MS 6943. Management Science Internship. (0-0) 3 Credit Hours.
Prerequisite: Graduate standing, 15 semester credit hours of graduate work, and consent of instructor. Internship must be approved in advance by the Internship Coordinator and the student's Graduate Advisor of Record. Supervised full- or part-time off-campus work experience and training in management science. Individual conferences and written reports required. This course has Differential Tuition.

MS 6953. Independent Study. (0-0) 3 Credit Hours.
Prerequisites: Graduate standing and permission in writing (form available) of the instructor and the student's Graduate Advisor of Record. Independent reading, research, discussion, and/or writing under the direction of a faculty member. For students needing specialized work not normally or not often available as part of the regular course offerings. May be repeated for credit, but not more than 6 hours, regardless of discipline, will apply to the degree. Differential Tuition: $387.

MS 6971. Special Problems. (1-0) 1 Credit Hour.
Prerequisite: Consent of instructor. An organized course offering the opportunity for specialized study not normally or not often available as part of the regular course offerings. Special Problems courses may be repeated for credit when topics vary, but not more than 6 hours, regardless of discipline, will apply to the degree. This course has Differential Tuition.

MS 6973. Special Problems. (3-0) 3 Credit Hours.
Prerequisite: Consent of instructor. An organized course offering the opportunity for specialized study not normally or not often available as part of the regular course offerings. Special Problems courses may be repeated for credit when topics vary, but not more than 6 hours, regardless of discipline, will apply to the degree. This course has Differential Tuition.

MS 6983. Master's Thesis. (0-0) 3 Credit Hours.
Prerequisite: Permission of the Graduate Advisor of Record and thesis director. Thesis research and preparation. May be repeated for credit, but not more than 6 hours will apply to the Master's degree. Credit will be awarded upon completion of the thesis. Enrollment is required each term in which the thesis is in progress. This course has Differential Tuition.

MS 7033. Applications in Causal Structural Modeling. (3-0) 3 Credit Hours.
Prerequisite: Consent of instructor. The purpose of this course is to provide students with an overview of structural equation modeling (SEM) procedures, which includes, but not limited to, issues related to measurement evaluation, model selection and specification, model estimation, and model fit. An additional aim of this course is to provide students with the computer skills needed to analyze and interpret their data, especially as it related to factor analysis, path analysis, and SEM. This course also addresses supplemental topics commonly encouraged in SEM and applied research (sample size and power, missing data, non-normal data, order categorical data, etc.). This course has Differential Tuition.

Statistics (STA) Courses

STA 5093. Introduction to Statistical Inference. (3-0) 3 Credit Hours.
Prerequisite: Admission to the Master's program or consent of instructor. This course covers introduction to sampling methods, random variables, and descriptive analysis methods, basic probability theory, common probability distributions, joint distributions, moment generating function, statistical estimation, interval estimation, hypothesis testing for a single parameter and comparing two parameters, and goodness-of-fit tests. Statistical software will be used for data analysis. This course has Differential Tuition.

STA 5103. Applied Statistics. (3-0) 3 Credit Hours.
Prerequisite: STA 5093 or equivalent, or consent of instructor. This course covers relations between categorical variables, one-way factor models, factorial experiments, multiple comparisons, simple linear regression, and multiple linear regression. Statistical software will be used for data analysis. Statistical software will be used for data analysis. This course has Differential Tuition.

STA 5313. Theory of Sample Surveys with Applications. (3-0) 3 Credit Hours.
Prerequisite: STA 5093 or STA 6003 or consent of instructor. Basic sampling techniques and their comparisons for finite populations. Topics include simple random sampling, stratified sampling, ratio and regression estimates, systematic sampling, cluster sampling, multistage and double sampling, and bootstrap and other sampling plans. This course has Differential Tuition.

STA 5503. Mathematical Statistics I. (3-0) 3 Credit Hours.
Prerequisite: Admission to the Statistics graduate program or consent of instructor. Axioms of probability, counting rules, univariate random variables, multivariate random variables, joint, marginal, and conditional probability distributions, mathematical expectation, variable transformation, moment generating function, commonly used probability distributions, sampling distributions, laws of large numbers and the central limit theorem. This course has Differential Tuition.

STA 5513. Mathematical Statistics II. (3-0) 3 Credit Hours.
Prerequisite: STA 5503 or consent of instructor. Data reduction, sufficient and complete statistics, unbiased estimation, maximum likelihood estimation, method of moments, best unbiased estimator, Fisher information, Cramer-Rao lower bound, hypothesis testing, likelihood ratio test, Neyman-Pearson lemma and uniformly most powerful test, and interval estimation. This course has Differential Tuition.

STA 5893. AI Practicum. (3-0) 3 Credit Hours.
Prerequisite: Graduate standing or consent of instructor. This AI practicum course includes weekly AI seminar which provides insights on the current state of the AI and ML technologies and covers a wide variety of AI topics, such as computer vision, natural language processing (NLP), theoretical ML, AI fairness and ethics, cognitive science, AI hardware, etc. The seminars will include speakers from industry and academia, who discuss the state of the practice with real use cases and methodologies to make AI projects a tangible success. The practicum also offers an experiential training opportunity to apply AI to problems in the real world. Standard AI programming tool suites and design flow concepts will be learned through the mini-project. Students will also be introduced to how AI is impacting society, the ethics of AI solutions, concerns surrounding AI, and deploying AI in complex scenarios. Python programming experience is needed. This course has Differential Tuition.

STA 5973. Directed Research. (0-0) 3 Credit Hours.
Prerequisite: Graduate standing and permission in writing (form available) from the instructor and the student's Graduate Advisor of Record. The directed research course may involve either a laboratory or a theoretical problem. May be repeated for credit, but not more than 6 hours, regardless of discipline, will apply to the Master's degree. This course has Differential Tuition.

STA 6003. Statistical Methods in Research and Practice I. (3-0) 3 Credit Hours.
Prerequisite: One semester of calculus and one statistics course, or consent of instructor. The course includes concepts and knowledge in basic probability, common distributions, point and interval statistical estimations, test of hypothesis, goodness-of-fit tests, simple linear regression, and analysis of variance for regression. Course emphasis will be placed on understanding the underlying assumptions and limitations of the different techniques. Statistical software will be used for data analysis. Cannot be applied to MS in Statistics and Data Science. This course has Differential Tuition.

STA 6013. Regression Analysis. (3-0) 3 Credit Hours.
Prerequisite: STA 6003 or equivalent, or consent of instructor. Multiple regression analysis, including model adequacy checks, transformations, weighted regression, diagnostics, outlier detection, polynomial regression, indicator variables, multicollinearity, remedial measures, variable selection, model validation, autocorrelation, and specialized regressions including robust regression, nonlinear regression, logistic regression, generalized linear models, and penalized regressions. Statistical software will be used for data analysis. This course has Differential Tuition.

STA 6033. SAS Programming and Data Management. (3-0) 3 Credit Hours.
This course introduces essential SAS programming concepts with a focus on data management and the preparation of data for statistical analysis. Topics include accessing data, exploring and validating data, manipulating data with functions, processing repetitive code, combining and restructuring data, analyzing and reporting data, exporting results, and SQL. This course employs efficient and innovative methods, including the use of PROCs and Macros, to accomplish the above. This course also prepares students for the SAS Certified Associate: Programming Fundamentals Using SAS certificate exam and the SAS Specialist: Base Programming Using SAS certificate exam. This course has Differential Tuition.

STA 6103. Statistical Methods in Research and Practice II. (3-0) 3 Credit Hours.
Prerequisite: STA 6003 or equivalent, or consent of instructor. The course is specifically designed for non-statistics major graduate students and is a continuation of STA 6003. The course includes topics in multiple linear regression, experimental design introductions, analysis of variance, analysis of covariance, generalized linear models, and optional topics such as introduction to causal inference and multi-stage least squares procedure. Statistical software will be used for data analysis. Cannot be applied to MS in Statistics and Data Science. This course has Differential Tuition.

STA 6113. Applied Bayesian Statistics. (3-0) 3 Credit Hours.
Prerequisite: STA 5103 or consent of instructor. Probability and uncertainty, conditional probability and Bayes' Rule, single parameter and multiple parameter Bayesian analysis, posterior analysis for commonly used distributions, prior distribution elicitation, comparison of Bayesian and frequentist methods, Bayesian methods in linear models, Bayesian computation methods including rejection sampling, and stochastic simulation (Markov chain Monte Carlo), Bayesian shrinkage and regularization, hierarchical Bayesian methods, and applications. This course has Differential Tuition.

STA 6133. Simulation and Statistical Computing. (3-0) 3 Credit Hours.
Prerequisite: STA 5513 or consent of instructor. Elements of computer number representation, deterministic methods for function optimization, the Newton-Raphson method and variants, numerical quadrature, Gaussian quadrature, Laplace approximation, simulation of probability distributions, the inverse transform, common transformation methods, accept-reject methods, examples in Statistics, simulation from multivariate distributions, Monte Carlo integration, importance sampling, methods for variance reduction, Bootstrap, and Jackknife applications. This course has Differential Tuition.

STA 6233. R Programming for Data Science. (3-0) 3 Credit Hours.
This course is designed to introduce students to the statistical program language R for data manipulation and analysis. Topics include importing and writing various types of data, exploring and summarizing data, reshaping and cleaning data, generating graphical representations of data, and conducting basic statistical analyses using R. Other topics include writing R functions for own research problems, simplifying code for readability and performance, and object-oriented programming. Techniques for efficient programming will be stressed. This course has Differential Tuition.

STA 6243. Exploratory Data Analysis with Python. (3-0) 3 Credit Hours.
This course delves into the exploration of Exploratory Data Analysis (EDA) principles and methodologies, emphasizing data cleaning, preparation, exploration, and visualization. Students will engage with real-world datasets, learning to source, manage, transform, and explore a variety of data types using Python as the primary software tool. The course emphasizes critical thinking in the interpretation of data analytics and the development of compelling data narratives. Students are expected to complete comprehensive projects that showcase their ability to innovate in data management, analysis, and visualization. It aims to equip students with the skills needed for data science roles alongside facilitating effective communication to convey insights. This course has Differential Tuition.

STA 6253. Time Series Analysis and Applications. (3-0) 3 Credit Hours.
Prerequisite: STA 5513 or consent of instructor. This course provides examples and goals of time series analysis, stochastic processes, mean and autocovariance and cross-covariance functions, stationarity, estimation of mean and autocovariance functions, linear filters, smoothing time series, autoregressive and moving average (ARMA) processes, estimation by method of moments, least squares and maximum likelihood, model diagnostics, order and model selection, forecasting/prediction of time series, best linear prediction, and autoregressive integrated moving average (ARIMA) models. This course has Differential Tuition.

STA 6413. Nonparametric Statistics. (3-0) 3 Credit Hours.
Prerequisite: STA 5093 or consent of instructor. This course is designed to cover two big topics: (i) statistical inference under a nonparametric setting and (ii) nonparametric regression modeling based on smoothing techniques. The statistical inference methods include one-sample location problems, two-sample location problems, two-sample dispersion problems, and regression problems. The nonparametric modeling methods include local regression and penalized regression with the optimal choice of the smoothing parameter, density estimation, wavelets, and other adaptive nonparametric regression methods. This course has Differential Tuition.

STA 6443. Statistical Modeling. (3-0) 3 Credit Hours.
Prerequisite: Basic statistics or equivalent. Introduction of basic statistical methods, with specific emphasis on inferential statistics and predictive modeling algorithms . Topics include (i) exploratory data analysis; data visualization, graphical methods, extracting important variables and detecting outliers, (ii) linear models; analysis of variance (ANOVA), linear regression models, and logistic regression models. Students will be provided the opportunity to gain an understanding of when to apply and how to select various predictive modeling algorithms for various types of problems, as well as data assumptions and requirements for algorithm use, proper parameter setting, and interpreting results. Cannot be applied to MS in Statistics and Data Science. This course has Differential Tuition.

STA 6543. Predictive Modeling. (3-0) 3 Credit Hours.
This course presents students with basic understanding of predictive modeling techniques and predictive analytics tools, with specific emphasis on problem-solving with real data using R programming. Topics include data preprocessing, over-fitting and model tuning, supervised learning methods, including linear regression and classification, nonlinear regression and classification models, resampling methods, model regularization, tree and rule-based methods, and support vector machines. Unsupervised learning methods include principal component analysis, clustering methods, and outlier detection. Students will learn how to select various predictive modeling algorithms for a wide variety of applications and how to code the programs in R, as well as assumptions and requirements of predictive modelling, optimal tuning parameter setting, and how to interpret and report the results. Cannot be applied to MS in Statistics and Data Science. This course has Differential Tuition.

STA 6713. Linear Models. (3-0) 3 Credit Hours.
Prerequisite: STA 5103 or equivalent, or consent of instructor. The main objective of this course is to understand the underlying theories of linear models for regression, analysis-of-variance (ANOVA), and linear mixed models. By starting with the review of topics in matrix algebra, including rank, inverse, determinants, and spectral decomposition, students learn multivariate Normal distribution and properties of their linear and quadratic transformations. Then, relevant theories are connected to linear regression problems to derive the statistical properties of parameter estimates and implement hypothesis testing. Students will also have the opportunity to learn the statistical properties of ANOVA models and their hypothesis-testing problems under linear model contexts. The formulation of linear mixed model and generalized linear model under matrix algebra theory is also covered. This course has Differential Tuition.

STA 6813. Multivariate Analysis. (3-0) 3 Credit Hours.
Prerequisite: STA 5103 or equivalent, or consent of instructor. This course includes an introduction to multivariate data, matrix algebra, random vectors, multivariate normal distribution, inference about mean vectors, comparison of several multivariate means, principal component analysis, factor analysis, and discrimination and classification. Statistical software will be used for data analysis. This course has Differential Tuition.

STA 6833. Design and Analysis of Experiments. (3-0) 3 Credit Hours.
Prerequisite: STA 5103 or equivalent, or consent of instructor. Introduction to experimental design and applied data analysis as used in business, technological, and scientific settings. Topics include one-factor and two-factor experiments, randomized block designs, two-level and three-level factorial and fractional factorial designs, nested and split-plot designs, and optimal designs. Statistical software will be used for data analysis. This course has Differential Tuition.

STA 6843. Computer Aided Optimal Design. (3-0) 3 Credit Hours.
Prerequisite: STA 6833 or equivalent, or consent of instructor. Introduction to obtaining experimental designs and statistical methods for fitting response surfaces, and how to computer-generate the designs and use them in applied settings. Topics discussed include generating designs for obtaining process improvements with steepest ascents and for fitting response surfaces of different shapes, and use of the resultant model diagnostics to find optimum operating conditions. Use is made of JMP and SAS for design generation. This course has Differential Tuition.

STA 6853. Categorical Data Analysis. (3-0) 3 Credit Hours.
Prerequisite: STA 5103 or equivalent, or consent of instructor. This course will cover an introduction to categorical data, analysis and asymptotic inferences on contingency tables, generalized linear model, logistic regression, logit models for binary data and multicategories, log-linear model, models for matched pairs, modeling correlated responses, and generalized linear mixed models. Statistical software will be used for data analysis. This course has Differential Tuition.

STA 6863. Spatial Statistics. (3-0) 3 Credit Hours.
Prerequisite: STA 5103 or equivalent, or consent of instructor. This course will cover types of spatial data, problems dealt by geostatistical methods, basic theory of random fields, Gaussian random fields, covariograms and variograms, exploratory spatial data analysis, description of some geostatistical software, covariogram/variogram estimation: method-of-moments, least squares, maximum likelihood and restricted maximum likelihood, model selection, spatial prediction (kriging): simple kriging, ordinary kriging, universal kriging, lognormal kriging, trans-Gaussian kriging, indicator kriging, Poisson kriging, block kriging, statistical properties of kriging predictors, cross-validation, and simulation of random fields. This course has Differential Tuition.

STA 6903. Survival Analysis. (3-0) 3 Credit Hours.
Prerequisite: STA 5093 or equivalent, or consent of instructor. This course introduces both parametric and nonparametric methods for analyzing time to event data. Topics include survivor and hazard functions, censoring, Kaplan-Meier estimation, log-rank and related tests, inference based on standard lifetime distributions, regression approach to survival analysis including the Cox proportional hazards model, and time dependent covariates. Emphasis will be given on application, interpretation and data analysis using statistical software. This course has Differential Tuition.

STA 6923. Introduction to Statistical Learning. (3-0) 3 Credit Hours.
Prerequisite: STA 5103 or equivalent, or consent of instructor. This course provides an introduction to statistical learning and data mining tools in analyzing the vast amounts of data found in business, informatics, cyber security and other industries. The course mostly covers supervised learning. The topics include concepts in statistical and machine learning, data preprocessing, variance-bias tradeoff, linear regressions with model assessment and regularization, model averaging, resampling tools, tree-based models with bagging, boosting, and random forests, discriminant analysis, and nearest-neighbor classification. Statistical software will be used for data analysis. This course has Differential Tuition.

STA 6933. Advanced Topics in Statistical Learning. (3-0) 3 Credit Hours.
Prerequisite: STA 6923 or equivalent, or consent of instructor. This course provides a deeper understanding of selected statistical learning concepts and tools with mathematical justifications. The topics include principal component analysis, cluster analysis, linear and nonlinear methods in regression and classification with regularization, generalized additive models, support vector machines, neural networks, and an introduction to deep learning. Statistical software will be used for data analysis. This course has Differential Tuition.

STA 6943. Statistics Internship. (0-0) 3 Credit Hours.
Prerequisite: Graduate standing, 15 semester credit hours of graduate work, and consent of instructor. Internship must be approved in advance by the Internship Coordinator and the student's Graduate Advisor of Record. Supervised full- or part-time off-campus work experience and training in statistics. Individual conferences and written reports required. This course has Differential Tuition.

STA 6953. Independent Study. (0-0) 3 Credit Hours.
Prerequisite: Graduate standing and permission in writing (form available) from the instructor and the student's Graduate Advisor of Record. Independent reading, research, discussion, and/or writing under the direction of a faculty member. For students needing specialized work not normally or not often available as part of the regular course offerings. May be repeated for credit, but not more than 6 hours, regardless of discipline, will apply to the degree. This course has Differential Tuition.

STA 6961. Comprehensive Examination. (0-0) 1 Credit Hour.
Prerequisite: Approval of the appropriate Graduate Program Committee to take the Comprehensive Examination. Independent study course for the purpose of taking the Comprehensive Examination. May be repeated as many times as approved by the Graduate Program Committee. Enrollment is required each term in which the Comprehensive Examination is taken if no other courses are being taken that term. The grade report for the course is either "CR" (satisfactory performance on the Comprehensive Examination) or "NC" (unsatisfactory performance on the Comprehensive Examination). This course has Differential Tuition.

STA 6973. Special Problems. (3-0) 3 Credit Hours.
Prerequisite: Consent of instructor. An organized course offering the opportunity for specialized study not normally or not often available as part of the regular course offerings. Special Problems courses may be repeated for credit when topics vary, but not more than 6 hours, regardless of discipline, will apply to the degree. This course has Differential Tuition.

STA 6983. Master's Thesis. (0-0) 3 Credit Hours.
Prerequisite: Permission from the Graduate Advisor of Record and thesis director. Thesis research and preparation. May be repeated for credit, but not more than 6 hours will apply to the Master's degree. Credit will be awarded upon completion of the thesis. Enrollment is required each term in which the thesis is in progress. This course has Differential Tuition.

STA 7023. Applied Linear Statistical Models. (3-0) 3 Credit Hours.
Prerequisite: Consent of instructor. An in-depth study of regression and analysis of variance models. Topics include multiple regression and model building, multiple and partial correlation, analysis of residuals, analysis of variance, multivariate analysis of variance, analysis of variance as regression analysis, generalized linear model, and applications of statistical models to problems in business. Computer software packages such as SAS or SPSS will be used for data analysis. This course is designed for doctoral students in Business and cannot be applied to a Master of Science degree in Applied Statistics without consent of the instructor and prior approval from the Graduate Advisor of Record. This course has Differential Tuition.

STA 7211. Doctoral Research. (0-0) 1 Credit Hour.
May be repeated for credit, but not more than 15 hours may be applied toward the Doctoral degree. This course has Differential Tuition.

STA 7212. Doctoral Research. (0-0) 2 Credit Hours.
May be repeated for credit, but not more than 15 hours may be applied toward the Doctoral degree. This course has Differential Tuition.

STA 7213. Doctoral Research. (0-0) 3 Credit Hours.
May be repeated for credit, but not more than 15 hours may be applied toward the Doctoral degree. This course has Differential Tuition.

STA 7214. Doctoral Research. (0-0) 4 Credit Hours.
May be repeated for credit, but not more than 15 hours may be applied toward the Doctoral degree. This course has Differential Tuition.

STA 7216. Doctoral Research. (0-0) 6 Credit Hours.
May be repeated for credit, but not more than 15 hours may be applied toward the Doctoral degree. This course has Differential Tuition.

STA 7311. Doctoral Dissertation. (0-0) 1 Credit Hour.
Prerequisite: Admission to candidacy for Doctoral degree in Applied Statistics. May be repeated for credit, but not more than 15 hours may be applied toward the Doctoral degree. This course has Differential Tuition.

STA 7313. Doctoral Dissertation. (0-0) 3 Credit Hours.
Prerequisite: Admission to candidacy for Doctoral degree in Applied Statistics. May be repeated for credit, but not more than 15 hours may be applied toward the Doctoral degree. This course has Differential Tuition.

STA 7314. Doctoral Dissertation. (0-0) 4 Credit Hours.
Prerequisite: Admission to candidacy for Doctoral degree in Applied Statistics. May be repeated for credit, but not more than 15 hours may be applied toward the Doctoral degree. This course has Differential Tuition.

STA 7316. Doctoral Dissertation. (0-0) 6 Credit Hours.
Prerequisite: Admission to candidacy for Doctoral degree in Applied Statistics. May be repeated for credit, but not more than 15 hours may be applied toward the Doctoral degree. This course has Differential Tuition.

STA 7503. Advanced Inference I. (3-0) 3 Credit Hours.
Prerequisite: STA 5513 or equivalent and Doctoral standing. This course is a brief discussion of measure theory and Lebesgue integration, statistical models, location and scale families of distributions, exponential families of distributions, sufficiency, factorization theorem, completeness, ancillarity, Basu's theorem, Fisher information, Kullback-Leibler divergence, elements of statistical decision theory, basic concepts for point estimation, best-unbiased estimation, Rao-Blackwell theorem, Lehmann–Scheffé theorem, Cramér–Rao (information) inequality, maximum likelihood estimation (MLE), and profiled/concentrated likelihood. This course has Differential Tuition.

STA 7513. Advanced Inference II. (3-0) 3 Credit Hours.
Prerequisite: STA 7503. Elements of asymptotics, different forms of stochastic convergence, laws of large numbers, central limit theorems, univariate and multivariate delta methods, asymptotic properties of maximum likelihood estimators, limit distribution of estimators, asymptotic relative efficiency, asymptotic confidence regions, tests of hypotheses, Neyman-Pearson theory, uniformly most powerful tests, unbiased tests, applications to exponential families, monotone likelihood ratio families, likelihood ratio tests, Wald tests, Rao/Score tests, asymptotic properties of tests, and duality between confidence regions and tests of hypotheses. This course has Differential Tuition.