STATISTICS (STAT)

STAT 252 Introductory Applied Probability Units: 3.00

Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite MATH 120/6.0 or MATH 121/6.0 or MATH 126/6.0 or MATH 124/3.0. Exclusion STAT 268/3.0; STAT 351/3.0.
Offering Faculty: Faculty of Arts and Science

STAT 263 Introduction to Statistics Units: 3.00
A basic course in statistical methods with the necessary probability included. Topics include probability models, random variables, distributions, estimation, hypothesis testing, elementary nonparametric methods. NOTE Also offered online, consult Arts and Science Online (Learning Hours may vary).

Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite None. Recommended An Ontario 4U mathematics course or equivalent. Exclusion BIOL 243/3.0; CHEE 209/3.5; COMM 162/3.0; ECON 250/3.0; GPHY 247/3.0; KNPE 251/3.0; NURS 323/3.0; POLS 385/3.0*; PSYC 202/3.0; SOCY 211/3.0; STAM 200/3.0. One-Way Exclusion May not be taken with or after STAT 269/3.0. Note This course is not open to Commerce students.

Offering Faculty: Faculty of Arts and Science

STAT 268 Statistics and Probability I Units: 3.00
Basic ideas of probability theory such as random experiments, probabilities, random variables, expected values, independent events, joint distributions, conditional expectations, moment generating functions. Main results of probability theory including Chebyshev’s inequality, law of large numbers, central limit theorem. Introduction to statistical computing.

Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite (MATH 120 or MATH 121 or MATH 122 or MATH 124). Corequisite (MATH 221 or MATH 280). Exclusion STAT 252; STAT 351.
Offering Faculty: Faculty of Arts and Science

STAT 269 Statistics and Probability II Units: 3.00
Basic techniques of statistical estimation such as best unbiased estimates, moment estimates, maximum likelihood. Bayesian methods. Hypotheses testing. Classical distributions such as the t-distribution, F-distribution, beta distribution. These methods will be illustrated by simple linear regression. Statistical computing.

Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite (MATH 221 or MATH 280) and (STAT 252 or STAT 268 or STAT 351) or permission of the Department.
Offering Faculty: Faculty of Arts and Science

STAT 351 Probability I Units: 3.00
Probability theory; probability models; random variables; jointly distributed random variables; transformations and generating functions. Inequalities and limit laws. Distributions: binomial, Poisson, exponential, gamma, normal. Applications: elementary stochastic processes, time-to-failure models, binary communication channels with Gaussian noise.

Learning Hours: 120 (36 Lecture, 12 Tutorial, 72 Private Study)
Requirements: Prerequisite None. Corequisite (MATH 221 or MATH 280). Exclusion STAT 252; STAT 268.
Offering Faculty: Faculty of Arts and Science

STAT 353 Probability II Units: 3.00
Intermediate probability theory as a basis for further study in mathematical statistics and stochastic processes; probability measures, expectations; modes of convergence of sequences of random variables; conditional expectations; independent systems of random variables; Gaussian systems; characteristic functions; Law of large numbers, Central limit theory; some notions of dependence.

Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite (STAT 252 or STAT 268 or STAT 351) and (MATH 110 or MATH 111 or MATH 112) and MATH 281.
Offering Faculty: Faculty of Arts and Science

queensu.ca/academic-calendar
STAT 361  Applied Methods in Statistics I  Units: 3.00
A detailed study of simple and multiple linear regression, residuals and model adequacy. The least squares solution for the general linear regression model. Analysis of variance for regression and simple designed experiments; analysis of categorical data.
Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite (MATH 110 or MATH 111 or MATH 112) and (STAT 252 or STAT 268 or STAT 351) and (STAT 263 or STAT 269) or permission of the Department. Exclusion ECON 351.
Offering Faculty: Faculty of Arts and Science

STAT 362  R for Data Science  Units: 3.00
Introduction to R, data creation and manipulation, data import and export, scripts and functions, control flow, debugging and profiling, data visualization, statistical inference, Monte Carlo methods, decision trees, support vector machines, neural network, numerical methods.
Learning Hours: 118 (36 Lecture, 12 Group Learning, 70 Private Study)
Requirements: Prerequisite (STAT 252 or STAT 263 or STAT 268 or STAT 351) and (MATH 110 or MATH 111 or MATH 120 or MATH 121 or MATH 124 or MATH 126 or [MATH 112 and MATH 212]) or permission of the Department.
Offering Faculty: Faculty of Arts and Science

STAT 367  Statistical Learning II  Units: 3.00
Introduction to the theory and application of statistical algorithms. Topics include classification, smoothing, model selection, optimization, sampling, supervised and unsupervised learning. Given jointly with STAT 857.
Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite (STAT 362/3.0 and [ECON 351/3.0 or STAT 361/3.0]) or permission of the Department.
Offering Faculty: Faculty of Arts and Science

STAT 455  Stochastic Processes and Applications  Units: 3.00
Learning Hours: 120 (36 Lecture, 12 Tutorial, 72 Private Study)
Requirements: Prerequisite STAT 353.
Offering Faculty: Faculty of Arts and Science

STAT 456  Bayesian Analysis  Units: 3.00
An introduction to Bayesian analysis and decision theory; elements of decision theory; Bayesian point estimation, set estimation, and hypothesis testing; special priors; computations for Bayesian analysis. Given jointly with STAT 856.
Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite STAT 463 or permission of the Department.
Offering Faculty: Faculty of Arts and Science

STAT 457  Statistical Learning II  Units: 3.00
A working knowledge of the statistical software R is assumed. Classification; spline and smoothing splines; regularization, ridge regression, and Lasso; model selection; treed-based methods; resampling methods; importance sampling; Markov chain Monte Carlo; Metropolis-Hasting algorithm; Gibbs sampling: optimization. Given jointly with STAT 862.
Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite ([STAT 361 or ECON 351] and STAT 362) or permission of the Department.
Offering Faculty: Faculty of Arts and Science

STAT 462  Statistical Learning I  Units: 3.00
A working knowledge of the statistical software R is assumed. Classification; spline and smoothing splines; regularization, ridge regression, and Lasso; model selection; treed-based methods; resampling methods; importance sampling; Markov chain Monte Carlo; Metropolis-Hasting algorithm; Gibbs sampling: optimization. Given jointly with STAT 862.
Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite ([STAT 361 or ECON 351] and STAT 362) or permission of the Department.
Offering Faculty: Faculty of Arts and Science

STAT 463  Fundamentals of Statistical Inference  Units: 3.00
Decision theory and Bayesian inference; principles of optimal statistical procedures; maximum likelihood principle; large sample theory for maximum likelihood estimates; principles of hypothesis testing and the Neyman-Pearson theory; generalized likelihood ratio tests; the chi-square, t, F and other distributions.
Learning Hours: 132 (36 Lecture, 96 Private Study)
Requirements: Prerequisite STAT 269. Equivalency STAT 363. Recommended STAT 353.
Course Equivalencies: STAT363; STAT463
Offering Faculty: Faculty of Arts and Science

STAT 464  Discrete Time Series Analysis  Units: 3.00
Autocorrelation and autocovariance, stationarity; ARIMA models; model identification and forecasting; spectral analysis. Applications to biological, physical and economic data.
Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite STAT 361 or ECON 351 or permission of the Department.
Offering Faculty: Faculty of Arts and Science
STAT 465  Quality Management  Units: 3.00
An overview of the statistical and lean manufacturing tools and techniques used in the measurement and improvement of quality in business, government and industry today. Topics include management and planning tools, Six Sigma approach, statistical process charting, process capability analysis, measurement system analysis and factorial and fractional factorial design of experiments.
Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite (STAT 263 or STAT 269) or permission of the Department.
Offering Faculty: Faculty of Arts and Science

STAT 466  Statistical Programming with SAS and Applications  Units: 3.00
Introduction to the basic knowledge in programming, data management, and exploratory data analysis using SAS software: data manipulation and management; output delivery system; advanced text file generation, statistical procedures and data analysis, macro language, structure query language, and SAS applications in clinical trial, administrative financial data.
Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite (STAT 263 or STAT 269) or permission of the Department.
Offering Faculty: Faculty of Arts and Science

STAT 471  Sampling and Experimental Design  Units: 3.00
Simple random sampling; Unequal probability sampling; Stratified sampling; Cluster sampling; Multi-stage sampling; Analysis of variance and covariance; Block designs; Fractional factorial designs; Split-plot designs; Response surface methodology; Robust parameter designs for products and process improvement. Offered jointly with STAT 871.
Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite ([STAT 361 or ECON 351] and STAT 463) or permission of the Department. Equivalency STAT 362.
Offering Faculty: Faculty of Arts and Science

STAT 473  Generalized Linear Models  Units: 3.00
An introduction to advanced regression methods for binary, categorical, and count data. Major topics include maximum-likelihood method, binomial and Poisson regression, contingency tables, log linear models, and random effect models. The generalized linear models will be discussed both in theory and in applications to real data from a variety of sources. Given jointly with STAT 873.
Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite ([STAT 361 or ECON 351] and STAT 463) or permission of the Department.
Offering Faculty: Faculty of Arts and Science

STAT 486  Survival Analysis  Units: 3.00
Introduces the theory and application of survival analysis: survival distributions and their applications, parametric and nonparametric methods, proportional hazards models, counting process and proportional hazards regression, planning and designing clinical trials. Given jointly with STAT 886.
Learning Hours: 120 (36 Lecture, 84 Private Study)
Requirements: Prerequisite ([STAT 361 or ECON 351] and STAT 463) or permission of the Department. Recommended STAT 462.
Offering Faculty: Faculty of Arts and Science

STAT 499  Topics in Statistics  Units: 3.00
An important topic in statistics not covered in any other courses.
Requirements: Prerequisite Permission of the Department. Exclusion STAT 505.
Offering Faculty: Faculty of Arts and Science

STAT 506  Topics in Statistics II  Units: 3.00
An important topic in probability or statistics not covered in any other course.
Learning Hours: 132 (24 Individual Instruction, 108 Private Study)
Requirements: Prerequisite Permission of the Department.
Offering Faculty: Faculty of Arts and Science