Subject Information Guide

Stochastic methods in finance STAT920

Semester 1, 2014

Administration and contact details

Host Department	School Of Mathematics and Applied Statistics
Host Institution	University of Wollongong
Name of lecturer	Chandra Gulati
Phone number	02-42213836
Email Address	cmg@uow.edu.au
Homepage	Click here to enter text.
Name of Honours coordinator	James McCoy
Phone number	02-42215189
Email Address	jamesm@uow.edu.au

Subject details

Handbook entry URL	Click here to enter text.
Subject homepage URL	https://solss.uow.edu.au/owa/sid/CAL.USER_SUBJECTINFO_SCREEN?p_faccde=24&p_subc ode=STAT920&p_depabb=MAAS&p_cal_subject_id=149999&p_year=2014&p_cal_type=P& p_cal_types=UP&p_display=NO
Honours student hand-out URL	Click here to enter text.
Start date:	3/03/2014
End date:	6/06/2014
Contact hours per week:	2 Hours
Lecture day and time:	Wednesday 8.30-10.30AM
Description of electronic access arrangements for students (for example, WebCT)	Moodle

Subject content

1. Subject content description

STAT920 covers necessary probabilistic concepts and models such as linear stochastic models, nonlinear stochastic models and nonlinear chaotic models used in finance. Topics discussed in this subject also include martingale methods, stochastic processes, optimal stopping, the modeling of uncertainty using a Wiener process, Ito's formula as a tool of stochastic calculus, equivalent martingale measures and the applications of these methods to finance.

2. Week-by-week topic overview

Week 1 Properties of returns (Chapter 1)
Week 2 ARIMA Models (Chapter 2)
Week 3 ARIMA Models   (Chapter 2)
Week 4 Regression Models with Correlated Errors (Chapter 2)
Week 5 Volatility Models (Chapter 3)
Week 6 Volatility Models (Chapter 3)
Week 7   Martingales and Optimal Stopping Problems
Week 8 Martingales and Optimal Stopping Problems
Week 9   High Frequency Data Analysis, Bid Ask Models (Chapter 5)
Week 10 Continuous Time Models, Brownian Motion, Ito's Lemma (Chapter 6)
Week 11 Continuous Time Models, Brownian Motion, Ito's Lemma (Chapter 6)
Week 12 Value at Risk (Chapter 6)
Week 13 Revison
(Chapters correspond to Tsay's Book)

3. Assumed prerequisite knowledge and capabilities

Statistical Inference and Regression and use of SAS

4. Learning outcomes and objectives

After successful completion of this subject, students should be able to
(i)   understand the concept of asset returns and derive some of its properties;
(ii)   fit appropriate time series (ARIMA) model to stock prices; asset returns, absolute and squared returns,
(iii)   apply time series techniques (GARCH models) to fit volatility models;

(iv)   understand the concept of optimal stopping problems;

(v)   understand the concept of martingales (including sub and super) and its application in Finance

5. Learning resources

Tsay R. (2010). Analysis of Financial Time Series, John Wiley 3nd Ed.

References:

Ruppert D. (2004). Statistics and Finance: An Introduction. Springer

Salih N. Neftci (2000). An Introduction to the Mathematics of Financial Derivatives, 2nd Edition, Academic Press

Lectures will be available at Moodle site for the subject.

Software Needed   SAS

6. Assessment

Exam/assignment/classwork breakdown					
Exam	70%	Assignment	30 %	Class work	Enter %
Assignment due dates		Week 4	Week 8	Week 12	Click here to enter a date.
Approximate exam date				18/06/2026	

Institution Honours program details

Weight of subject in total honours assessment at host department	1/8
Thesis/subject split at host department	BMath(Hons): Thesis worth 25% BMathAdv(Hons): Thesis worth 37.5%
Honours grade ranges at host department:	
H1	85-100
H2a	75-84
H2b	65-74
H3	50-64