THE UNIVERSITY OF SYDNEY
Semester 1, 2012

Information Sheet for **MATH1015 Biostatistics**

Websites
It is important that you check both the MATH1015 website and the Junior Mathematics website regularly. Both sites may be accessed through WebCT, or directly.

Junior Mathematics webpage: `http://www.maths.usyd.edu.au/u/UG/JM/`

MATH1015 webpage: `http://www.maths.usyd.edu.au/u/UG/JM/MATH1015`

Important announcements relating to Junior Mathematics are posted on the Junior Mathematics page.
On the MATH1015 page you will find on-line resources and other useful links. Announcements regarding assessment tasks will be made on this page at various times throughout the semester. Make sure you check the page weekly.

Lectures
There are 2 different lecture streams. You should attend one stream (that is, two lectures per week), as shown on your personal timetable.

Times	Location	Lecturer
8 am Mon & Tue	Wallace	Dr Jennifer Chan, Carslaw 817
11am Mon & Tue	Merewether LT 1 & Carslaw 159	A/Prof Shelton Peiris, Carslaw 819

Lectures run for 13 weeks, and the last lecture will be on Tuesday 05 June.

Consultation times
Lecturers are available for consultation as follows:

Dr Chan: 1–2pm Mondays, in Carslaw room 817.
A/Prof Peiris: 1–2pm Tuesdays, in Carslaw room 819.

Note: You may attend either of these consultations, irrespective of which lecture stream you attend.

Tutorials
Tutorials (one per week) start in week 2. You should attend the tutorial given on your personal timetable. Attendance at tutorials will be recorded. Your attendance cannot be recorded unless you attend the tutorial in which you are enrolled. Your attendance record may be important in the event that you apply for special consideration at any stage. Some tutorial problems are based on the computer software R.

Tutorial exercise sheets
The tutorial sheets for a given week will be available on the MATH1015 web page. **You must print out the current week's tutorial sheet from the web, and take it to your tutorial with you.** Solutions to tutorial exercises for week n will usually be posted on the web on the afternoon of the Friday of week n.

Assessment
Your final raw mark for this unit will be calculated as follows:

65%:	Exam at end of semester 1.
30%:	Quiz mark.
5%:	Assignment mark.

Final grades are returned within one of the following bands:

> **High Distinction (HD), 85–100:** representing complete or close to complete mastery of the material; **Distinction (D), 75–84:** representing excellence, but substantially less than complete mastery; **Credit (CR), 65–74:** representing a creditable performance that goes beyond routine knowledge and understanding, but less than excellence; **Pass (P), 50–64:** representing at least routine knowledge and understanding over a spectrum of topics and important ideas and concepts in the course.

A student with a passing or higher grade should be well prepared to undertake further studies in statistics on which this unit of study depends.

Examination
There is one examination of 1.5 hours duration during the examination period at the end of semester 1. Further information about the exam will be made available at a later date.

Quizzes
Two quizzes will be held during tutorials: **Quiz 1 in the week beginning 30 April** and **Quiz 2 in the week beginning 21 May**. Each quiz is worth 15% of your final raw mark. You must sit for the quiz during the tutorial in which you are enrolled. Your quiz mark will not be recorded if you sit for the quiz in a tutorial in which you are not enrolled.

Assignments
One assignment will be marked, and will be worth 5% your final raw mark. The assignment will be due on **Thursday 01 April**. Please see page 25 of the Junior Mathematics Handbook for details relating to the submission of assignments.

Text book
MATH1015 Biostatistics - Custom Publishing for The University of Sydney, Cengage Learning (2011). Compiled by Shelton Peiris, Jennifer Chan and Dobrin Marchev.
Available from the *Co-op Bookshop*.
See the Junior Mathematics Handbook for other references.

Where to go for help
For administrative matters, go to the **Student Services Office, Carslaw room 520.** For help with mathematics, see your lecturer, or your tutor. Lecturers guarantee to be available during their indicated office hour, but may be available at other times as well. If you are having difficulties with mathematics or statistics due to insufficient background, you may seek help from the **Mathematics Learning Centre, Carslaw 455**.

Objectives
This is an introductory statistics course which aims to:

- introduce techniques for summarising experimental univariate data that arise in various branches of science, medicine, commerce etc, by means of elementary statistics, diagrams and tables;
- introduce basic probability theory to provide a mathematical framework for real life data modelling;
- introduce a number of discrete and continuous distributions and their applications to real life problems;
- introduce statistical inference and show how statistical tests can provide evidence for or against a scientific question;
- introduce bivariate data analysis, correlation, simple linear regression and related problems with applications;
- introduce categorical data analysis, contingency tables, goodness-of-fit tests and applications;
- introduce the freely available statistical software package R and its applications.

Outcomes
Students who successfully complete this unit should be able to:

- explain univariate and bivariate data by means of the five number summary, mean, variance and standard deviation, correlation coefficient, boxplot, histogram, scatterplot, stem-and-leaf plot and frequency distribution;
- use methods derived from the three axioms of probability to calculate the probabilities of simple events;
- understand the concept of a random variable and the meaning of the expected value and variance;
- apply the Binomial distribution as a model for discrete data, read binomial probabilities from a table, calculate binomial probabilities using R;
- use the Normal distribution as a model for continuous data, read normal probability tables, calculate normal probabilities using R;
- understand the central limit theorem;
- understand the concept of hypotheses tests and P-values for finding evidence for or against simple null hypotheses, in particular using the binomial test for testing proportions, one- or two-sided z-, t- tests for making inference about the population mean;
- apply two-sample t-tests for making inference about two population means;
- understand the concept of a confidence interval and be able to apply it to real data;
- find the correlation coefficient and fit the least squares regression line as a way of describing a linear relationship in bivariate data;
- use the Chi-squared test for simple contingency tables and goodness-of-fit problems.
- develop basic statistical computing skills using R.

MATH1015 Biostatistics
Week-by-week outline - Semester 1, 2012

Use: MATH1015 BIOSTATISTICS - Custom Publishing for The University of Sydney
CENGAGE Learning (2011) Compiled by Shelton Peiris, Jennifer Chan and Dobrin Marchev

Week	Topics from the Textbook	Sections
1	L1: Introduction. Stem-and-leaf plot. R Statistical Package.	1, 1.2.1
	L2: Frequency distribution. Histogram.	1.2.2, 1.2.3
2	L1: Measures of location and spread.	1.3, 1.4
	L2: Five number summary, boxplot and grouped data	1.5, 1.6
3	L1: Introduction to Probability.	2.1
	L2: Useful Probabilistic Notation. Examples.	2.2, 2.3
4	L1: Independence and conditional probability. Probability rules.	2.4, 2.5
	L2: Discrete Probability Distributions.	3.1
5	L1: The Binomial distribution. Use of binomial tables.	3.2.1 - 3.2.4
	L2: Applications. Mean and variance of binomial distribution.	3.2.5, 3.2.6
	Week 5: Assignment due	
	M-I-D-S-E-M-E-S-T-E-R—B-R-E-A-K	
6	L1: Continuous Probability Distributions. The normal distribution.	4.1, 4.2.1 - 3
	L2: The normal table. Sum of independent normal variables. (**Omit** 4.3.)	4.2.3, 4.2.4
7	L1: Estimation. (**Omit** 6.3, 6.4.) Estimation of the mean. Central Limit Theorem (CLT)	6.1, 6.2, 6.5
	L2: t distribution. Confidence Interval (CI) for the Mean (**Omit** 6.6)	6.5
	CI for the Binomial parameter p	6.8
8	L1: Hypothesis Testing: Introduction to hypothesis testing. P-values.	7.1 - 7.3
	L2: One-sample test for the mean. (**Omit** 7.5 to 7.6)	7.4
	Week 8: Quiz 1 in your tutorial class	
9	L1: One-sample test for a proportion.	7.10
	L2: Paired-sample t-test. (**Omit** 8.3)	8.1 - 8.2
10	L1: Two-sample t-test for independent samples.	8.4
	CI for the difference of the means from two independent samples.	8.5
	L2: Two-sample test for binomial proportions.	10.2
11	L1: Categorical Data. (**Omit** 10.3-10.5)	10.1
	$R \times C$ Contingency Tables.	10.6
	L2: Chi-Square Goodness-of-Fit Test. Applications. (**Omit** 10.8).	10.7
	Week 11: Quiz 2 in your tutorial class	
12	L1: Regression and Correlation. (**Omit** 11.4, 11.5).	11.1 - 11.3
	L2: Assessing the Goodness of Fit of Regression Lines	11.6
13	L1: The Correlation Coefficient. Applications to Regression (**Omit** 11.8-11.13).	11.7
	L2: Revision.	