

# Information Sheet for STAT231 Probability and Random Variables

Autumn Session 2008

Wollongong

## Subject Coordinator/Lecturer

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Consultation: Tuesday 10.00am – 11:00am  
Thursday 10.00am – 12.00pm

## Subject Prerequisites:

MATH188

This information sheet must be read in conjunction with the general information on educational issues and student matters provided in the document "Policies and Services of the University, Faculty and School" published by the School of Mathematics and Applied Statistics. A copy may be obtained from the subject coordinator or at <http://www.math.uow.edu.au/subjects/generic.shtml>.

## Lectures & Tutorials

Each student should attend three hours of lectures and one tutorial each week, except for the week including Good Friday (March 21) and ANZAC day (April 25). All tutorials will be held in the Horner Computer Lab 15.210, starting in week 1.

Lecture times and venues for STAT231 are:

Wednesday	4.30pm - 5.30pm	1.G05
Friday	11.30am - 1.30pm	20.LT3

Tutorial times and venues are:

Group A	Thursday 3.30pm-4.30pm	15.210
Group B	Thursday 4.30pm-5.30pm	15.210

Details of tutorial allocations will be placed on the STAT231 subject website as soon as they are finalised, but in Week 1 you may attend your choice of class A or B.

You are strongly advised to attend *all classes* in STAT231. Students with timetable clashes should notify the subject coordinator as soon as possible.

## Lecture Notes & Textbook

STAT231 Lecture Notes are available from WebCT. Statistical tables, JMP Version 4 manual and a previous examination paper are also included.

Text:

Mathematical Statistics with Applications, 6<sup>th</sup> ed by Wackerley, Mendenhall & Scheaffer [WMS]

You are not required to purchase reference books. Several copies of all these books are available in the Library. These readings are recommended only and

are not intended to be an exhaustive list. You are encouraged to use the Library catalogue and databases to locate additional readings with similar titles and contents.

## Computer Package

Statistical computing is a compulsory part of the course, and will be assessed both in assignments and in the final examination. The package to be used is JMP, available in the Horner Lab 15.210, 9.00 am – 5.00 pm, Monday to Friday, and in other labs around campus.

In order to save data files or output you will require your own thumb drive or equivalent, available from the UniShop. As JMP is covered by a University site license, you may install it on your own computer. An installation CD may be borrowed from the Closed Reserve Section of the library.

## Notices and WebCT Vista

There is a WebCT Vista space for STAT231. Assignments, tutorials, solutions and notices will be placed on this website. You are responsible for checking the Vista space regularly.

## Subject Learning Outcomes

After successful completion of this subject, students should be able to

- (i) apply Exploratory Data Analysis, both with and without use of a computer package, and present the conclusions of that analysis;
- (ii) interpret and model practical problems;
- (iii) explain the basic concepts of probability and distribution theory;
- (iv) derive distributions from models and by transformations;

- (v) derive the moments of distributions directly and by using moment generating functions;
- (vi) simulate various random variables.

## Subject Outline

### Week 1:

Exploratory data analysis, introduction to the JMP computer package. Random events, probability axioms, combinatorial probability.  
Text/exercises: WMS 1.1, 1.2, 1.3, 2.3, 2.4, 2.6

### Week 2:

Conditional probability, independence, multiplicative law, probabilities of unions, law of total probability, Bayes' Rule.  
Text/exercises: WMS 2.7, 2.8, 2.10

### Week 3:

Discrete random variables, discrete probability function, cumulative distribution function, mean and variance, median, binomial and geometric distributions.  
Text/exercises: WMS 2.11, 3.2, 3.3, 3.4, 3.5

### Week 4:

Hypergeometric and Poisson distributions. Continuous random variables: probability density function, cumulative distribution function, mean and variance, quantiles.  
Text/exercises: WMS 3.7, 3.8, 4.2, 4.3

### Week 5:

Uniform distribution, Normal, exponential and gamma distributions.  
Text/exercises: WMS 4.4, 4.5, 4.6

### Week 6:

Univariate transformations, distribution function and transformation methods.  
Text/exercises: WMS 6.3 (Examples 6.1, 6.5), 6.4 (Examples 6.6, 6.7)

### Week 7:

Tchebysheff's inequality, infinite and non-existent expected values.  
Text/exercises: 3.11, 4.10

### Week 8:

Moments and moment generating functions.  
Text/exercises: WMS 3.9, 4.9

### Week 9:

Discrete and continuous bivariate distributions, expected values, marginal distributions, independence of random variables.  
Text/exercises: WMS 5.2, 5.5, 5.3 (Examples 5.5, 5.7), 5.4

### Week 10:

Covariance and correlation, conditional distributions, conditional expectation, bivariate transformations: distribution function method.  
Text/exercises: WMS 5.7, 5.3, 5.11, 6.3

### Week 11:

Maximum and minimum of independent random variables, mean and variance of linear combinations, multinomial distribution.  
Text/exercises: WMS 6.7, 5.8, 5.9

### Week 12:

Moment generating function of sum, Central Limit Theorem, approximations of binomial and Poisson distribution.

Text/exercises: WMS 6.5, 7.3, 7.4, 7.5

### Week 13:

Poisson process, waiting and interarrival times. Not specifically in text, but revise WMS 3.8, 4.6

## Assignments

There will be 12 assignments, each worth 2.5% of the final assessment. **If there is no further notice**, assignments are due at the start of the Friday lecture, weeks 2 through 13, and will be placed on WebCT Vista at least two weeks before the due date. You should keep a copy of all work submitted. Faxed, mailed or e-mailed assignments will not be accepted unless special permission has been granted by the subject co-ordinator. The front page of the assignment should include your name, student number, tutorial group, subject name and assignment number. If you want somebody else to pick up your assignment, you must sign a note authorising them to do so.

Extensions of the due dates for Assignments will be granted only in exceptional circumstances, such as serious medical or compassionate reasons, and will require appropriate documentary evidence covering the period immediately before the due date. Pressure of work, either from employment or from other subjects, is *not* normally an acceptable reason for seeking an extension of time. Alternative assessment tasks may be set in cases when an extension is granted beyond the return date for other students. Late assignments for which no extension has been granted will be subject to a penalty – see assignment sheet for details.

Assignments will be marked on the basis of clear working and explanation, in addition to mathematical correctness. Every assignment submitted will contribute towards your final assessment. *However, the primary purpose of each assignment is to give you feedback on your progress and understanding of the work.*

## Minimum Weekly Workload

STAT231 is a 6 credit point single-session subject offered in Autumn session. This means that a student of average ability would be expected to work 12 hours per week on STAT231 to achieve an average result. Since 4 hours per week is taken up with formal lectures and tutorials, *an average student would be expected to work at least 8 hours per week on STAT231 outside scheduled compulsory class time.*

## Assessment

The approved grades of performance and associated ranges of marks are:

### Satisfactory Completion:

High Distinction	85% – 100%
Distinction	75% – 84%
Credit	65% – 74%
Pass	50% – 64%
Pass Conceded	45% – 49%

### Unsatisfactory Completion:

Fail	0% – 44%
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Note: A Pass Conceded is acceptable as a pre-requisite, but you may only include a limited number of credit points at the Pass Conceded in your degree (refer University Calendar).

Your final mark in STAT231 will be determined as follows:

Assignments	–	30%
Final Exam	–	70%
Total	–	100%

### **Calculators**

Calculators will be permitted in the final examination, and should be brought to all tutorial classes. Preferably your calculator should have basic statistical functions (mean and standard deviation), and exponential/log keys.

### **Final Examination**

The final examination in STAT231 will be as follows:

Duration: 3 hours and 15 minutes

Value: 70% of final mark.

The examination will be held during the examination period in June, at a time to be advised by the University. As a student enrolled in the University of Wollongong, you are required to be available for the entire examination period in June.

### **Cheating and Plagiarism**

The University does not tolerate cheating nor plagiarism and regards them very seriously. For more information, see the document "Policies and Services of the University, Faculty and School" and the section in the University Undergraduate Handbook entitled "Acknowledgement Practice/Plagiarism", or visit <http://www.uow.edu.au/handbook/courserules/plagiarism.html>

### **Consultation**

If you are having any difficulties with STA231, you are encouraged to seek advice from the subject coordinator.

If you cannot come at the listed consultation times, contact the subject coordinator to arrange an appointment at a mutually convenient time.

When you send an email to a lecturer or the subject co-ordinator, you should do so from your University email account. Email sent from other accounts may be automatically redirected into a junk-mail folder; the staff member may then not read it for several days, or it may be automatically deleted before it is read at all. Furthermore, the subject line of your email should refer to STA231.

**If you are having any difficulty with STA231,  
you should seek advice before it is too late.**