

STATISTICS 220F - The Practice of Statistics (Sept.1995)

IMPORTANT INFORMATION - READ THIS CAREFULLY AND SAVE IT

This course(in combination with Sta221S) presents the basic statistical methodology used in many fields of application. The emphasis of this course is on concepts and techniques and will be useful to students who seek to gain an understanding of the use of statistics in their own fields. Students seeking a more theoretical or mathematical development of the subject should consider STA 250 and STA 255/STA 257 . However, Sta220&221 will be accepted in lieu of Sta250H as a prerequisite for Sta255/Sta257, after which, further studies in Statistics may be pursued.

Tutorials(Practicals)

Tutorials begin September 18 .

Tutorials meet for one hour each week. Problem assignments/quizzes will be given, collected and returned in tutorials. Computer accounts will be distributed at the first tutorial. All records are kept by tutorial so *KNOW YOUR TUTORIAL CODE AND TUTOR'S NAME*.

The location of your tutorial will be posted outside the Statistics Aid Centre (SS2133), prior to 10am on September18. You may use the Student Telephone Service to change your tutorial (practical) section, up to Sept 22. Some sections, of course, will be filled up, but keep trying, in case someone transfers out.

Lectures

There are three lecture sections. All of them cover the same material; the examinations and assignments are common to all lecture sections. From day to day , however, there is no guarantee that all sections are dealing with the identical topic. Thus, students are advised to stay with the same lecture section to avoid gaps and ensure continuity.

The time table is as follows:

LECTURER	DAYS	TIME	PLACE
A. Vukov:	T,R,F	3-4 pm	Earth Science 1050(Auditorium)
B. Crowe:	M,W,F	10-11 am	MS 2158 (Auditorium) **
N,Taback:	T	7-10 pm	Lash Miller 159

The course co-ordinator is A. Vukov.

**Earth Science 1050 on Oct. 20 only

Course Contents

Content, emphasis, etc. of the course is defined by means of the lecture material - not the text. It is important to attend all the lectures as there is normally no way to make up for missed lectures. There will also be numerous lecture examples using the Minitab statistical software package, which students will be using.

Required Texts

Introduction to the Practice of Statistics(2nd ed.) - Moore and McCabe (Freeman)

Minitab Guide to accompany the above edition-Greenberg,Serva(Freeman)

[You may also find helpful the TVOntario series 'Against All Odds' which was designed in conjunction with the above text. It appears occasionally on TVO and is in the audio-visual library]

Some Other Good/Interesting Books On Statistics:

Statistics - McClave and Dietrich (Dellen)
Statistics: A Computer Integrated Approach - Kvanli (West)
Introduction to Statistical Methods and Data Analysis - Ott (Duxbury)
Statistics, Making Sense of Data - Chester Olson (WC Brown)
Minitab Handbook, 2nd Edition - Ryan/Joiner/Ryan (PWS-Kent)
Statistical Methods - Snedecor and Cochran (Iowa State)
Statistics for Lawyers-Feinstein
Statistics: A Guide to the Unknown - Tanner, et al (Holden-Day)
The Visual Display of Quantitative Information-Tufte
(Some of the above are in Sigmund Samuel Library, and/or the Math Library.)

Statistics Aid Centre(from Sept 20)

Your primary source of help with difficulties is your tutor in the scheduled tutorial, but additional assistance can be obtained at the Statistics Aid Centre, Room 2133, in Sidney Smith Hall. A schedule will be posted on the door. Your own tutor will be on duty there at least one hour per week - and will let you know when.

Evaluation

Your final course grade will be composed of a multiple choice Final Exam worth 55%, a tutorial grade for 10% and a term test worth 35%. If your final exam grade exceeds your test, its weight will be increased from 55% to 65% (test decreased to 25%).

The term test is scheduled as follows:

<u>Date</u>	<u>Time</u>
October 25, 1995	6:10-8:00 pm

There will be **only one alternative test sitting**, at 4-6 pm on the same day, for those who provide proof of a conflict with the 6-8 time slot. So you must be available at either 4-6 or 6-8 pm on the day above.

Programmable calculators are not permitted on tests and exam. Even though tests/exams place a very minor emphasis on formulae, we will allow a one-sided 8-1/2"x 11" hand-written, non-reduced aid sheet on tests (two-sided on final exam). **You must bring your student identification to term tests as well as the final exam.**

Test locations will vary by tutorial and will be posted in tutorial and outside of SS2133 several days before each test.

The final exam will consist of 30 multiple choice questions (5 selections each). A correct answer receives 3.33 marks, an unanswered question receives 0.67 marks, and an incorrect answer receives 0 marks.

A raw score of 30 or better on the final exam is required in order to pass the course.

Missed Tests

There are **no make-up tests**. Should you be forced to miss the term test, you are now required by new faculty regulations to **submit, within one week, appropriate documentation** (print on it your NAME & STUDENT NUMBER, course number, date) to A. Vukov, SS6024. The test's weight will be shifted to the final exam. **If documentation is not received, your test mark will be zero.**

Calculators

Hand calculators are cheap and useful. Any one will do. Mean, standard deviation, sum, and sum of squares keys may save you a bit of time on occasion, but we do not recommend the purchase of expensive calculators to get keys with special statistical calculations. Tests and exams will be designed so that those calculators give no advantage.

Computing

Students will be using, on a weekly basis, the Minitab Statistical Computing System, via computing facilities at the University of Toronto. **No previous computing experience is assumed.** There will be an introductory talk on Minitab during the first few classes. *Students with a PC or Mac computer at home have the option of buying the software package 'The Student Edition of Minitab' for home use rather than using the computing facilities on campus.*

Academic Offences

Academic offences are unacceptable, and harm everyone. Offenders are caught, and **sanctions can be severe** - zero in the course with annotation on the transcript for several years; suspension for a year; even expulsion. Various measures, announced and unannounced, will be taken throughout the year to reduce their incidence and to insure successful prosecution when they do occur. (e.g. photocopying or videotaping of students' tests). Two rules that we will apply, in order to reduce the incidence of altered test papers submitted for remarking, are:

- (i) Any **oversight in marking on a test paper** (e.g. addition error, overlooked work) must be brought to the attention of the T.A. **immediately** during the same class when papers are handed back. Otherwise, it will not be remarked.
- (ii) **A term test must be written in ink**, not pencil. If written in pencil, it will not be accepted for any regrading.

Final Comments

For most students, statistics is a new subject. Like most new subjects, it seems difficult at first but simple in retrospect. Many new concepts will be introduced and built upon. The course will be far easier and more useful if you master concepts as they are introduced. **Doing the exercises is not like calisthenics or jogging, which are good for you no matter how your mind wanders as long as you go through the motions.** Think about why a particular method was used, and what has been learned about the original questions motivating the study!

The lecturers and tutors are there to help. **Ask questions, ask questions, ask.** If you have any comments or suggestions about the course, please tell us. We want to know what is good, we want to know when problems are developing. Remember that **it takes time for information to travel and for action to be taken.** Therefore, if you become aware of any problems, mention this to your instructors, or to the course coordinator (A. Vukov) right away.

STATISTICS 220F (W95) - APPROXIMATE LECTURE GUIDE

Textbook(Moore/McCabe) chapter references are in parentheses. Do most of the odd problems in the text for practice(answers are in the back)

Week 1 : Introduction to course, overview. Variables, units, measurement. Frequency, relative frequency, cumulative frequency distributions. Histograms. Shapes, outliers. Stem and leaf plot. (1.1)

Week 2 : Intro to Minitab. Summation notation. Sample mean, median, trimmed mean. Standard deviation. The empirical(68-95-99.7) rule. Calculations for grouped data. Z-scores. Percentiles. Boxplots.

Week 3 : Linear and non-linear transformations of data. Density curves and the normal distribution. Normal probability plot. (1.2, 1.3) Bi-variate data: Scatterplot, correlation.

Week 4 : The least-squares line, coef. of determination, residual plots, outliers&influential observations; lurking variables, association & causality. Contingency tables for 2 categorical variables. Comparing boxplots. (2)

Week 5 : Collecting data: Randomized experiments & observational studies. Sample vs population characteristics. Simple random samples and variations. Sampling and non-sampling errors(bias). Designing experiments: comparison, randomization, blocking; factorial designs. (3)

Week 6 : Introduction to probability. Sample space, outcomes and events. Rules of calculation for probabilities. Conditional probability (Bayes example via tree diagram). Statistical independence. Two useful counting rules(combinations, sequences) Discrete random variables and probability functions.

Week 7 : Expectation and Variance of R.V's and linear combinations of R.V's. (e.g. sum, difference, average). (4) The binomial distribution, applications, mean and variance, the sample proportion. [TEST-Oct25-6pm-on chapters 1-4]

Week 8 : Continuous r.v.'s and density functions. The normal distribution and normal approximation of binomial. (5.1) Sampling distributions. Distribution of the sample mean (and total). The Central Limit Theorem. An example of a control chart. (5.2)

Week 9 : Margin of error, Confidence Intervals, and sample size, for μ and p .(6.1,8.1). Exact C.I. tables for p . Statistical tests, for μ (σ known) and p . Observed and fixed levels of significance (p -value, α -level).

Week 10 : Directional alternatives. Decision errors -types I, II , and power(with a z-test calculation). Testing hypotheses via C.I.s . Statistical vs practical significance. Multiple tests and data snooping. (6.2,6.3) Tests & C.I.s for μ with unknown variance : the Student t distribution.

Week 11 : Power of the t-test - using tables. Paired comparison t-test, and a nonparametric (distribution-free) approach- the sign test. (7.1) The two sample problem: Large sample z-test & C.I. for comparing means.

Week 12 : Small sample t-tests comparing two population means: pooled/unpooled variance procedures . Comparing designs: paired comparison vs independent groups . Robustness, transformations. Comparing proportions(z-test) (7.2, 8.2))

Week 13 : Testing equality of two population variances - the F distribution. (7.3) Overview of the various testing procedures discussed. Looking ahead.