# STATISTICS

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Statistical theory and methodology have applications in almost all areas of science, engineering, government, and industry. The practising statistician is involved in such diverse projects as designing als to test a new drug, economic model-building to evaluate the costs of a guaranteed-income scheme, ; the outcome of a national election, planning a survey of television viewing habits, and estimating pulations.

Today's consumer is bombarded with the results of so many quantitative studies using statistical ogy that it is necessary for him to know something about Statistics in order to be properly critical. A wledge of Statistics should be an integral part of everyone's general education.

Advanced probability theory is used to analyse the changing balance among the age-groups in a n as the birth rate changes, the control force needed to keep an aircraft on course through gusts of : chance that the demand for electricity by all the customers served by a substation will exceed its These are just three of many phenomena that can only be analysed properly in terms of randomness ıbility.

The course offerings are intended not only for specialists in the theory of the subject but also to serve of the many other disciplines that use statistical methods, among which sample surveys and design of nts are included. Students following the Specialist Programme are encouraged to include courses in lds of application in their overall programme. The Major Programme can be profitably combined with tion in another discipline.

Both applied and theoretical courses are offered in Statistics and Probability. The foundational TA222Y, 242Y and 352Y are distinguished primarily by their mathematical demands, as indicated by equisites. The highest numbered course for which the student has reasonable standing in the ite courses should generally be chosen. Students interested in the Biological or Social Sciences will find the single most relevant course of the more advanced courses to be, respectively, STA402H or rthermore, the probability course STA347H will be of interest to those whose field of application model building.

Those wishing to find out more about the underlying nature of Statistics and its varied applications l *Statistics: A Guide to the Unknown*, edited by Judith M. Tanur. This entirely non-technical book is in many school libraries or may be purchased from The University of Toronto Textbook Store.

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**mes:** Actuarial Science; Economics and Statistics; Mathematical Statistics; Statistics



STA222Y **Statistics: A General Survey** 52L, 52T
A basic course in standard statistical methods and applications (Students planning advanced study in statistics should enrol in STA242Y/352Y). Frequency distributions, populations and samples, probability distributions, tests of significance, confidence intervals, regression and correlation, analysis of variance, introduction to design of experiments, and sampling theory.
*Exclusion*: ECO220Y, GGR270Y, PSY201H, 202H, SOC201Y, STA242Y, 352Y
*Prerequisite*: Grade 12 Mathematics and one University course in the physical, social, or life sciences

STA242Y **Probability and Statistics: An Introduction** 78L
Probability spaces, conditional probability and independence, discrete and absolutely continuous random variables, standard distributions, expectation, moment generating functions and sums of random variables, sampling distributions, estimation, significance tests and confidence intervals, regression, analysis of variance, introduction to design of experiments.
*Exclusion*: ECO220Y, GGR270Y, PSY201H, 202H, SOC201Y, STA222Y, 352Y
*Prerequisite*: MAT110Y/130Y(with co-requisite MAT230Y)/133Y/134Y/135Y/139Y/150Y

STA302H **Regression Analysis** 39L
Methods of Regression theory with applications to the analysis of non-orthogonal data.
*Prerequisite*: STA222Y with permission of instructor/STA242Y/352Y
*Recommended preparation*: MAT140Y/224H/225Y

STA322H **Design of Sample Surveys** 39L
Methods of selecting samples to ensure valid inferences about a population at reasonable cost. Both sampling errors and important non-sampling errors, such as non-response, will be discussed.
*Prerequisite*: ECO220Y/GGR270Y/PSY201H&202H/SOC201Y/STA222Y/242Y/352Y

STA347H **Probability and Applications** 39L
Methods of the theory of probability and stochastic processes are developed and applied to problems from a variety of fields. Important topics include conditional expectations, generating functions, systems of independent trials, the Poisson model, Markov chains and processes, including systems involving costs.
*Prerequisite*: STA242Y/352Y

STA352Y **Probability and Statistics** (formerly STA252Y) 78L
An abstract and theoretical course in statistics and probability. Topics: probability spaces and distributions on $R^1$ and $R^r$; marginal probability, independence, and distributions on product spaces; expectations and characteristics of distributions; sequences of random variables. Inference from symmetry and large sample theory, parametric models and related estimation and testing, variation-based models, regression analysis and experimental design.
*Prerequisite*: MAT (140Y, 150Y)/STA242Y

STA402H **Experimental Design** 39L
The statistical aspects of collecting and analyzing experimental data; analysis of variance, and orthogonal designs.
*Prerequisite*: STA242Y/302H/322H/352Y

STA412H **Estimation and Testing** 39L
Basic theory of estimation and hypothesis testing. (Offered in alternate years with STA462H)
*Prerequisite*: STA252Y/312H

STA422H **Methods of Statistical Inference** (formerly STA312H) 39L
A survey course: the mathematical methods of statistical inference.
*Prerequisite*: (1982-83) STA242Y/252Y; (1983-84) STA352Y

STA437H **Applied Multivariate Statistics** 26L, 13P
Practical techniques for the analysis of multivariate statistical data. $T^2$ tests, tests of means, simultaneous confidence bounds, profile analysis. Multivariate analysis of variance, completely randomized design, randomized complete block design, Latin square designs, regression and analysis of covariance. Growth curve models, the fitting of polynomials to correlated data. Partial, multiple (R), and canonical correlation. Data reduction, principal component analysis. Discriminant analysis. Computer packages are used.
*Prerequisite*: STA242Y