ACE Network Subject Information Guide
Semester 1, 2023

Administration and contact details

Host department	School Mathematics
Host institution	Monash University
Name of lecturers	Dr. Greg Markowsky (1st part) and A/Prof Andrea Collevecchio (2nd part and Chief Examiner)
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Name of masters coordinator	Dr. Greg Markowsky
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Subject details

Handbook entry URL	
Subject homepage URL	
Honours student hand-out URL	
Teaching period (start and end date):	27 Feb – 26 May
Exam period (start and end date):	5–23 Jun
Contact hours per week:	
ACE enrolment closure date:	
Lecture day(s) and time(s):	
Description of electronic access arrangements for students (for example, LMS)	

1. Welcome to MTH5220! The aim of this course is to study martingale theory. In particular, we will focus on the following topics. Doob's convergence theorem. Optional sampling theorem. Discrete Stochastic integral. Martingale inequalities such as Doob and Burkholder-Davis-Gundy inequalities. Bucy-Kalman filter. Applications to finance. Option pricing - discrete Black-Scholes formula. Control theory.

2.

2. **Learning outcomes:**

3. By the end of this unit you will be able to:

4. On successful completion of this unit, you should be able to:

5. **1.**

6. Develop specialised mathematical knowledge and skills within the theory of martingales.

7. **2.**

8. Apply sophisticated stochastic modelling skills within a variety of contexts, from population biology to finance to management science, and more.

9. **3.**

10. Apply critical thinking to problems in discrete-time stochastic processes in general, and in the theory of discrete-time martingales in particular.

11. **4.**

12. Formulate expert solutions to practical financial, engineering or scientific problems using specialised cognitive technical skills within the theory of discrete-time martingales.

13.

14. Assessment summary

Assessment task description	Value	Due date	Learning outcome
Assignment 1	10%	**Due Week 5**	
Assignment 2	15%	**Due Week 10**	
Assignment 3	15%	**Due Week 12**	
Final Exam	60%		

Learning Outcome Descriptors at AQF Level 8
Knowledge
K1: coherent and advanced knowledge of the underlying principles and concepts in one or more disciplines
K2: knowledge of research principles and methods
Skills
S1: cognitive skills to review, analyse, consolidate and synthesise knowledge to identify and provide solutions to complex problem with intellectual independence
S2: cognitive and technical skills to demonstrate a broad understanding of a body of knowledge and theoretical concepts with advanced understanding in some areas
S3: cognitive skills to exercise critical thinking and judgement in developing new understanding
S4: technical skills to design and use in a research project
S5: communication skills to present clear and coherent exposition of knowledge and ideas to a variety of audiences
Application of Knowledge and Skills
A1: with initiative and judgement in professional practice and/or scholarship
A2: to adapt knowledge and skills in diverse contexts
A3: with responsibility and accountability for own learning and practice and in collaboration with others within broad parameters
A4: to plan and execute project work and/or a piece of research and scholarship with some independence

15. Assessment

Exam/assignment/classwork breakdown					
Exam	Enter %	**Assignment**	Enter %	**Class work**	Enter %
Assignment due dates	Click here to enter a date.	Click here to enter a date.	Click here to enter a date.	Click here to enter a date.	
Approximate exam date				Click here to enter a date.	

Institution honours program details

Weight of subject in total honours assessment at host department	Click here to enter text.
Thesis/subject split at host department	Click here to enter text.
Honours grade ranges at host department	
H1	Enter range %
H2a	Enter range %
H2b	Enter range %
H3	Enter range %

Institution masters program details

Weight of subject in total masters assessment at host department	Click here to enter text.
Thesis/subject split at host department	Click here to enter text.
Masters grade ranges at host department	
H1	Enter range %
H2a	Enter range %
H2b	Enter range %