

## STAT 203: Statistical Methods

The following is a guide to the course STAT 203, Statistical Methods, as given in the Fall term of the academic year 2015-16.

*Aims and Objectives:* Detailed aims and objectives for this course will be found in a document located on the course web page, at [www.slate.stat.ubc.ca](http://www.slate.stat.ubc.ca). You are urged to refer to this document throughout the course to clarify the outcomes you are expected to attain for each section of the material.

*Pre-requisites:* Math 11.

*Co-requisites:* None.

*Lecturer:* Dr. B. Dunham (room ESB 3118, email: [B.Dunham@stat.ubc.ca](mailto:B.Dunham@stat.ubc.ca))

*Lectures and learning support:* Mondays, Wednesdays, and Fridays, 1pm (in ESB 1012). There be a lab/seminar each week of the term. On the following weeks the lab/seminar activity will count toward the final grade:

	Commencing
Week 2	14th Sep.
Week 3	21st Sep.
Week 4	28th Sep.
Week 7	19th Oct.
Week 11	16th Nov.
Week 12	23rd Nov.
Week 13	30th Nov.

On other weeks the labs will be office hours, though tutorial activities will be available. There will also be office hours each week. Both these resources commence in week 2.

*Assessment:* By the completion of the labs (5%), a fifty-minute midterm test (25%, on **2nd November**), responses to clickers questions (5%), on-line WeBWorK homeworks (10%), a  $2\frac{1}{2}$ -hour unseen examination (45%) and two assignments (10%, each worth 5%). Clickers can be registered via the STAT 203 page on *Connect* (at [connect.ubc.ca](http://connect.ubc.ca)). It is necessary to pass the final examination to pass the course overall. The usual university rules for extenuating circumstances and plagiarism apply. Dates for the setting and completion of the assignments are indicated below:

	Set	Hand-in
Assignment 1	2nd Oct.	21st Oct.
Assignment 2	6th Nov.	25th Nov.

For the on-line WeBWorK homeworks, the dates when each homework opens and closes are as follows:

	Opens	Closes
HW1	18th Sep.	27th Sep.
HW2	25th Sep.	4th Oct.
HW3	2nd Oct.	11th Oct.
HW4	9th Oct.	18th Oct.
HW5	16th Oct.	25th Oct.
HW6	23rd Oct.	1st Nov.
HW7	30th Oct.	8th Nov.
HW8	6th Nov.	15th Nov.
HW9	13th Nov.	22nd Nov.
HW10	20th Nov.	29th Nov.
HW11	27th Nov.	6th Dec.

Specific details regarding assessment regulations for the course can be found on the course web page.

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*Teaching methods:* Classes of approximately fifty minutes duration will occur three times a week, with sets of notes being available from the course web page in advance. In most sessions an in-class activity will replace at least part of the lecture component. Usually guided reading or other activities may be set at the end of one lecture to be completed prior to the next. There will be either seminars or office hours each week. The web page provides other sundry resources including an on-line forum. To access the forum, your username is the first eight characters of the your name (including middle name if applicable, and not case sensitive), the password is S followed by the first seven digits of your student number.

*Programme of work:* The study time should total at least eight hours per week. So in addition to the contact hours, it is essential that learners spend no less than four hours per week on self-study for the course. It is suggested at least two hours per week are spent on revising and assimilating the material covered in the lectures or on guided reading, and at least two hours should be spent attempting the on-line homeworks.

*On-line homework:* After the first week of classes there will be an on-line

homework set each week, available on the course web page at [webwork.elearning.ubc.ca/webwork2/](http://webwork.elearning.ubc.ca/webwork2/) and the Connect page. All questions set are of multiple choice or “fill in the blanks” format. You will be scored on your best ten overall homeworks, these counting 10% toward your final grade. All deadlines fall on Sunday evenings.

*Feedback:* After all assignments have been submitted and marked, individual feedback will be provided in the form of brief notes on marked work. Detailed written comments will also be provided on the course web–page where appropriate.

*Recommended texts:* The core text is

De Veaux, R.D., Velleman, P.F., Bock, D.E., Vukov, G. and Weir, A. (2011): *Stats: Data and Models*, (First Canadian edition). Pearson,

and chapter labels below refer to this book. In fact there is a new 2015 edition of this text, similar although with some content re-ordered. The “non–Canadian” version,

De Veaux, R.D., Velleman, P.F. and Bock, D.E. (2015): *Intro Stats*. (Fourth edition) Pearson/Addison Wesley,

and earlier editions are also acceptable texts. Copies of the older editions of either version can be obtained second–hand at modest expense.

There follows a provisional guide to the lecture slots available. It is possible that the material covered in the classes will differ slightly from the description below.

1. Introduction, motivation.
2. Introduction to data types. Population and sample. (Chapter 2)
3. Displaying categorical data. Frequency tables, pictograms, bar charts. (Chapter 3)
4. Pie charts. Introduction to contingency tables.
5. Marginal and conditional distributions from tables. Simpson’s paradox.
6. Displaying quantitative data: histograms, stem–and–leaf plots, dot-plots. (Chapter 4)
7. Describing data distributions. (Chapter 5)
8. Median, range, interquartile range. Five–number summary.

9. Sample mean. Measures of spread: variance and standard deviation.
10. Comparing distributions: Boxplots. Outliers.
11. Standardizing. Shifting. Rescaling. (Chapter 6)
12. Models in Statistics. The Normal model,  $N(\mu, \sigma)$ .
13. Normal percentiles. Probability plots.
14. Scatterplots. Correlation. (Chapter 7)
15. Interpreting correlation. Cautions.
16. Linear models. Line of best fit. (Chapter 8)
17. Correlation and regression. Prediction. Residuals.
18. Subsets. Extrapolation. Outliers, leverage. (Chapter 9)
19. Sample surveys. Population parameters. Simple random samples. Stratified and cluster sampling. (Chapter 12)
20. Experiments. Principles of experimental design. (Chapter 13)
21. Properties of experiments: randomization, controls, blinding, placebos, blocking.
22. Randomness and probability: Law of Large Numbers. Theoretical and personal probabilities. Rules for probability. (Chapter 14)
23. Midterm test (2nd November).
24. Independence and general rules. Conditional probability. (Chapter 15)
25. Tree diagrams and Bayes' rule.
26. Sampling distributions. Distribution of a sample proportion. (Chapter 18)
27. Central limit theorem.
28. Confidence intervals for a proportion. (Chapter 19)

29. Review of assumptions and theory. Choice of sample size.
30. Hypothesis tests for proportions. Components of hypothesis tests. (Chapter 20)
31. P-values. One and two-sided tests.
32. Types of errors in hypothesis testing. (Chapter 21)
33. Inference about means:  $t$  distribution, confidence intervals. (Chapter 23)
34. Hypothesis test for a mean.
35. Comparison of two means. (Chapter 24)
36. More on comparison of two means.

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