STATISTICS (STAT)

STAT*2040 Statistics I Summer, Fall, and Winter (LEC: 3) [0.50]
This course focuses on the practical methods of Statistics and the topics include: descriptive statistics; univariate models such as binomial, Poisson, uniform and normal; the central limit theorem; expected value; the t, F and chi-square models; point and interval estimation; hypothesis testing methods up to two-sample data; simple regression and correlation; introduction to analysis of variance. Assignments will deal with real data from the natural sciences and involve the use of statistical software for computing and visualization.
Offering(s): Also offered through Distance Education format.
Prerequisite(s): 1 of 4U Calculus and Vectors, Advanced Functions and Calculus, OAC Calculus, MATH*1080
Restriction(s): STAT*2060, STAT*2080, STAT*2120, STAT*2230. This is a Priority Access Course. Enrollment may be restricted to particular programs or specializations. See department for more information.
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*2050 Statistics II Fall and Winter (LEC: 3) [0.50]
In this course, students will learn how to implement good study design and analyze data from complex studies. This course follows naturally from STAT*2040 and features both previously unseen statistical techniques, as well as studying in greater depth some topics covered in STAT*2040. These topics will include: experiments and observational studies; a review of t-tests and confidence intervals; confounding variables; association and causality; Analysis of Variance (ANOVA); simple and multiple linear regression; binary responses (logistic regression); odds ratios and relative risk; and an introduction to experimental design (including blocked designs and factorial treatment designs). Assignments carried out using modern statistical software will form the basis for mastering the material.
Prerequisite(s): 1 of STAT*2040, STAT*2060, STAT*2120, STAT*2230
Restriction(s): STAT*2090
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*2060 Statistics for Business Decisions Fall and Winter (LEC: 3) [0.50]
This course is designed for students interested in the application of statistics in a business setting. Topics will include graphical and numerical methods for describing various data types, including time series data; basic probability; discrete and continuous probability distributions; sampling distributions; confidence intervals and hypothesis testing for one- and two-sample problems; and linear regression and correlation. The role of statistics in business decisions will be discussed throughout the course, and industry-relevant software will be used for data visualization and computation.
Prerequisite(s): (4U mathematics or equivalent) or 0.50 credit in mathematics
Restriction(s): STAT*2040, STAT*2080, STAT*2120, STAT*2230. Not available to BSC students.
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*2080 Introductory Applied Statistics I Fall Only (LEC: 3) [0.50]
The topics covered in this course include: Frequency distributions, graphing and tabulation of data; measures of central tendency, variability and association; elementary probability; hypothesis testing and confidence intervals; basic concepts of experimental design; treatment designs; simple linear regression and correlation. Examples come from a variety of disciplines, including family studies, education, marketing, medicine, psychology and sociology.
Prerequisite(s): (4U mathematics or equivalent) or 0.50 credit in mathematics
Restriction(s): STAT*2040, STAT*2060, STAT*2120, STAT*2230. BSC students cannot take this course for credit.
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*2090 Introductory Applied Statistics II Winter Only (LEC: 3) [0.50]
The topics covered in this course include: analysis of qualitative data; analysis of variance for designed experiments; multiple regression; exposure to non-parametric methods; power and sample size calculations; special topics such as logistic regression. Examples come from a variety of disciplines, including nutrition, family studies, education, marketing, medicine, psychology and sociology.
Prerequisite(s): STAT*2080
Restriction(s): STAT*2050
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*2120 Probability and Statistics for Engineers Fall and Winter (LEC: 3) [0.50]
The topics covered in this course include: Sample spaces; probability, conditional probability and independence; Bayes' theorem; probability distributions; probability densities; algebra of expected values; descriptive statistics; inferences concerning means, variances, and proportions; curve fitting, the method of least squares and correlation. An introduction to quality control and reliability is provided. This course is recommended for students in the B.Sc.(Eng.) program.
Prerequisite(s): 1 of IPS*1510, MATH*1210, MATH*2080
Restriction(s): STAT*2040, STAT*2060, STAT*2080, STAT*2230
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*2230 Biostatistics for Integrative Biology Winter Only (LEC: 3, LAB: 2) [0.50]
This course introduces students to the design, completion and interpretation of research projects, including identifying categories of research questions, types of data, data gathering methods, efficient graphic and numeric methods to summarize data, standard statistical analyses involving parameter estimation and hypothesis tests and interpreting results in the context of research goals. Statistical concepts underlying practical aspects of biological research will be emphasized. Computer-intensive laboratory sessions will focus on practical data organization, visualization, statistical analysis using software, and interpretation and communication of statistical results.
Prerequisite(s): BIOL*1070
Restriction(s): STAT*2040, STAT*2060, STAT*2080, STAT*2120. Restricted to students in the BSC majors in BIOD, MFB, MFB:C WBC, WLB, and ZOO, and BSES majors in ECOL and ECOL:C.
Department(s): Department of Mathematics and Statistics, Department of Integrative Biology
Location(s): Guelph

STAT*3100 Introductory Mathematical Statistics I Fall Only (LEC: 3) [0.50]
The topics covered in this course include: Probability spaces; discrete and continuous random variables; multivariate distributions; expectations; moments, Chebyshev's inequality, product moments; sums of random variables, generating functions; Gamma, Beta, t and F distributions; central limit theorem; sampling distributions.
Prerequisite(s): (1 of IPS*1510, MATH*1210, MATH*2080), (STAT*2040 or STAT*2120)
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*3110 Introductory Mathematical Statistics II Winter Only (LEC: 3) [0.50]
Estimation, unbiasedness, Cramer-Rao inequality, consistency, sufficiency, method of moments, maximum likelihood estimation; hypothesis testing, Neyman-Pearson lemma, likelihood ratio test, uniformly most powerful test; linear regression and correlation; non-parametric methods.
Prerequisite(s): STAT*3100
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*3210 Experimental Design Fall Only (LEC: 3) [0.50]
This course presents the basic principles of design: randomization, replication, and local control (blocking); RCBD, Latin square and crossover designs, incomplete block designs, factorial and split-plot experiments, confounding and fractional factorial designs, response surface methodology; linear mixed model computer analysis of the designs; nonparametric methods; Taguchi philosophy.
Offering(s): Offered in even-numbered years.
Prerequisite(s): STAT*2050
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*3240 Applied Regression Analysis Fall Only (LEC: 3, LAB: 1) [0.50]
This course reviews simple linear regression and introduces multiple regression with emphasis on theory of least squares estimation, residual analysis, and model interpretation. Within the multiple regression context, transformations of variables, interactions, model selection techniques, ANOVA, influence diagnostics and multicollinearity will be discussed. Topics may also include Box-Cox transformations, weighted regression, and logistic and Poisson regression. This course is supplemented with computer labs involving interactive data analysis using statistical software.
Prerequisite(s): MATH*1160, STAT*2050, (1 of IPS*1510, MATH*1090, MATH*1210, MATH*2080)
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*3320 Sampling Theory with Applications Fall Only (LEC: 3) [0.50]
This course focuses on the design and analysis of survey samples for finite populations. Topics covered include: non-probability and probability sampling, simple random sampling, stratified sampling, cluster sampling, systematic sampling, double sampling, two-phase sampling and multi-stage cluster sampling. Expectation, variance estimation procedures and sample size calculations for the above techniques are included.
Offering(s): Offered in odd-numbered years.
Prerequisite(s): (1 of IPS*1510, MATH*1210, MATH*2080), (1 of STAT*2050, STAT*3240, STAT*3100)
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*3510 Environmental Risk Assessment Winter Only (LEC: 3) [0.50]
Contemporary statistical methods for assessing risk are discussed. Topics covered include: dose-response models, survival analysis, relative risk analysis, bioassay, estimating methods for zero risk, trend analysis, survey of models for assessing risk. Case studies are used to illustrate the methods.
Prerequisite(s): STAT*2050
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*4000 Statistical Computing Fall Only (LEC: 3) [0.50]
The topics in this course will include pseudorandom number generation, numerical optimization as used in statistics, simulation study design, Monte Carlo integration and variance reduction, and bootstrapping. Other topics may include permutation tests, visualization of multivariate data, and big data.
Prerequisite(s): MATH*2130, STAT*2050, STAT*3110
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*4050 Topics in Applied Statistics I Winter Only (LEC: 3) [0.50]
Topics such as statistical computing procedures, quality control, bioassay, survival analysis and introductory stochastic processes will be covered. This course is intended for statistics students and interested students from other disciplines who have appropriate previous courses in statistics. Information on particular offerings will be available at the beginning of each academic year.
Offering(s): Offered in odd-numbered years.
Prerequisite(s): STAT*3110, STAT*3240
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*4060 Topics in Applied Statistics II Winter Only (LEC: 3) [0.50]
Same as for STAT*4050.
Offering(s): Offered in even-numbered years.
Prerequisite(s): STAT*3110, STAT*3240
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*4150 Topics in Applied Statistics III Fall and Winter (LEC: 3) [0.50]
In this course students will discuss selected topics at an advanced level as in STAT*4050, but with different choice of topics.
Prerequisite(s): STAT*3110, STAT*3240
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*4340 Statistical Inference Winter Only (LEC: 3) [0.50]
This course reviews and extends the theory of estimation introduced in STAT*3110. Topics including point estimation, interval estimation, hypothesis testing and decision theory will be presented from both the frequentist and likelihood-based perspectives. Foundational issues concerning the frequentist and Bayesian paradigms will also be discussed.
Prerequisite(s): STAT*3110, STAT*3240
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*4350 Applied Multivariate Statistical Methods Fall Only (LEC: 3) [0.50]
This course introduces the multivariate normal, and Wishart and Hotelling's T-square distributions. Topics covered include: statistical inference on the mean vector, canonical correlation, multivariate analysis of variance and covariance, multivariate regression, principal components analysis, and factor analysis. Topics will be illustrated using examples from various disciplines.
Prerequisite(s): MATH*1160, STAT*3110, STAT*3240
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*4360 Applied Time Series Analysis Fall Only (LEC: 3) [0.50]
This course will investigate the nature of stationary stochastic processes from the spectral and time domain points of view. Aspects of parameter estimation and prediction in a computationally intensive environment will be the presentation style. The methods developed in this course will have applicability in many sciences such as engineering, environmental sciences, geography, soil sciences, and life sciences.
Prerequisite(s): STAT*3240
Department(s): Department of Mathematics and Statistics
Location(s): Guelph

STAT*4600 Advanced Research Project in Statistics Fall and Winter (LAB: 6) [1.00]
Each student in this course will undertake an individual research project in some area of statistics, under the supervision of a faculty member. A written report and a public presentation of the project will be required.
Prerequisite(s): 1.00 credits in Statistics at the 3000 level or above.
Restriction(s): Approval of a supervisor and the course coordinator.
Department(s): Department of Mathematics and Statistics
Location(s): Guelph