

STATISTICS

The BS Statistics program prepares students to enter the workforce or pursue graduate studies. Students learn how to use numerical information to solve problems in a wide variety of fields, ranging from business and industry to medical research.

In addition to providing students with a solid background in Statistics, the Actuarial Science option prepares students for careers in the actuarial field.

- Applied Statistics, Minor (<https://bulletin.uakron.edu/undergraduate/colleges-programs/arts-sciences/statistics/applied-statistics-minor/>)
- Statistics, Actuarial Science, BS (<https://bulletin.uakron.edu/undergraduate/colleges-programs/arts-sciences/statistics/statistics-actuarial-science-option-bs/>)
- Statistics, BS (<https://bulletin.uakron.edu/undergraduate/colleges-programs/arts-sciences/statistics/statistics-bs/>)
- Statistics, Data Science, BS (<https://bulletin.uakron.edu/undergraduate/colleges-programs/arts-sciences/statistics/statistics-data-science-bs/>)
- Statistics, Minor (<https://bulletin.uakron.edu/undergraduate/colleges-programs/arts-sciences/statistics/statistics-minor/>)

Statistics (STAT)

STAT 140 From Foundations to Statistics I (2 Units)

Students will learn the basics of developmental math (such as rounding, decimal to percent conversions, order of operations, and basic number sense) and have an introduction to statistical ideas (such as measures of center, basic vocabulary, and basics of probability).

STAT 240 From Foundations to Statistics II (3 Units)

Prerequisite: STAT 140. Students will interact with statistical ideas ranging from sampling to inference testing.

STAT 250 Statistics for Everyday Life (4 Units)

Prerequisite: DEVP 50 with a C- or better or placement test. Conceptual approach to the basic ideas and reasoning of statistics. Topics include descriptive statistics, probability (uncertainty), statistical inference (estimation and hypothesis testing). Computer applications laboratory. (Formerly 3470:250)

Ohio Transfer 36: Yes

STAT 260 Basic Statistics (3 Units)

Prerequisite: placement test. Applied approach to data description and statistical inference (hypothesis testing, estimation). Analysis of ratios, rates, and proportions. Computer applications. Laboratory. (Formerly 3470:260)

Ohio Transfer 36: Yes

STAT 261 Introductory Statistics I (2 Units)

Prerequisite: placement test. Descriptive statistics, tabular and graphical data displays; probability, probability distributions. Introduction to statistical inference (hypothesis testing, estimation); one-sample parametric and nonparametric methods. Computer applications. (Formerly 3470:261)

Ohio Transfer 36: Yes

STAT 262 Introductory Statistics II (2 Units)

Prerequisite: STAT 261 or equivalent. Parametric and nonparametric methods of statistical inference for paired data and two-sample problems; one-way ANOVA, simple linear regression and correlation. Computer applications. (Formerly 3470:262)

Ohio Transfer 36: Yes

STAT 289 Selected Topics in Statistics (1-3 Units)

Prerequisite: Permission. Selected topics of interest in statistics. (Formerly 3470:289)

STAT 360 Statistical Investigations (3 Units)

Prerequisites: STAT 250 or STAT 260 or STAT 262. This course provides practical statistical methods beyond the introductory course. The topics include design of experiments, data analysis, multiple regression and modern software use. (Formerly 3470:360)

STAT 401 Probability and Statistics for Engineers (2 Units)

Prerequisite: MATH 221. Introduction to probability, statistics, random variables, data descriptions, statistical inference, confidence intervals, hypothesis testing, design of experiments, and applications of statistics to engineering. (Formerly 3470:401)

STAT 450 Probability (3 Units)

Prerequisite: MATH 221. Introduction to probability, random variables and probability distributions, expected value, sums of random variables, Markov processes. (Formerly 3470:450)

STAT 451 Theoretical Statistics I (3 Units)

Prerequisite: MATH 223. Sequential (part 1 of 2). Appropriate background is three semesters of calculus or equivalent. Elementary combinatorial probability theory, probability distributions (discrete and continuous), expectation and variance, bivariate and multivariate distributions, distributions of functions of random variables. (Formerly 3470:451)

STAT 452 Theoretical Statistics II (3 Units)

Prerequisite: STAT 451. Sequential (2nd of 2 parts). Sampling distributions, point estimation and properties of point estimators, sufficiency, Rao-Blackwell method and MVUE, methods of obtaining point estimators, interval estimation, hypothesis testing, Neyman-Pearson theory of optimal tests (Formerly 3470:452)

STAT 461 Applied Statistics (4 Units)

Prerequisite: MATH 221. Applications of statistical theory to natural and physical sciences and engineering, including probability distributions, interval estimation, hypotheses testing (parametric and nonparametric), and simple linear regression and correlation. (Formerly 3470:461)

STAT 462 Applied Regression and ANOVA (4 Units)

Prerequisite: STAT 262 or STAT 461. Applications of the techniques of regression and multifactor analysis of variance. (Formerly 3470:462)

STAT 465 Design of Sample Surveys (3 Units)

Prerequisite: STAT 262 or STAT 461 or equivalent. Design and analysis of frequently used sample survey techniques. (Formerly 3470:465)

STAT 466 Applied Nonparametric Statistical Methods (3 Units)

Prerequisites: [STAT 261 and STAT 262] or STAT 461. This course introduces the basic tasks of inferential statistics (estimation, hypothesis testing, regression, analysis of variance) in situations where the usual assumption of the data following a parametric distribution cannot be justified or verified. Topics include the one-sample location problem, the two-sample location problem, the two-sample dispersion problem, the case with 3 or more populations – one-way layout, the case with 3 or more populations – two-way layout, binary data and success probabilities, regression and correlation. (Formerly 3470:466)

STAT 469 Reliability Models (3 Units)

Prerequisite: STAT 461. Selected topics in reliability modeling including parametric and nonparametric models, competing modes of failure, censored data and accelerated life models. (Formerly 3470:469)

STAT 470 Biostatistics and Epidemiology (3 Units)

Prerequisite: STAT 261 and STAT 262 or STAT 461, or equivalent. Biostatistics and Epidemiological methods for biological and medical studies, including ANOVA, analysis of repeated measures, disease-related measures, log-linear models, and clinical trials. (Formerly 3470:470)

STAT 471 Introduction to Actuarial Science (3 Units)

Prerequisite: MATH 221 or equivalent. Pre/Corequisite: MATH 222 or equivalent. Interest theory and financial mathematics used in actuarial science. Topics include value of money, annuities, loans, bonds, cash flows and immunization, interest rate swaps. (Formerly 3470:471)

STAT 472 Actuarial Models (3 Units)

Prerequisite: STAT 451. Study of severity, frequency and aggregate models used in actuarial applications. Calibration and evaluation. credibility procedures, fundamental principles of pricing in short-term insurance coverage. (Formerly 3470:472)

STAT 473 Survival Analysis (3 Units)

Prerequisite: STAT 262 or STAT 461. Basic concepts in survival analysis, censoring and data truncation, estimation of survival models, nonparametric hazard and survival function estimation, comparing survival times between groups. (Formerly 3470:473)

STAT 475 Foundations of Statistical Quality Control (3 Units)

Prerequisite: STAT 461 or equivalent. Course provides a solid foundation in the theory and applications of statistical techniques widely used in industry. (Formerly 3470:475)

STAT 476 Bayesian Statistics (3 Units)

Prerequisite: STAT 262 or STAT 461 or equivalent. Basic concepts in Bayesian theory, sampling methods, MCMC, and hierarchical modeling. Computer applications of Bayesian statistics to natural; and physical; sciences and engineering. (Formerly 3470:476)

STAT 477 Time Series Analysis (3 Units)

Prerequisite: STAT 262, STAT 450, STAT 451, or STAT 461. Stationarity. ARIMA modeling with seasonality. Parameter estimation, model diagnostics and forecasting. Regression with autocorrelated errors. Cointegration and multivariate ARMA models. Heteroscedasticity and long-memory models (Formerly 3470:477)

STAT 480 Statistical Data Management (3 Units)

Prerequisite: STAT 262 or STAT 461. Students learn data organization and structures, design of statistical data bases, statistical software analysis, importing and exporting data between software, and missing data analysis. (Formerly 3470:480)

STAT 483 Advanced Statistical Computing (3 Units)

Prerequisite: STAT 262 or STAT 461 or equivalent. Topics include data management, random number generation, resampling methods, numerical optimization, Markov Chain Monte Carlo, smoothing methods, data mining: clustering and classification. (Formerly 3470:483)

STAT 484 Introduction to Machine Learning (3 Units)

Prerequisite: STAT 262 or STAT 461 or equivalent. Methodologies for statistical learning, including generalized logistic regression, ridge regression, neural networks, support vector machines, principal components analysis, and K-means and hierarchical clustering (Formerly 3470:484)

STAT 485 Applied Analytics-Decision Trees (3 Units)

Prerequisite: STAT 262 or STAT 461. Selected topics in predictive modeling using CHAID, Classification and Regression Trees, Logistic Regression and Neural Networks (Formerly 3470:485)

STAT 486 Spatial-temporal Statistics (3 Units)

Prerequisite: STAT 262 or STAT 461 or equivalent. Basic concepts of geostatistics, point pattern, area unit. Spatial-temporal modeling in high dimensional data. Computer applications to natural and physical sciences and engineering. (Formerly 3470:486)

STAT 489 Topics in Statistics (1-3 Units)

(May be repeated for a total of six credits) Prerequisite: Permission. Selected topics in advanced statistics, including quality control, reliability, sampling techniques, decision theory, advanced inference, stochastic processes and others. (Formerly 3470:489)

STAT 491 Workshop in Statistics (1-3 Units)

(May be repeated with change of topic) Group studies of special topics in statistics. May not be used to meet undergraduate or graduate major requirements in mathematics and statistics. May be used for elective credit only. (Formerly 3470:491)

STAT 494 High-Dimensional High-Throughput Data Analysis (3 Units)

Prerequisites: STAT 462 and STAT 480, or permission or instructor. This course provides exposure to a variety of advanced statistical methods (beyond the ones taught in our undergraduate curriculum) for handling the challenges of high-dimensional high-throughput data, along with their software implementation and applications. Topics include multiple hypothesis testing and multiplicity adjustment, curse of dimensionality, sparsity, high-dimensional data visualization, dimension reduction methods, model selection and estimator selection, machine learning methods, and aggregation of estimators and classifiers. (Formerly 3470:494)

STAT 495 Statistical Consulting (1-3 Units)

Prerequisite: STAT 462 or STAT 480 or permission. Students will learn about various aspects of statistical consulting and will work on current projects of the Center for Statistical Consulting. May be repeated for a total of 4 credits. (Formerly 3470:495)

STAT 496 Advanced Statistical Methods for Modern Data Analysis (3 Units)

Prerequisites: STAT 462 and STAT 480, or permission of instructor. This course provides exposure to a variety of advanced statistical methods (beyond the ones taught in our undergraduate curriculum) for handling the challenges of modern-day data analysis, along with their software implementation and applications. Topics include distribution-free statistical methods, modern regression methods (robust, penalized, nonparametric), generalized linear models, random effects models, generalized linear mixed models, generalized additive models, some machine learning methods, some data mining methods, and an introduction to biostatistics. (Formerly 3470:496)

STAT 497 Individual Reading: Statistics (1-2 Units)

(May be repeated for a total of four credits) Prerequisites: senior standing and permission. Directed studies in statistics designed as introduction to research problems under guidance of selected faculty member. (Formerly 3470:497)

STAT 498 Senior Honors Project (2-3 Units)

Prerequisite: STAT 489 (honors) and senior in the Honors Program. Directed study for a senior student in the University Honors Program who has completed STAT 489 (honors). An introduction to research problems in Statistics under the guidance of selected faculty. (Formerly 3470:498)