



College of Science and Mathematics

Department of Statistics and
Analytical Sciences

Applied Statistics and Data Analysis Minor

WHY MINOR IN STATISTICS?

Data drives almost every corner of our world from Finance and Marketing to Nursing and Psychology and everything in between. Whether you are planning to get a job right after graduation or planning to pursue an advanced degree, you will need to understand how to use data to support decision making. The minor in Applied Statistics and Data Analysis at Kennesaw State University has been developed by faculty who have significant experience in engineering, manufacturing, medicine, finance and strategic consulting. The minor includes a complementary series of course topics, which are relevant to ANY discipline.

WHAT WILL I LEARN WITH A MINOR IN APPLIED STATISTICS?

- Translate data into information to support improved decision making.
- Professionally communicate your analysis in written and oral form, including the correct usage of graphics packages.
- Design experiments.
- Develop and test statistical models.
- Represent yourself as proficient in EXCEL, SPSS, Minitab, R, and SAS.
- Develop the foundation necessary to pursue a Six Sigma or SAS certification.

WHAT ARE PEOPLE SAYING ABOUT THE STATISTICS MINOR?

"I feel the minor is one that truly fills a need in our university's overall offerings."

- Keith Tudor, Chair and Professor of Marketing & Professional Sales

"Nurse researchers need statistical knowledge to accurately interpret healthcare data and patient outcomes."

- Tommie Nelms, Interim Director, WellStar School of Nursing, Coordinator of the DNS Program

"The Minor in Applied Statistics at KSU is an excellent program. The faculty mentoring and academic rigor will undoubtedly prepare our students for both graduate school as well as professional careers."

- Sharon Pearcey, Chair & Associate Professor, Psychology

"Science doesn't make sense without statistics."

- Kamal Fatehi, Professor of International Management & Coordinator of Global Academic Initiatives

"The world that we live in is becoming increasingly data-driven. This means that there is an increasing demand for professionals who know how to organize and analyze data in all walks of life including the sciences, the social sciences, business, etc. Whatever you are majoring in, getting a minor in applied statistics to go along with your major will give you a wiser choice of career possibilities and boost your competitiveness in the job market."

- Sean Ellermeyer, Professor, Mathematics and Statistics

WHAT CLASSES ARE REQUIRED?

The program includes five courses, which utilize datasets from Finance, Marketing, Medicine, and Psychology. Students must complete the following three courses in sequential order (receiving an A or B):

1. STAT 3010 Computer Applications of Statistics
2. STAT 3120 Statistical Methods I or STAT 3125 BioStatistics
3. STAT 3130 Statistical Methods II

Students must then select two courses from the following elective options (receiving an A or B):

- STAT 4025 Clinical Trial Design
- STAT 4120 Applied Experimental Design
- STAT 4125 Design and Analysis of Human Studies
- STAT 4210 Applied Regression Analysis
- STAT 4310 Statistical Data Mining
- STAT 4330 Applied Topics in Binary Classification
- STAT 4490 Special Topics in Statistics
- IS 4540 Data Mining (Information Systems majors)
- PSYC 3301 Experimental Psychology (Psychology majors)

WHAT ELSE SHOULD I KNOW?

- The Applied Statistics & Data Analysis minor is officially 15 hours of upper division STAT courses; however, 12 of those hours cannot be duplicated within classes that are required for your major.
- See the other side and use <http://catalog.kennesaw.edu> for official details, course descriptions, and pre-requisites.
- If you decide to pursue the Applied Statistics & Data Analysis minor, you will need to fill out the 'Minor Declaration' form, available from the Department of Statistics and Analytical Sciences.
- As part of your petition to graduate, you will need to fill out the 'Minor Approval' form, available with the Office of the Registrar or from the Department of Statistics and Analytical Sciences.

COURSE DESCRIPTIONS:

STAT 3010 Computer Applications of Statistics

Introduction to the use of computer-based statistical software packages and applications in the analysis and interpretation of the data. Topics include both descriptive statistics and inference methods. Software packages include SAS, JMP, SPSS, Minitab, and EXCEL.

STAT 3120 Statistical Methods I

This course is designed to provide students with a foundation in statistical methods, including confidence intervals for population parameters, correlation, linear regression and hypothesis testing (F and T-tests for regression, chi-square for independence, 2 group and paired sample T-tests). These concepts are taught with heavy emphasis on statistical computing software and real world datasets. Students are expected to have a working knowledge of SAS, SPSS, and Minitab (satisfied through the pre-requisite of STAT 3010).

STAT 3125 Biostatistics

In this course students use descriptive statistics and visual displays to describe data. They learn about some common population and sample distributions. They perform and analyze results of statistical inferences, including confidence intervals, correlation, linear regression, odds/risk ratios, and hypothesis testing (F and T-tests for regression, Chi-square for independence, 2 group and paired sample t-tests). Analyses are performed using MS-Excel. The student is required to select, analyze and interpret real life data for a project.

STAT 3130 Statistical Methods II

Students will continue to build their foundation in statistical methods in this course beginning with review of ttests. They will perform and analyze results of Wilcoxon Signed Rank and Rank Sum tests (Non-Parametric t-tests), ANOVA, Kruskal Wallis (Non-Parametric ANOVA), and Multiple Regression. These concepts will be taught with heavy emphasis on statistical computing software and real world datasets. Students will use at least two of the following statistical packages for analyses: SAS, Minitab, SPSS, JMP.

STAT 4025 Clinical Trial Design

The course introduces students to statistical concepts used to design clinical trials, or randomized studies of humans. Students will be able to design, conduct, and analyze clinical trials in the format required by the Food and Drug Administration. The topics include endpoint definition, sources of bias, randomization schemes, types of blindness, phases of clinical studies (I-IV), hypothesis formation, sample size determination, patient recruitment, adverse events, and protocol development.

STAT 4120 Applied Experimental Design

Methods for constructing and analyzing designed experiments are the focus of this course. The concepts of experimental unit, randomization, blocking, replication, error reduction and treatment structure are introduced. The design and analysis of completely randomized, randomized complete block, incomplete block, Latin square, split-plot, repeated measures, factorial and fractional factorial designs will be covered. Statistical software, including SPSS, Minitab and SAS will be utilized.

STAT 4125 Design and Analysis of Human Studies

This course serves as an introduction to epidemiologic methods used to investigate disease outbreaks and the effectiveness of public health interventions. At the end of the course, students are able to design, analyze, and report the results of a simple epidemiologic investigation and interpret literature related to analysis of studies of disease causality and treatment.

STAT 4210 Applied Regression Analysis

Topics include simple linear regression, multiple regression models, generalized linear model, multicollinearity, qualitative predictor variables, model selection and validation, identifying outliers and influential observations, diagnostics for multicollinearity, and logistic regression and discriminant analysis.

STAT 4310 Statistical Data Mining

Data Mining is an information extraction activity whose goal is to discover hidden facts contained in databases, perform prediction and forecasting, and generally improve their performance through interaction with data. The process includes data selection, cleaning, coding, using different statistical, pattern recognition and machine learning techniques, and reporting and visualization of the generated structures. The course will cover all these issues and will illustrate the whole process by examples of practical applications. The students will use recent SAS Enterprise Miner software.

STAT 4330 Applied Topics in Binary Classification

Binary Classification is a heavily used concept in statistical modeling. Common applications include credit worthiness and the associated development of a credit risk score, fraud detection, the presence of a disease or the identification of manufacturing units which fail inspection. Students will learn how to use logistic regression, odds, ROC curves, and maximization functions to apply binary classification concepts to real-world datasets. This course will utilize SAS-software and students are expected to have a strong working knowledge of SAS.

STAT 4490 Special Topics in Statistics

Special topics of interest to faculty and students.

IS 4540 Data Mining

Data mining aims at finding useful regularities and patterns in large data sets. In this course students will learn how this interdisciplinary field brings together techniques from databases, statistics, machine learning, and information retrieval. This course covers major data mining techniques including association mining, classification, clustering, trend analysis, prediction, fraud detection, and their applications in e-commerce, CRM, health care and others. Tools like SQL Server 2005 business intelligence toolkit will be used to create analytical applications. (Information Systems Majors)

PSYC 3301 Experimental Psychology

This course will focus on experimental designs used in laboratory research in psychology. Topics will include hypothesis testing, independent-group and within-subjects designs, complex designs, and statistical analysis using t-tests and the Analysis of Variance. Emphasis will be on the selection of appropriate designs for different research questions, data collection, data analysis, the interpretation of results, and writing laboratory reports. (Psychology majors)