Subject Information Guide

C*-algebras II: Unitizations and Crossed Products

Semester 2, 2014

Administration and contact details

Host Department	**School of Mathematics and Applied Statistics**
Host Institution	**University of Wollongong**
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Subject details

Handbook entry URL	Click here to enter text.
Subject homepage URL	Click here to enter text.
Honours student hand-out URL	Click here to enter text.
Start date:	**28/07/2014**
End date:	**31/10/2014**
Contact hours per week:	**2-3**
Lecture day and time:	Tues 10:30-12:30 and Wed 13:30-15:30
Description of electronic access arrangements for students (for example, WebCT)	**N/A**

Subject content

1. Subject content description

We will discuss the two key constructions for embedding a non-unital C*-algebra in a unital one: adjoining a unit, and the multiplier algebra. We will construct multiplier algebras as algebras of operators on Hilbert modules, and study some of the basic properties of multiplier algebras. Then we will consider dynamical systems and C*-algebras. We will show that Gelfand duality allow us to regard group actions on locally compact Hausdorff spaces as group actions on commutative C*-algebras and

vice-versa. Then we will study crossed-products of C*-algebras by discrete groups, paying particular attention to the irrational-rotation algebras.

2. Week-by-week topic overview

Week 1: adjoining a unit to a C*-algebra
Week 2: Hilbert modules over C*-algebras
Week 3: Adjointable and "compact" operators on Hilbert modules;
Week 4: Approximate identities
Week 5: Unitizations and the multiplier algebra
Week 6: Universality of the multiplier algebra
Week 7: Locally compact groups
Week 8: Gelfand duality for dynamical systems
Week 9: Covariant representations; crossed-products by discrete groups
Week 10: Construction of the crossed-product
Week 11: Structure of the crossed-product
Week 12: Structure of the irrational-rotation algebra

3. Assumed prerequisite knowledge and capabilities

Students are assumed to be familiar with the contents of the subject matter from *C*-algebras*, which ran in semester 1. Familiarity with basic point-set topology, functional analysis, and Hilbert space would also be helpful.

4. Learning outcomes and objectives

Students successfully completing this subject will develop a thorough understanding of the structure of unitizations of C*-algebras and how they are used to extend results from unital C*-algebras to non-unital ones. They will also understand the basic theory of C*-dynamical systems and of crossed-product C*-algebras. They will have a thorough knowledge of the fundamental definitions and concepts in these two topics. They will be able to prove key results about unitizations and crossed products. They will be able to produce examples exhibiting important structural properties.

5. Learning resources

Insert texts, printed notes and/or software required

6. Assessment

Exam/assignment/classwork breakdown					
Exam	60%	**Assignment**	40%	**Class work**	0%
Assignment due dates		**19/09/2014**	**24/10/2014**	Click here to enter a date.	Click here to enter a date.
Approximate exam date				**10/11/2014**	

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