Subject Information Guide

C*-Algebras

Semester 1, 2014

Administration and contact details

Host Department	**School of Mathematics and Applied Statistics**
Host Institution	**University of Wollongong**
Name of lecturer	**Mike Whittaker and Aidan Sims**
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Homepage	**http://www.michaelwhittaker.ca/ and http://www.uow.edu.au/~asims**
Name of Honours coordinator	**James McCoy**
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Subject details

Handbook entry URL	**N/A**
Subject homepage URL	**N/A**
Honours student hand-out URL	**N/A**
Start date:	**3/03/2014**
End date:	**13/06/2014**
Contact hours per week:	**2**
Lecture day and time:	**Tuesday 1:30-3:30**
Description of electronic access arrangements for students (for example, WebCT)	**Resources will be hosted and available for download on the lecturers' web-sites. Details available at the commencement of the course.**

Subject content

1. Subject content description

We will cover the basics of the theory of C*-algebras, including spectral theory, Gelfand duality and the commutative Gelfand-Naimark theorem, the continuous functional

calculus, the structure of ideals and positive elements, representation theory, the GNS construction and the noncommutative Gelfand-Naimark theorem, and pure states and irreducible representations.

2. Week-by-week topic overview

Wk 1: Bounded operators on Hilbert space, and examples
Wk 2: Banach algebras and the spectrum
Wk 3: Spectral radius and automatic continuity
Wk 4: Ideals and maximal ideals
Wk 5: Maximal-ideal space and Gelfand transform
Wk 6: Gelfand's theorem
Wk 7: The Gelfand-Naimark theorem and the functional calculus
Wk 8: Functional calculus, spectral permanence, automatic isometry
Wk9: Positive elements and quotients
Wk10: The GNS construction
Wk11: The noncommutative Gelfand-Naimark theorem
Wk12: Pure states and irreducible representations

3. Assumed prerequisite knowledge and capabilities

Basic point-set topology. Complex Hilbert space. Fundamentals of real analysis.
The fundamentals of complex analysis and of functional analysis are preferable but not essential.

4. Learning outcomes and objectives

Over the duration of this course you will learn the basic theory of C*-algebras including most of the fundamental structure theorems that underpin the subject. You will also be proficient in working with the spectrum of an element of a Banach algebra and exploiting the spectral radius formula, and you will be proficient in exploiting the continuous functional calculus for normal elements of C*-algebras.

5. Learning resources

Printed notes will be provided. No other resources are needed.

6. Assessment

Exam/assignment/classwork breakdown					
Exam	60%	**Assignment (2)**	40%	**Class work**	0%
Assignment due dates		**7/04/2014**	**12/05/2014**	Click here to enter a date.	Click here to enter a date.
Approximate exam date				**18/06/2014**	

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