STATISTICS (STAT)

STAT 1000 Basic Statistical Analysis 1 3 cr
(Lab required) This course is not recommended for students in certain programs (see the description of STAT 1150). An introduction to the basic principles of statistics and procedures used for data analysis. Topics to be covered include: gathering data, displaying and summarizing data, examining relationships between variables, sampling distributions, estimation and significance tests, inference for means. May not be held with STAT 1001, STAT 1150, STAT 2220.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: One of any grade 12 or 40S Mathematics (50%), MATH 1018, or MSKL 0100.
Equiv To: STAT 1001
Mutually Exclusive: STAT 1150, STAT 2220
Attributes: Mathematics Requirement, Science, Recommended Intro Courses

STAT 1150 Introduction to Statistics and Computing 3 cr
(Lab required) This course is recommended for students in mathematically rich disciplines, including Statistics, Data Science, Mathematics, Actuarial Science, Computer Science, and related interdisciplinary programs. Topics to be covered include: summarizing and displaying large data sets, sampling, estimation and significance tests, probability calculations, random variables and probability distributions, introduction to regression and correlation analysis, statistical software. May not be held with STAT 1000, STAT 1001, STAT 2000, STAT 2001 and STAT 2220.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: One of Pre-Calculus Mathematics 40S (70%), MATH 1018 (B), or MSKL 0100 (B).
Mutually Exclusive: STAT 1000, STAT 1001, STAT 2000, STAT 2001, STAT 2220
Attributes: Mathematics Requirement, Science, Recommended Intro Courses

STAT 2000 Basic Statistical Analysis 2 3 cr
(Lab required) This course is not recommended for students in certain programs (see the description of STAT 2150). The study of estimation and hypothesis testing procedures for means and proportions in one, two and multiple sample situations, introduction to the analysis of variance; regression and correlation analysis; optional topics may include nonparametric procedures, design of experiments, probability models. May not to be held with STAT 1150, STAT 2001.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: STAT 1000 or STAT 1001.
Equiv To: STAT 2001
Mutually Exclusive: STAT 1150
Attributes: Mathematics Requirement, Science, Recommended Intro Courses

STAT 2150 Statistics and Computing 3 cr
(Lab required) This course is recommended for students in mathematically rich disciplines, including Statistics, Mathematics, Actuarial Science, Computer Science, and related interdisciplinary programs. Topics to be covered include: exploratory data analysis and visualization, graphical methods, random number generation, random variables, simple statistical models and computing, Monte Carlo methods, large sample and simulation-based inference, statistical software packages.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: [one of STAT 1150, STAT 2000 (B), STAT 2001 (B), or STAT 2220] and [one of MATH 1230, MATH 1500, MATH 1501, MATH 1510, the former MATH 1520, MATH 1524, or MATH 1525].
Attributes: Mathematics Requirement, Science, Recommended Intro Courses

STAT 2220 Contemporary Statistics for Engineers 3 cr
(Lab required) Descriptive statistics, basic probability concepts, special statistical distributions, statistical inference-estimation and hypothesis testing, regression, reliability, statistical process control. May not be held with STAT 1000, STAT 1001 or STAT 1150.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: One of MATH 1232, MATH 1700, MATH 1701, MATH 1710.
Mutually Exclusive: STAT 1000, STAT 1001, STAT 1150
Attributes: Mathematics Requirement, Science

STAT 2300 Principles of Data Collection 3 cr
Introduction to the basic principles and foundational aspects of data collection with a focus on the design and basic analysis of observational and experimental studies. Important issues like randomization, blocking and confounding, sampling, stratification, response bias and nonresponse will be covered. May not be held with the former STAT 3480.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: one of STAT 1150, STAT 2000, STAT 2001, or STAT 2220.
Mutually Exclusive: STAT 3480
Attributes: Mathematics Requirement, Science

STAT 2400 Introduction to Probability 1 3 cr
(Lab required) Basic probability, discrete and continuous random variables, important families of distributions, functions of a random variable, expectation and variance, introduction to joint distributions. This course is not available to students who have previously obtained credit for STAT 3500.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: [one of STAT 1150, STAT 2000 (B), STAT 2001 (B), or STAT 2220] and [one of MATH 1232, MATH 1700 (B), MATH 1701 (B), or MATH 1710 (B)].
Mutually Exclusive: STAT 3500
Attributes: Mathematics Requirement, Science

STAT 2800 Introduction to Probability 2 3 cr
(Lab Required) Joint and conditional distributions, distributions of functions of random variables, laws of total expectation and variance, moments and generating functions. May not be held with the former STAT 3400 or the former STAT 3500.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: STAT 2400. Pre- or corequisite: one of MATH 2150, MATH 2151, MATH 2720, MATH 2721, or the former MATH 2750.
Mutually Exclusive: STAT 3400, STAT 3500
Attributes: Mathematics Requirement, Science

STAT 3000 Applied Linear Statistical Models 3 cr
Applied linear regression, analysis of variance for designed experiments and related topics. This course is not for use in any of the Major, Honours or Joint Honours degree programs in Statistics. May not be held with STAT 3450, the former STAT 3120, or the former STAT 3470.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: one of STAT 1150, STAT 2000, STAT 2001, or STAT 2220.
Mutually Exclusive: STAT 3120, STAT 3450, STAT 3470
Attributes: Mathematics Requirement, Science

STAT 3030 Introduction to Stochastic Processes 3 cr
Review of conditional probability and expectations, Markov chains, homogeneous and nonhomogeneous Poisson processes. Optional topics include: reliability theory, queuing theory and Brownian motion. May not be held with the former STAT 3050.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: [one of STAT 2800, the former STAT 3400, or the former STAT 3500] and [one of MATH 2150, MATH 2151, MATH 2720, MATH 2721, or the former MATH 2750].
Equiv To: STAT 3050
Attributes: Mathematics Requirement, Science

STAT 3100 Introduction to Statistical Inference 3 cr
(Lab Required) Overview of the most common approaches to inference associated with point estimation, confidence intervals and hypothesis testing, including likelihood, least-squares and moment-based methods, as well as large sample approximations. May not be held with the former STAT 3600 or the former STAT 3800.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: STAT 2150 and STAT 2400. Pre- or corequisite: one of MATH 2150, MATH 2151, MATH 2720, MATH 2721, or the former MATH 2750.
Mutually Exclusive: STAT 3600, STAT 3800
Attributes: Mathematics Requirement, Science

STAT 3150 Statistical Computing 3 cr
Programming using statistical software, random number generation, principles of Monte Carlo simulation, simulation-based inference, Monte Carlo integration, and other related topics.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: STAT 2150 and STAT 2400.
Attributes: Mathematics Requirement, Science

STAT 3170 Statistical Quality Control 3 cr
Techniques for quality improvement through the use of statistical process control. Topics will include acceptance sampling, Pareto diagrams, control charts, measurements of process capability and process performance.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: one of STAT 1150, STAT 2000, STAT 2001, or STAT 2220.
Attributes: Mathematics Requirement, Science

STAT 3380 Introduction to Nonparametric Statistics 3 cr
Parametric versus nonparametric inference, inference using ranks and order statistics, contingency tables, goodness-of-fit tests, applications in the social and physical sciences.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: one of STAT 1150, STAT 2000, STAT 2001, or STAT 2220.
Attributes: Mathematics Requirement, Science

STAT 3450 Linear Models 3 cr
Least-squares approach to simple and multiple regression, one-way analysis of variance, two-way analysis of variance and related topics. May not be held with STAT 3000, the former STAT 3120, or the former STAT 3470.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: STAT 2150 and STAT 2400 and [one of MATH 1220, MATH 1210 (B), MATH 1211 (B), MATH 1300 (C+), or MATH 1301 (C+)].
Equiv To: STAT 3120, STAT 3470
Mutually Exclusive: STAT 3000
Attributes: Mathematics Requirement, Science

STAT 3490 Time Series Analysis 3 cr
Analysis of time series data and related methodologies: autoregressive and moving-average models and their generalizations, trend and seasonal components, exponential smoothing, the Box-Jenkins Methodology.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: one of STAT 3450, the former STAT 3120, or the former STAT 3470.
Attributes: Mathematics Requirement, Science

STAT 3550 Nonlinear Regression Models 3 cr
Nonlinear multiple regression, logistic regression, Poisson regression and generalizations, over/under dispersion, model selection techniques. May not be held with STAT 4000.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: one of STAT 3450, the former STAT 3120, or the former STAT 3470. Pre- or corequisites: [one of STAT 3100, the former STAT 3600, or the former STAT 3800] and STAT 3150.
Mutually Exclusive: STAT 4000
Attributes: Mathematics Requirement, Science

STAT 3690 Multivariate Analysis 3 cr
Multivariate normal distribution, multivariate regression and applications, visualization of multivariate data and dimension reduction, principal component analysis, canonical correlation. May not be held with the former STAT 4690.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: [one of STAT 2800, the former STAT 3400, or the former STAT 3500] and [one of STAT 3450, the former STAT 3120, or the former STAT 3470] and [one of MATH 2150, MATH 2151, MATH 2720, MATH 2721, or the former MATH 2750].
Mutually Exclusive: STAT 4690
Attributes: Mathematics Requirement, Science

STAT 3900 Intermediate Topics in Statistics 3 cr
Topics of current interest in Statistics that will vary with the needs and interests of students and faculty. This course can be completed as a topics course multiple times under different titles.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Consent of Department.
Attributes: Mathematics Requirement, Science

STAT 3910 Intermediate Topics in Statistics with Laboratory 3 cr
(Lab required) Topics of current interest in Statistics that will vary with the needs and interests of students and faculty. This course can be completed as a topics course multiple times under different titles.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Consent of Department.
Attributes: Mathematics Requirement, Science

STAT 3980 Work Term I 0 cr
Work assignment in business, industry, or government for students registered in the Statistics Honours or Major Cooperative Option. Requires submission of a written report covering the work completed during the four-month professional assignment. (Pass/Fail grade only).
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: STAT 3470 and STAT 3480.
Attributes: Mathematics Requirement, Science

STAT 3990 Work Term II 0 cr
Work assignments in business, industry or government for students registered in the Statistics Honours or Major Cooperative program. Requires submission of a written report covering the work completed during the four-month professional assignment. (Pass/Fail).
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: STAT 3980 (P).
Attributes: Mathematics Requirement, Science

STAT 4000 Applied Statistical Modelling 3 cr
Generalizations of linear models, including polynomial regression, analysis of covariance, logistic regression and regression for count data. Other optional topics include: random effects and mixed models, models for dependent data, advanced concepts in designing experiments. This course is not for use in any of the Major, Honours or Joint Honours degree programs in Statistics. May not be held with STAT 3550.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: one of STAT 3000, STAT 3450, the former STAT 3120, or the former STAT 3470.
Mutually Exclusive: STAT 3550
Attributes: Mathematics Requirement, Science

STAT 4100 Statistical Inference 3 cr
(Lab required) Rigorous treatment of inferential methods associated with point estimation, confidence intervals and hypothesis testing, including large sample techniques. May not be held with the former STAT 4140.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: [one of STAT 2800, the former STAT 3400, or the former STAT 3500] and [one of STAT 3100, the former STAT 3600, or the former STAT 3800].
Mutually Exclusive: STAT 4140
Attributes: Mathematics Requirement, Science

STAT 4150 Bayesian Analysis and Computing 3 cr
(Lab required) Bayesian modelling, prior and posterior distributions, predictive distributions, credible regions, Bayes factors and model uncertainty, Bayesian computational methods.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: [one of STAT 2800, the former STAT 3400, or the former STAT 3500] and [one of STAT 3100, the former STAT 3600, or the former STAT 3800] and STAT 3150.
Attributes: Mathematics Requirement, Science

STAT 4170 Lifetime Data Analysis 3 cr
Introduction to basic principles and techniques for lifetime data analysis in biostatistics and reliability, with emphasis on theory and applications. Topics to be covered include: censoring, truncation, survival and hazard functions, parametric and nonparametric methods, proportional hazards regression.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: [one of STAT 3100, the former STAT 3600, or the former STAT 3800] and [one of STAT 3450, the former STAT 3120, or the former STAT 3470].
Attributes: Mathematics Requirement, Science

STAT 4250 Statistical Learning 3 cr
(Lab required) Topics related to the use of Statistics and inferential methods in machine learning, including the lasso and ridge regression, classification and clustering, neural networks, support vector machines, bagging, boosting and ensemble methods.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: [one of STAT 3100, the former STAT 3600, or the former STAT 3800] and STAT 3150 and [STAT 3690 or the former STAT 4690].
Attributes: Mathematics Requirement, Science

STAT 4520 Sampling Techniques 3 cr
Development of sampling theory for use in sample survey problems. Covered topics include: probability sampling and inclusion probabilities, standard sampling designs, ratio and regression estimators, linearization of estimators.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: [STAT 2300 and (one of STAT 3450, the former STAT 3120, or the former STAT 3470)] or the former STAT 3480.
Attributes: Mathematics Requirement, Science

STAT 4530 Design of Experiments 3 cr
Construction and analysis of commonly used experimental designs: block designs, Latin square designs, factorial and fractional factorial designs, split-plot designs.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: [STAT 2300 and (one of STAT 3450, the former STAT 3120, or the former STAT 3470)] or the former STAT 3480.
Attributes: Mathematics Requirement, Science

STAT 4630 Stochastic Processes 3 cr
Continuous time processes, renewal processes, Brownian motion, martingales, and other related processes.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: STAT 3030 or the former STAT 3050.
Attributes: Mathematics Requirement, Science

STAT 4700 Statistical Consulting 3 cr
The role of a Statistics Consultant. Practical consulting experience. This course is restricted to students in the Honours, Joint Honours, or Major degree programs in Statistics. Students are advised to take this course in their fourth year.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: STAT 2300 or the former STAT 3480. Pre- or corequisites: STAT 3550 and [STAT 3690 or the former STAT 4690].
Attributes: Mathematics Requirement, Science

STAT 4900 Advanced Topics in Statistics 3 cr
Topics of current interest in Statistics that will vary with the needs and interests of students and faculty. This course can be completed as a topics course multiple times under different titles.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: consent of Department.
Attributes: Mathematics Requirement, Science

STAT 4910 Advanced Topics in Statistics with Laboratory 3 cr
(Lab required) Topics of current interest in Statistics that will vary with the needs and interests of students and faculty. This course can be completed as a topics course multiple times under different titles.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: consent of Department.
Attributes: Mathematics Requirement, Science

STAT 4950 Honours Thesis in Statistics 6 cr
The student will conduct a research project chosen in consultation with a Statistics faculty member, acting as an advisor, and the Department Head (or designate). The student will present the project, the results and conclusions in both a written format (i.e. the thesis) and an oral format (i.e. an oral presentation to be held upon completion of the thesis). Both data oriented and theoretical topics are acceptable. This course will normally be taken in a student's final year. This course is restricted to students in the Honours or Joint Honours degree programs in Statistics.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: consent of Department.
Attributes: Mathematics Requirement, Science

STAT 4980 Work Term III 0 cr
Work assignments in business, industry or government for students registered in the Statistics Honours or Major Cooperative program. Requires submission of a written report covering the work completed during the four-month professional assignment. (Pass/Fail).
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: STAT 3990 (P).
Attributes: Mathematics Requirement, Science

STAT 4990 Work Term IV 0 cr
Work assignments in business, industry or government for students registered in the Statistics Honours or Major Cooperative program. Requires submission of a written report covering the work completed during the four-month professional assignment. (Pass/Fail).
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: STAT 4980 (P).
Attributes: Mathematics Requirement, Science