

Statistical Science and Data Analytics

Sanat K. Sarkar, Chair and Cyrus H. K. Curtis Professor
Office: Speakman Hall 390
sanat@temple.edu

Alexandra Carides, Assistant Professor
Office: Speakman Hall 345
alexandra.carides@temple.edu

The Statistical Science Department offers the Bachelor of Science (B.S.) in Statistical Science and Data Analytics. The recent Best Jobs list compiled by CareerCast (a Local and National Job search company) and cited by Forbes, ranks Statistician as No. 4 and Data Scientist as No. 6, while the entire top 10 list is a STEM list. As we survey representatives from different companies, the consistent message we receive is that the cost of hiring and the demand for talent are skyrocketing. The demand is driven by the proliferation of computing technology, software and statistical tools for capturing and interpreting the substantial volume of data now available at the enterprise, government and personal levels.

The educational objective of the program is to provide graduates with a rigorous and broad-based curriculum providing:

1. Rigorous quantitative foundation
2. Alignment and coordination with the established quantitative disciplines at Fox and at Temple University
3. Exposure to programming and modern languages such as C, SAS, etc., including preparation for future SAS certification exams, after obtaining the Basics SAS certificate during the program
4. Effective communication skills

The major areas of employment mentioned in the report are: decision-making in business, healthcare, policy, as well as in social media, and commercial areas. In these areas, there are large bodies of data accumulated over the internet, in need of being explored, understood, and analyzed. Statisticians will also be increasingly needed in the pharmaceutical industry. Biostatisticians will be needed to conduct the research and clinical trials necessary for companies to obtain approval for their products from the Food and Drug Administration. Another area of employment for statisticians is the government, where policy analysis is needed more and more. There is also growth projected for future graduates in statistics in research and development in the physical, engineering, and life sciences, where statisticians' skills in designing tests and assessing results are highly useful.

Reputable national organizations, like the American Statistical Association (ASA), endorse the value of undergraduate programs in statistics as a reflection of the increasing importance of the discipline. Statistics programs should be flexible enough to prepare bachelor's graduates to either be functioning statisticians in a service-oriented economy or go on to graduate school. The ASA guidelines for curriculum development address required changes in curriculum and suggest pedagogy in response to the strong upward demand for statisticians. Institutions need to ensure students entering the work force or heading to graduate school have the appropriate capacity to "think with data" and to pose and answer statistical questions.

Summary of Requirements

University Requirements

All new students are required to complete the university's General Education (GenEd (<http://bulletin.temple.edu/undergraduate/general-education>)) curriculum.

Note that students not continuously enrolled who have not been approved for a Leave of Absence or study elsewhere must follow University requirements current at the time of re-enrollment.

College Requirements

Students must meet College Graduation Requirements (<http://bulletin.temple.edu/undergraduate/fox-business-management/#requirementstext>) for the Bachelor of Science, including the requirements of the major listed below. Students must attain an overall GPA of 2.0 and a 2.0 GPA in the major to graduate as a Statistical Science and Data Analytics major. To calculate the GPA in the major, use the major GPA calculator (<http://www.fox.temple.edu/advising/students/gpa-calculator>).

Core Requirements

Code	Title	Credit Hours
BA 2104	Excel for Business Applications	1
ECON 1101 or ECON 1901	Macroeconomic Principles Honors Macroeconomic Principles	3
ECON 1102 or ECON 1902	Microeconomic Principles Honors Microeconomic Principles	3

HRM 1101 or HRM 1901	Leadership and Organizational Management Honors Leadership and Organizational Management	3
MATH 1041 or MATH 1941	Calculus I Honors Calculus I	4
MATH 1042 or MATH 1942	Calculus II Honors Calculus II	4
STAT 2103 or STAT 2903	Statistical Business Analytics Honors Statistical Business Analytics	4
ACCT 2101 or ACCT 2901	Financial Accounting Honors Financial Accounting	3
BA 2196 or BA 2996	Business Communications Honors Business Communications	3
CIS 1051	Introduction to Problem Solving and Programming in Python	4
CIS 1068	Program Design and Abstraction	4
MKTG 2101 or MKTG 2901	Marketing Management Honors Marketing Management	3
RMI 2101 or RMI 2901	Introduction to Risk Management Honors Introduction to Risk Management	3

Total Credit Hours		42
--------------------	--	----

Major Requirements

Students must follow the Major Requirements and College Requirements current at the time of declaration. Students not continuously enrolled who have not been approved for a Leave of Absence or study elsewhere must follow University, College, and Major requirements current at the time of re-enrollment.

Requirements of Statistical Science and Data Analytics Major

Code	Title	Credit Hours
STAT 2501	Quantitative Foundations for Data Science	3
STAT 2512	Intermediate Statistics	3
STAT 2521	Data Analysis and Statistical Computing (fall only)	3
STAT 2522	Survey Design and Sampling (spring only)	3
STAT 2523	Design of Experiments and Quality Control (fall only)	3
STAT 3502	Regression and Predictive Analytics (fall only)	3
STAT 3503	Applied Statistics and Data Science	3
STAT 3504	Time Series and Forecasting Models (fall only)	3
STAT 3505	Introduction to SAS for Data Analytics (spring only)	3
STAT 3506	Nonparametric and Categorical Data Analysis (fall only)	3
STAT 4596	Capstone: Statistical Science and Data Analytics (spring only) ¹	3

Focus Area

Select one set from the following: 6-8

ACCT 2102 & FIN 3101	Managerial Accounting and Financial Management
CIS 1166 & CIS 2109	Mathematical Concepts in Computing I and Database Management Systems
HCM 3501 & HCM 3502	Introduction to Health Services Systems and Healthcare Financing and Information Technology
MKTG 3508 & MKTG 3509	Digital Marketing and Customer Data Analytics
MSP 1011 & MSP 1701 or MSP 2141	Introduction to Media Theory and Introduction to Media Technology Media Research
MSOM 3101 & SCM 3515	Operations Management and Principles of Supply Chain Management

or SCM 3516

Transportation and Logistics Management

Total Credit Hours

39-41

¹ STAT 4596 will be offered for the first time in Spring 2019.

Suggested Academic Plan

Bachelor of Science in Statistical Science and Data Analytics

Requirements for New Students starting in the 2018-2019 Academic Year

Please note that this plan is suggested only, ensuring prerequisites are met.

Year 1		Credit Hours
Fall		
MATH 1041	Calculus I (waives GenEd Quantitative Literacy requirement)	4
BA 2104	Excel for Business Applications	1
ECON 1102	Microeconomic Principles	3
HRM 1101	Leadership and Organizational Management	3
ENG 0802, 0812, or 0902	Analytical Reading and Writing [GW]	4
Term Credit Hours		15
Spring		
MATH 1042	Calculus II	4
STAT 2103	Statistical Business Analytics	4
ECON 1101	Macroeconomic Principles	3
IH 0851 or 0951	Intellectual Heritage I: The Good Life [GY]	3
GenEd Breadth Course		3
Term Credit Hours		17
Year 2		
Fall		
STAT 2521	Data Analysis and Statistical Computing	3
ACCT 2101	Financial Accounting	3
BA 2196	Business Communications [WI]	3
CIS 1051	Introduction to Problem Solving and Programming in Python	4
IH 0852 or 0952	Intellectual Heritage II: The Common Good [GZ]	3
Term Credit Hours		16
Spring		
STAT 2501	Quantitative Foundations for Data Science	3
STAT 2522	Survey Design and Sampling	3
CIS 1068	Program Design and Abstraction	4
MKTG 2101	Marketing Management	3
RMI 2101	Introduction to Risk Management	3
Term Credit Hours		16
Year 3		
Fall		
STAT 2512	Intermediate Statistics	3
STAT 2523	Design of Experiments and Quality Control	3
Focus Area Elective ¹		3
GenEd Breadth Course		3
GenEd Breadth Course		3
Term Credit Hours		15
Spring		
STAT 3503	Applied Statistics and Data Science	3
STAT 3505	Introduction to SAS for Data Analytics	3
Focus Area Elective ¹		3

GenEd Breadth Course		3
GenEd Breadth Course		3
	Term Credit Hours	15
Year 4		
Fall		
STAT 3502	Regression and Predictive Analytics	3
STAT 3504	Time Series and Forecasting Models	3
STAT 3506	Nonparametric and Categorical Data Analysis	3
GenEd Breadth Course		3
GenEd Breadth Course		3
	Term Credit Hours	15
Spring		
STAT 4596	Capstone: Statistical Science and Data Analytics [WI]	3
Free Elective		3
Free Elective		3
Free Elective		4
	Term Credit Hours	13
	Total Credit Hours:	122

¹ See Requirements (p. 1) section for list of Focus Area courses.

Courses

STAT 0826. Statistics in the News. 4 Credit Hours.

Through discussion of approximately 50 news articles, learn basic principles of statistics. This course focuses on the relevance, interpretation and usage of statistics in the news media. It has no quantitative prerequisites and involves more reading than math aptitude. Statistics deals with the study of variability, uncertainty, and decision-making, and has applicability to most other disciplines and everyday life. NOTE: This course fulfills the Quantitative Literacy (GQ) requirement for students under GenEd and a Quantitative Reasoning (QA or QB) requirement for students under Core.

Course Attributes: GQ

Repeatability: This course may not be repeated for additional credits.

STAT 0827. Statistical Reasoning & Games of Chance. 4 Credit Hours.

This is a beginning course in probability and statistics with special emphasis on the critical analysis of games of chance. The objectives of the course are to introduce several quantitative concepts with real-life applications. These applications are related to situations that involve fallacies in reasoning, equity markets and games of chance. NOTE: This course fulfills the Quantitative Literacy (GQ) requirement for students under GenEd and a Quantitative Reasoning (QA or QB) requirement for students under Core.

Course Attributes: GQ

Repeatability: This course may not be repeated for additional credits.

STAT 1001. Quantitative Methods for Business I. 3 Credit Hours.

Fundamentals of mathematics and Excel are necessary for a student to pursue their degree at the Fox School of Business and Management. Topics and illustrations are specifically directed to applications in business and economics throughout this course. The overarching theme of this class is to solidify foundational quantitative and Excel skills and use those skills to solve relevant business applications.

Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Accounting, Actuarial Science, Business Management, Business Basics, Economics, Economics, Entrprnrship & Innovation Mgt, Entrepreneurship, Finance, Financial Planning, Horticulture, Human Resource Management, International Business, Law & Business, Legal Studies, Management Information Systems, Marketing, Pre Business, Real Estate, Risk Management and Insurance, Supply Chain Management, Statistical Sci + Data Analyt, Undeclared-Business & Mngt, Undeclared-University Studies.

Course Attributes: QA

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

MATH 0701 to 0702| Required Courses:1|Minimum Grade of C-|May not be taken concurrently

OR STA1 Y|May not be taken concurrently

OR STA2 Y|May not be taken concurrently

OR MATH 1011|Minimum Grade of C-|May not be taken concurrently

OR MATH 1021|Minimum Grade of C-|May not be taken concurrently

OR ST1A Y|May not be taken concurrently

OR ST2A Y|May not be taken concurrently.

STAT 1102. Quantitative Methods for Business II. 4 Credit Hours.

Fundamentals of mathematics and Excel are necessary for a student to pursue their degree at the Fox School of Business and Management. Topics and illustrations are specifically directed to applications in business and economics throughout this course. The overarching theme of this class is to prepare students to be proficient in areas of quantitative analysis, and to use those skills to solve relevant business applications. The course will also include broader and deeper applications of the topics from STAT 1001. Excel will be used to reinforce topics and present solutions.

Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Accounting, Actuarial Science, Business Management, Economics, Economics, Entrprnrship & Innovation Mgt, Entrepreneurship, Finance, Financial Planning, Human Resource Management, International Business, Law & Business, Legal Studies, Management Information Systems, Marketing, Pre Business, Real Estate, Risk Management and Insurance, Supply Chain Management, Statistical Sci + Data Analyt, Undeclared-Business & Mngt, Undeclared-University Studies.

Course Attributes: QB

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

MATH 1022|Minimum Grade of C-|May not be taken concurrently

OR STAT 1001|Minimum Grade of C-|May not be taken concurrently

OR STA2 Y|May not be taken concurrently

OR STT2 Y|May not be taken concurrently

OR ST2A Y|May not be taken concurrently.

STAT 1902. Honors Quantitative Methods for Business II. 4 Credit Hours.

Fundamentals of mathematics and Excel are necessary for a student to pursue their degree at the Fox School of Business and Management. Topics and illustrations are specifically directed to applications in business and economics throughout this course. The overarching theme of this class is to prepare students to be proficient in areas of quantitative analysis, and to use those skills to solve relevant business applications. The course will also include broader and deeper applications of the topics from STAT 1001. Excel will be used to reinforce topics and present solutions.

Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Accounting, Actuarial Science, Business Management, Economics, Economics, Entrprnrship & Innovation Mgt, Entrepreneurship, Finance, Financial Planning, Human Resource Management, International Business, Law & Business, Legal Studies, Management Information Systems, Marketing, Real Estate, Risk Management and Insurance, Supply Chain Management, Statistical Sci + Data Analyt, Undeclared-Business & Mngt, Undeclared-University Studies.

Cohort Restrictions: Must be enrolled in one of the following Cohorts: SCHONORS, UHONORS, UHONORSTR.

Course Attributes: HO, QB

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

MATH 1022|Minimum Grade of C-|May not be taken concurrently
 OR STAT 1001|Minimum Grade of C-|May not be taken concurrently
 OR STA2 Y|May not be taken concurrently
 OR STT2 Y|May not be taken concurrently
 OR ST2A Y|May not be taken concurrently.

STAT 2103. Statistical Business Analytics. 4 Credit Hours.

This course will cover the fundamentals of data description, data analysis, and graphical methods with applications to business problems. Topics include random variables, discrete and continuous distributions, estimation of parameters, and hypothesis testing. Students will gain proficiency in simple and multiple regression models and forecasting. Excel will be used for data analysis and to reinforce topics taught in class.

Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Accounting, Facilities Management, Actuarial Science, Business Management, Business, Construction Mgt Tech, Career and Technical Education, Economics, Economics, Entrprnrship & Innovation Mgt, Engineering, Engineering Technology, Entrepreneurship, Finance, Financial Planning, General Business Studies, Human Resource Management, International Business, Law & Business, Legal Studies, Management Information Systems, Marketing, Pre Business, Real Estate, Risk Management and Insurance, Supply Chain Management, Statistical Sci + Data Analyt, Statistics, Undeclared-Business & Mngt.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

(MATH 1022|Minimum Grade of C-|May not be taken concurrently
 OR STAT 1001|Minimum Grade of C-|May not be taken concurrently
 OR STA2 Y|May not be taken concurrently
 OR STT2 Y|May not be taken concurrently
 OR MATH 1021|Minimum Grade of C-|May not be taken concurrently
 OR ST2A Y|May not be taken concurrently)
 AND (STAT 1102|Minimum Grade of C-|May not be taken concurrently
 OR STAT 1902|Minimum Grade of C-|May not be taken concurrently
 OR MATH 1031|Minimum Grade of C-|May not be taken concurrently
 OR MATH 1041|Minimum Grade of C-|May not be taken concurrently
 OR MATH 1941|Minimum Grade of C-|May not be taken concurrently
 OR MATH 1038|Minimum Grade of C-|May not be taken concurrently
 OR STT3 Y|May not be taken concurrently)

STAT 2104. Selected Topics in Statistical Business Analytics. 1 Credit Hour.

Statistics 2104 is a one credit hour course that covers probability rules, joint and conditional probability, inference, confidence intervals, hypothesis tests, two sample design, simple linear regression, inference for regression, and multiple regression. NOTE: This course is designed for transfer students who have successfully completed a 3 credit hour introductory statistics course. This one credit hour course will bridge the gap between a 3 credit hour introductory statistics course taken at another institution, and the 4 credit hour Statistics 2103 (Business Statistics) course at Fox. Prior to fall 2014, the title of STAT 2104 was "Selected Topics in Business Statistics."

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

STAT 2101|Minimum Grade of C-|May not be taken concurrently
 OR STAT 2901|Minimum Grade of C-|May not be taken concurrently
 OR MATH 1013|Minimum Grade of C-|May not be taken concurrently
 OR CEE 3048|Minimum Grade of C-|May not be taken concurrently
 OR PSY 1167|Minimum Grade of C-|May not be taken concurrently
 OR SOC 1167|Minimum Grade of C-|May not be taken concurrently
 OR STAT 2512|Minimum Grade of C-|May not be taken concurrently
 OR PSY 2168|Minimum Grade of C-|May not be taken concurrently
 OR ECE 3522|Minimum Grade of C-|May not be taken concurrently.

STAT 2501. Quantitative Foundations for Data Science. 3 Credit Hours.

This course will cover topics in linear algebra, matrix theory, advanced calculus, optimization and numerical techniques. This course will allow students to acquire knowledge necessary in understanding concepts in statistical theory and methods. Students will apply quantitative analysis, critical thinking and interpretation to real-life problems in diverse areas, like business, engineering, healthcare, etc.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

(MATH 1041|Minimum Grade of C|May not be taken concurrently)
 AND (MATH 1042|Minimum Grade of C|May not be taken concurrently)

STAT 2512. Intermediate Statistics. 3 Credit Hours.

This course covers the basics of statistical estimation theory, in preparation for further study in regression, time series analysis, and forecasting (as tested on the SOA/CAS Course 4 professional examination). Topics include: classical point estimation methods; construction of confidence intervals; tests of statistical hypotheses; and basic analysis of categorical data. NOTE: This course replaces the Statistics 2102 (0022) Business Core requirement for Actuarial Science majors.

Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Accounting, Actuarial Science, Business Management, Economics, Economics, Entrprnrship & Innovation Mgt, Entrepreneurship, Finance, Financial Planning, Human Resource Management, International Business, Law & Business, Legal Studies, Management Information Systems, Marketing, Real Estate, Risk Management and Insurance, Supply Chain Management, Statistical Sci + Data Analyt, Statistics, Undeclared-Business & Mngt.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

AS 2101|Minimum Grade of C-|May not be taken concurrently
 OR MATH 3031|Minimum Grade of C-|May not be taken concurrently
 OR STAT 2103|Minimum Grade of C-|May not be taken concurrently
 OR STAT 2903|Minimum Grade of C-|May not be taken concurrently
 OR STAT 2104|Minimum Grade of C-|May not be taken concurrently.

STAT 2521. Data Analysis and Statistical Computing. 3 Credit Hours.

This course presents practical applications of statistical methods using software. The emphasis is on giving students experience in solving real life problems using appropriate statistical methods. Statistical techniques studied include organization and presentation of data, statistical testing, multiple regression, Chi-Square tests and logistic regression. Case studies and projects, with applications, are used to show the application of statistical methods to business problems. Through this course students should be able to select, utilize and apply quantitative statistical methods to real life problems, and get familiar with data analysis using statistical software. The main statistical software we use is SPSS. Students will also be exposed to other packages, such as Excel and R.

Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Accounting, Actuarial Science, Business Management, Economics, Economics, Entrprnrship & Innovation Mgt, Entrepreneurship, Finance, Financial Planning, General Business Studies, Human Resource Management, International Business, Law & Business, Legal Studies, Management Information Systems, Marketing, Real Estate, Risk Management and Insurance, Supply Chain Management, Statistical Sci + Data Analyt, Statistics, Undeclared-Business & Mngt.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

STAT 2103|Minimum Grade of C|May not be taken concurrently
 OR STAT 2903|Minimum Grade of C|May not be taken concurrently
 OR MATH 3031|Minimum Grade of C|May not be taken concurrently
 OR STAT 2104|Minimum Grade of C|May not be taken concurrently
 OR SOC 1167|Minimum Grade of C|May not be taken concurrently
 OR CEE 3048|Minimum Grade of C|May not be taken concurrently
 OR PSY 1167|Minimum Grade of C|May not be taken concurrently
 OR PSY 2168|Minimum Grade of C|May not be taken concurrently
 OR AS 2101|Minimum Grade of C|May not be taken concurrently
 OR ECE 3522|Minimum Grade of C|May not be taken concurrently
 OR SOC 0825|Minimum Grade of C|May not be taken concurrently
 OR ANTH 0825|Minimum Grade of C|May not be taken concurrently
 OR POLS 0825|Minimum Grade of C|May not be taken concurrently
 OR PSY 0825|Minimum Grade of C|May not be taken concurrently.

STAT 2522. Survey Design and Sampling. 3 Credit Hours.

This course presents the principal applications of sample surveys, survey design, criteria of a good sample design, and characteristics of simple random sampling, stratified random sampling, and cluster sampling. Case studies are used where appropriate to illustrate applications of survey sampling. Emphasis will be placed on both the theory and methodology of surveying and include sampling principles, sample design, questionnaire construction, and response problems.

Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Accounting, Actuarial Science, Business Management, Economics, Economics, Entrprnrship & Innovation Mgt, Entrepreneurship, Finance, Financial Planning, General Business Studies, Human Resource Management, International Business, Law & Business, Legal Studies, Management Information Systems, Marketing, Real Estate, Risk Management and Insurance, Supply Chain Management, Statistical Sci + Data Analyt, Statistics, Undeclared-Business & Mngt.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

STAT 2103|Minimum Grade of C|May not be taken concurrently
 OR STAT 2903|Minimum Grade of C|May not be taken concurrently
 OR MATH 3031|Minimum Grade of C|May not be taken concurrently
 OR STAT 2104|Minimum Grade of C|May not be taken concurrently
 OR SOC 1167|Minimum Grade of C|May not be taken concurrently
 OR CEE 3048|Minimum Grade of C|May not be taken concurrently
 OR PSY 1167|Minimum Grade of C|May not be taken concurrently
 OR PSY 2168|Minimum Grade of C|May not be taken concurrently
 OR AS 2101|Minimum Grade of C|May not be taken concurrently
 OR ECE 3522|Minimum Grade of C|May not be taken concurrently
 OR SOC 0825|Minimum Grade of C|May not be taken concurrently
 OR ANTH 0825|Minimum Grade of C|May not be taken concurrently
 OR POLS 0825|Minimum Grade of C|May not be taken concurrently
 OR PSY 0825|Minimum Grade of C|May not be taken concurrently.

STAT 2523. Design of Experiments and Quality Control. 3 Credit Hours.

The first part of this course provides students with insight into statistically designed experiments and related topics. The course covers the fundamental statistical concepts required for designing efficient experiments to answer real questions. The fundamental concepts of replication, blocking, and randomization are examined. Topics covered include block designs, balanced incomplete block designs, and Latin Square designs. Additional topics include factorial experiments, fractional factorial designs, and orthogonal arrays. The course also introduces students to response surface methodology, mixture designs, and conjoint analysis. Quality improvement can be accomplished using experimental design principles. The second part of the course covers the core principles of the management of quality in the production of goods and services. Statistical quality control techniques are used in the implementation of these principles. Topics covered include control charts, cusum procedures, and Taguchi methods.

Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Accounting, Actuarial Science, Business Management, Economics, Economics, Entrprnrship & Innovation Mgt, Entrepreneurship, Finance, Financial Planning, General Business Studies, Human Resource Management, International Business, Law & Business, Legal Studies, Management Information Systems, Marketing, Real Estate, Risk Management and Insurance, Supply Chain Management, Statistical Sci + Data Analyt, Statistics, Undeclared-Business & Mngt.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

STAT 2103|Minimum Grade of C|May not be taken concurrently
 OR STAT 2903|Minimum Grade of C|May not be taken concurrently
 OR MATH 3031|Minimum Grade of C|May not be taken concurrently
 OR STAT 2104|Minimum Grade of C|May not be taken concurrently
 OR SOC 1167|Minimum Grade of C|May not be taken concurrently
 OR CEE 3048|Minimum Grade of C|May not be taken concurrently
 OR PSY 1167|Minimum Grade of C|May not be taken concurrently
 OR PSY 2168|Minimum Grade of C|May not be taken concurrently
 OR ECE 3522|Minimum Grade of C|May not be taken concurrently
 OR SOC 0825|Minimum Grade of C|May not be taken concurrently
 OR ANTH 0825|Minimum Grade of C|May not be taken concurrently
 OR POLS 0825|Minimum Grade of C|May not be taken concurrently
 OR PSY 0825|Minimum Grade of C|May not be taken concurrently
 OR AS 2101|Minimum Grade of C|May not be taken concurrently.

STAT 2903. Honors Statistical Business Analytics. 4 Credit Hours.

This course provides students with the fundamental concepts and tools needed to understand the role of statistics and business analytics in organizations. It covers basic descriptive statistics, probability, and statistical inference. Topics include probability distributions, random sampling and sampling distributions, point and interval estimation, and hypothesis testing. The course also covers hypothesis testing for several populations, correlation, simple linear regression, multiple regression, and an introduction to data mining. Use of Excel for data analysis and inference. NOTE: This course is a four credit hour course which will substitute for Statistics 2101 (C021) and 2102 (0022) for Fox School students. Prior to fall 2014, the title of STAT 2903 was "Honors Business Statistics."

Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Accounting, Facilities Management, Actuarial Science, Business Management, Business, Construction Mgt Tech, Career and Technical Education, Economics, Economics, Entrprnrship & Innovation Mgt, Engineering, Engineering Technology, Entrepreneurship, Finance, Financial Planning, General Business Studies, Human Resource Management, International Business, Law & Business, Legal Studies, Management Information Systems, Marketing, Real Estate, Risk Management and Insurance, Supply Chain Management, Statistical Sci + Data Analyt, Statistics, Undeclared-Business & Mngt.

Cohort Restrictions: Must be enrolled in one of the following Cohorts: SCHONORS, UHONORS, UHONORSTR.

Course Attributes: HO

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

(MATH 1022|Minimum Grade of C-|May not be taken concurrently
 OR STAT 1001|Minimum Grade of C-|May not be taken concurrently
 OR STA2 Y|May not be taken concurrently
 OR STT2 Y|May not be taken concurrently
 OR MATH 1021|Minimum Grade of C-|May not be taken concurrently
 OR ST2A Y|May not be taken concurrently)
 AND (STAT 1102|Minimum Grade of C-|May not be taken concurrently
 OR STAT 1902|Minimum Grade of C-|May not be taken concurrently
 OR MATH 1031|Minimum Grade of C-|May not be taken concurrently
 OR MATH 1041|Minimum Grade of C-|May not be taken concurrently
 OR MATH 1941|Minimum Grade of C-|May not be taken concurrently
 OR MATH 1038|Minimum Grade of C-|May not be taken concurrently
 OR STT3 Y|May not be taken concurrently)

STAT 3501. Statistics for Engineers. 3 Credit Hours.

Not to be taken by School of Business and Management students; open only to Engineering students. Descriptive statistics, inference, regression and correlation, and experimental design. Engineering applications.

College Restrictions: Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

MATH 1041|Minimum Grade of C-|May not be taken concurrently
 OR MATH 1941|Minimum Grade of C-|May not be taken concurrently
 OR MATH 1038|Minimum Grade of C-|May not be taken concurrently.

STAT 3502. Regression and Predictive Analytics. 3 Credit Hours.

The course covers a variety of statistical methods useful in interdisciplinary research, such as simple and multiple regression analysis, ANOVA, analysis of covariance, logistic regression, and predictive models. Emphases are placed on rationales, assumptions, techniques, and interpretation of results from computer packages.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

(STAT 2103|Minimum Grade of C|May not be taken concurrently
 OR STAT 2903|Minimum Grade of C|May not be taken concurrently
 OR MATH 3031|Minimum Grade of C|May not be taken concurrently
 OR STAT 2104|Minimum Grade of C|May not be taken concurrently
 OR SOC 1167|Minimum Grade of C|May not be taken concurrently
 OR CEE 3048|Minimum Grade of C|May not be taken concurrently
 OR PSY 1167|Minimum Grade of C|May not be taken concurrently
 OR PSY 2168|Minimum Grade of C|May not be taken concurrently
 OR AS 2101|Minimum Grade of C|May not be taken concurrently
 OR ECE 3522|Minimum Grade of C|May not be taken concurrently
 OR SOC 0825|Minimum Grade of C|May not be taken concurrently
 OR ANTH 0825|Minimum Grade of C|May not be taken concurrently
 OR POLS 0825|Minimum Grade of C|May not be taken concurrently
 OR PSY 0825|Minimum Grade of C|May not be taken concurrently)
 AND (STAT 2501|Minimum Grade of C|May not be taken concurrently)
 AND (STAT 2512|Minimum Grade of C|May not be taken concurrently)

STAT 3503. Applied Statistics and Data Science. 3 Credit Hours.

This course will focus on the analysis of messy, real life data to perform predictions using statistical methods, such as multiple regression, forecasting, and time series, as well as machine learning methods. Some basic theory will be reviewed, but the course will emphasize applications. Material covered will integrate the five key facets of an investigation using data: (1) data collection - data wrangling, cleaning, and sampling to get a suitable data set; (2) data management - accessing data quickly and reliably; (3) exploratory data analysis - generating hypotheses and building intuition; (4) prediction or statistical learning; and (5) communication - summarizing results through visualization, stories, and interpretative summaries. Standard statistical packages will be introduced and used extensively.

Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Accounting, Actuarial Science, Business Management, Economics, Economics, Entrprnrship & Innovation Mgt, Entrepreneurship, Finance, Financial Planning, Human Resource Management, International Business, Law & Business, Legal Studies, Management Information Systems, Marketing, Real Estate, Risk Management and Insurance, Supply Chain Management, Statistical Sci + Data Analyt, Statistics, Undeclared-Business & Mngt.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

STAT 2103|Minimum Grade of C|May not be taken concurrently
 OR STAT 2903|Minimum Grade of C|May not be taken concurrently
 OR MATH 3031|Minimum Grade of C|May not be taken concurrently
 OR STAT 2104|Minimum Grade of C|May not be taken concurrently
 OR SOC 1167|Minimum Grade of C|May not be taken concurrently
 OR CEE 3048|Minimum Grade of C|May not be taken concurrently
 OR PSY 1167|Minimum Grade of C|May not be taken concurrently
 OR PSY 2168|Minimum Grade of C|May not be taken concurrently
 OR SOC 3201|Minimum Grade of C|May not be taken concurrently
 OR ECE 3522|Minimum Grade of C|May not be taken concurrently
 OR SOC 0825|Minimum Grade of C|May not be taken concurrently
 OR ANTH 0825|Minimum Grade of C|May not be taken concurrently
 OR POLS 0825|Minimum Grade of C|May not be taken concurrently
 OR PSY 0825|Minimum Grade of C|May not be taken concurrently.

STAT 3504. Time Series and Forecasting Models. 3 Credit Hours.

This time series analysis and forecasting models course with interdisciplinary applications covers important univariate and multivariate time series methods, including ARIMA models, further forecasting methods (logistic regression, ARIMA), centered and training Moving Average (MA). Students will apply the body of theoretical knowledge to analyzing real-life data sets.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

(STAT 2103|Minimum Grade of C|May not be taken concurrently
 OR STAT 2903|Minimum Grade of C|May not be taken concurrently
 OR MATH 3031|Minimum Grade of C|May not be taken concurrently
 OR STAT 2104|Minimum Grade of C|May not be taken concurrently
 OR SOC 1167|Minimum Grade of C|May not be taken concurrently
 OR CEE 3048|Minimum Grade of C|May not be taken concurrently
 OR PSY 1167|Minimum Grade of C|May not be taken concurrently
 OR PSY 2168|Minimum Grade of C|May not be taken concurrently
 OR AS 2101|Minimum Grade of C|May not be taken concurrently
 OR ECE 3522|Minimum Grade of C|May not be taken concurrently
 OR SOC 0825|Minimum Grade of C|May not be taken concurrently
 OR ANTH 0825|Minimum Grade of C|May not be taken concurrently
 OR POLS 0825|Minimum Grade of C|May not be taken concurrently
 OR PSY 0825|Minimum Grade of C|May not be taken concurrently)
 AND (STAT 2501|Minimum Grade of C|May not be taken concurrently)
 AND (STAT 2512|Minimum Grade of C|May not be taken concurrently)

STAT 3505. Introduction to SAS for Data Analytics. 3 Credit Hours.

This course is an introduction to programming for statistical analysis using the SAS Software System. Students will learn data set creation by data transformation to/from SAS using Import and Export functions. Concatenation, merging and subsetting data, as well as data restructuring and new variable construction using arrays and SAS functions will be taught. Simple procedures to clean and perform quality control of data, as well as procedures for calculating descriptive statistics, plots, and print outs will be covered. Laboratory exercises and homework assignments include brief exercises as well as manipulation and analysis of real data sets.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

STAT 2103|Minimum Grade of C|May not be taken concurrently
 OR STAT 2903|Minimum Grade of C|May not be taken concurrently
 OR MATH 3031|Minimum Grade of C|May not be taken concurrently
 OR STAT 2104|Minimum Grade of C|May not be taken concurrently
 OR SOC 1167|Minimum Grade of C|May not be taken concurrently
 OR CEE 3048|Minimum Grade of C|May not be taken concurrently
 OR PSY 1167|Minimum Grade of C|May not be taken concurrently
 OR PSY 2168|Minimum Grade of C|May not be taken concurrently
 OR AS 2101|Minimum Grade of C|May not be taken concurrently
 OR ECE 3522|Minimum Grade of C|May not be taken concurrently
 OR SOC 0825|Minimum Grade of C|May not be taken concurrently
 OR ANTH 0825|Minimum Grade of C|May not be taken concurrently
 OR POLS 0825|Minimum Grade of C|May not be taken concurrently
 OR PSY 0825|Minimum Grade of C|May not be taken concurrently
 OR SOC 3201|Minimum Grade of C|May not be taken concurrently.

STAT 3506. Nonparametric and Categorical Data Analysis. 3 Credit Hours.

This course covers estimation and testing of hypotheses when the functional form of the population distribution is not completely specified. The topics also include sampling models and analyses for discrete data: Fisher's exact test, logistic regression, ROC analysis, log-linear models and Poisson regression, conditional logistic regression, Cochran-Mantel-Haenszel test, measures of agreement between observers, quasi-independence, multinomial logit models, proportional odds model, association models, generalized estimating equations (GEE). Students work with R and SAS throughout the semester.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

(STAT 2103|Minimum Grade of C|May not be taken concurrently
OR STAT 2903|Minimum Grade of C|May not be taken concurrently
OR MATH 3031|Minimum Grade of C|May not be taken concurrently
OR STAT 2104|Minimum Grade of C|May not be taken concurrently
OR SOC 1167|Minimum Grade of C|May not be taken concurrently
OR CEE 3048|Minimum Grade of C|May not be taken concurrently
OR PSY 1167|Minimum Grade of C|May not be taken concurrently
OR PSY 2168|Minimum Grade of C|May not be taken concurrently
OR AS 2101|Minimum Grade of C|May not be taken concurrently
OR ECE 3522|Minimum Grade of C|May not be taken concurrently
OR SOC 0825|Minimum Grade of C|May not be taken concurrently
OR ANTH 0825|Minimum Grade of C|May not be taken concurrently
OR POLS 0825|Minimum Grade of C|May not be taken concurrently
OR PSY 0825|Minimum Grade of C|May not be taken concurrently)
AND (STAT 2501|Minimum Grade of C|May not be taken concurrently)
AND (STAT 2512|Minimum Grade of C|May not be taken concurrently)

STAT 3580. Special Topics - Statistics. 3 Credit Hours.

Special topics in current developments in the field of statistics.

College Restrictions: Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

Repeatability: This course may be repeated for additional credit.

STAT 3582. Independent Study. 1 to 6 Credit Hour.

Readings, papers and/or laboratory work under supervision of a faculty member.

College Restrictions: Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

Repeatability: This course may be repeated for additional credit.

STAT 4596. Capstone: Statistical Science and Data Analytics. 3 Credit Hours.

The purpose of the capstone project is for the students to apply theoretical knowledge acquired during the program to a real project involving actual data in a realistic setting. During the project, students engage in the entire process of solving a real-world data science project: from collecting and processing actual data, to applying a suitable and appropriate analytic method to the problem. Both the problem statements for the project assignments and the datasets originate from real-world domains similar to those that students might typically encounter within industry, government, NGO, or academic research. The project will culminate with both an in-class presentation and final research paper.

Course Attributes: WI

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:

STAT 2521|Minimum Grade of C|May not be taken concurrently.