

School of Economics and Finance

**QUAN 203 Quantitative Methods for Economics and Finance  
(Econometric Theory)**

Trimester 2, 2015

**COURSE OUTLINE**

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**Staff:**

- John Randal, RWW119, phone 463-5558 (lecturer, coordinator)  
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- Alice Fong, RH318, phone 463-5353 (administrator)  
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**Lecture times, venue:** Tuesday and Thursday, 08:30–09:20, GB LT4

**Teaching period:** Monday 13 July to Friday 16 October

**Study period:** Monday 19 October to Thursday 22 October

**Examination period:** Friday 23 October to Saturday 14 November (inclusive)

**Withdrawal from Course:**

1. Your fees will be refunded if you withdraw from this course on or before Friday 24 July 2015.
2. The standard last date for withdrawal from this course is Friday 25 September 2015. After this date, students forced to withdraw by circumstances beyond their control must apply for permission on an *'Application for Associate Dean's Permission to Withdraw Late'* including supporting documentation. The application form is available from any of the Faculty's Student Customer Service Desks or online at <http://www.victoria.ac.nz/vbs/studenthelp/forms>.

**Course website**

<http://www.blackboard.vuw.ac.nz/> If QUAN203 does not appear in your list of courses, please email John immediately, with your Blackboard username.

**Course delivery**

Two lectures per week (24 in total), and a weekly tutorial (from week 2).

**Expected workload**

A 15 point course has an expected total workload of 150 hours. Over the duration of the course, this is roughly 10 hours per week.

A suggested way of allocating this time is to focus on each of the following:

- preparation for each lecture (by reviewing old material and the published lecture notes)

- reviewing each lecture after its delivery (e.g. making sure your notes are free of errors)
- preparing for the next tutorial by attempting the relevant problems
- preparing assignment material for submission.

### Prescription

Quantitative methods for advanced study in economics and finance. Topics include calculus of functions of several variables; matrices and quadratic forms; distribution theory; expectations, with applications to problems in economics and finance.

### Course learning objectives

We aim to develop essential background econometric theory (including mathematics and statistics) for progression into third year econometrics, economics or finance, or higher study in those subjects (e.g. honours). Assessment will test students' knowledge and appreciation of these key concepts.

By the end of this course, students should be able to:

- C1 explain and use formal intermediate level multivariate calculus, linear algebra, and probability theory
- C2 use linear algebra to analyse selected applications in economics and finance
- C3 derive properties of discrete and continuous random variables
- C4 manipulate conditional and independent random variables and their expectations
- C5 derive method of moments and maximum likelihood estimators for selected random variables

### Course content

Below is a tentative schedule for the course. Changes to the schedule will be advised via Blackboard. The main goal of the course is to enable students to be more comfortable with common mathematical and statistical ideas for further study in economics, finance, and econometrics. We intend to achieve this goal by covering the following topics:

**Weeks 1–3** *Discrete random variables and their properties.* Definitions of: probability function, parameters, mean, variance, moment generating function, moments. Proof of linearity of expectation. Properties of: binomial, Poisson, geometric, hypergeometric, and negative binomial random variables.

**Weeks 4–6** *Continuous random variables and their properties.* Definitions of: probability density function, cumulative distribution function, moments, moment generating function. Transformation of continuous random variables. Properties of: uniform, exponential, beta, normal, and chi-square random variables.

**Weeks 7–8** *Independent and conditional random variables.* Properties of sums of independent random variables. Sampling distribution. CLT. Joint and conditional distributions; the bivariate normal distribution.

**Weeks 9–10** *Regression.* Ordinary least squares. Estimation of parameters in the case of a single dependent variable. Estimation and properties of parameters using matrix notation. Multiple regression.

**Weeks 11–12** *Method of moments and maximum likelihood.* MM estimators and MLEs for discrete and continuous distributions. Regression estimators as MM estimators or MLEs.

Lecture materials will be supported by practice in the tutorials, and through the assignments. Specific tutorial and assignment exercises will be distributed via Blackboard. You should try the problems in advance of attending the tutorial. The assignment will allow further practice of these skills.

### Tutorials

Sign up online: <https://student-sa.victoria.ac.nz>. Tutorial sign up will be available from 8am, Monday 13 July until noon on Friday 17 July. As above, tutorial exercises will be distributed via Blackboard. It is strongly recommended that you try the exercises before you attend the class. Tutorials will be held every week, starting in Week 2.

### Assignments

The Assessment Handbook will apply to all VUW courses: see <http://www.victoria.ac.nz/documents/policy/staff-policy/assessment-handbook.pdf>.

There will be four assignments, corresponding to the first four major topics listed above. Assignments will be issued on Blackboard, and submission of these is *a mandatory course requirement*. The assignments will be given one of three marks:

- 0, indicating the assignment is of unacceptable quality
- 1, indicating reasonable understanding/accuracy, but some flaws or omissions
- 2, indicating a near-perfect assignment
- 3, all attempted, all correct.

A mark of less than 4/12 would indicate that you may struggle to pass the test and/or final exam. Discussion of assignments with other students is allowed, but submitted work should be your own. *The purpose of these assignments IS FOR YOU TO LEARN, and copying negates this purpose.* Copied work (for all involved parties) is unacceptable and will not only count as having been missed, but may also initiate disciplinary action against the students concerned.

Marked assignments will be returned at the tutorial of the following week. Uncollected assignments will be disposed of at the end of the course. Late assignments will be given a *zero mark*, but will count as submitted.

The assignments are *worth 10% of your final grade, determined as follows:*

Assignment total	0	1	2	3	4	5	6	7	8	9	10	11	12
Grade contribution	0	2	3	4	5	6	7	8	9	9	10	10	10

### Readings

Lecture notes will be provided via Blackboard. Reading these in advance of the lecture, and preparing any preliminary material (i.e. previous lectures) is a very good idea. The recommended text book for the course is: Hogg and Tanis, *Probability And Statistical Inference 8/e*, Pearson, and this is available from Vic Books. There are also many textbooks on mathematical statistics in the library which do cover relevant material, and resources online best found by googling relevant terms.

The VUW library has a web page that contains detailed information about library resources and has links to other sites. Its URL is <http://www.victoria.ac.nz/library>

### Course Materials

A calculator may be useful during this course. Any calculator used for the prerequisites of this course will be appropriate.

### Assessment requirements

As above, the four assignments are *worth 10% of the final grade*.

A ninety minute test covering lectures 1–12 (inclusive) will be held at 6:40pm on Wednesday 9 September, in RHLT2. *This will be worth 35% of your final grade.*

A two-hour final examination for this course will be scheduled at some time during the period (Friday 23 October to Saturday 14 November inclusive). *This exam will be worth the remaining 55% of your final grade.* Reduced emphasis will be placed on content in the first half of the course. You are obliged to attend this examination at the University at any time during the formal examination period.

All CLOs will be assessed in the exam and assignments. CLOs C1 and C3 will also be assessed in the test.

If you cannot complete an assignment or sit the test or examination, refer to <http://www.victoria.ac.nz/home/study/exams-and-assessments/aegrotat>. It is also recommended that you contact the course coordinator at your earliest opportunity.

### **Penalties**

Late assignments will not be marked (discuss an extension in advance of the due date with the course coordinator).

### **Mandatory course requirements**

Students must submit all four assignments, scoring at least two marks of one or better.

Any student who is concerned that they have been (or might be) unable to meet any of the MCRs because of exceptional personal circumstances, should contact the course coordinator as soon as possible.

### **Class representative**

A class representative will be elected in the first class, and that person's name and contact details made available to VUWSA, the course coordinator and the class. The class representative provides a communication channel to liaise with the course coordinator on behalf of students.

### **Course feedback**

A course evaluation will be conducted for this course in Week 12. Student feedback on University courses may be found at [http://www.cad.vuw.ac.nz/feedback/feedback\\_display.php](http://www.cad.vuw.ac.nz/feedback/feedback_display.php)

### **Communication of additional information**

Blackboard will be the authoritative location of any information about this course.

We may use Blackboard to send email to you. This will go to your official university email address. Should you prefer to receive these to your personal email address, you can set up your VUW account to forward email. Instructions for doing so are available on Blackboard, in Course Resources.

### **Link to general information**

For general information about course-related matters, go to <http://www.victoria.ac.nz/vbs/studenthelp/general-course-information>

### **Note to students**

Your assessed work may also be used for quality assurance purposes, such as to assess the level of achievement of learning objectives as required for accreditation and academic audit. The findings may be used to inform changes aimed at improving the quality of VBS programmes. All material used for such processes will be treated as confidential, and the outcome will not affect your grade for the course.