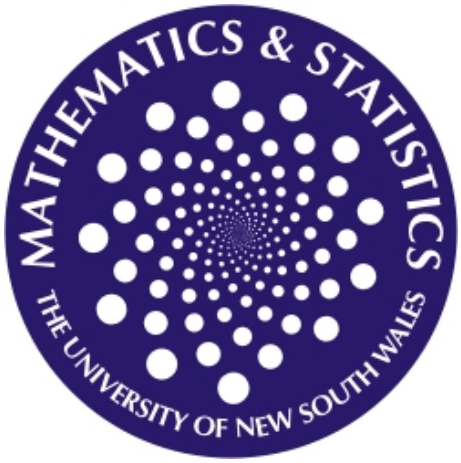
UNSW SYDNEY

FACULTY OF SCIENCE
SCHOOL OF MATHEMATICS AND STATISTICS

MATH5715

HARMONIC ANALYSIS

Session 2, 2018



Cricos Provider Code: 00098G

MATH5715 – Course Outline

Information about the course

Course Authority: Dr Denis Potapov

Lecturer: Denis Potapov, RC-6111, email d.potapov@unsw.edu.au

Credit & Prerequisites: This course counts for 6 Units of Credit (6UOC).

This course is usually taken by Honours students and coursework Masters students. Very well-prepared third year students might be admitted after approval by Dr Denis Potapov — see him if you are interested.

The course will assume a familiarity with some of the basic notions of analysis and (to a lesser extent) algebra. Students who have done MATH5605 Functional Analysis and a first course in group theory should be well-prepared. Although we won't need too much about the structure of Hilbert and Banach spaces, you should at least know what these are. Some basic knowledge of measure and integration is also required.

Course aims

Harmonic analysis is a very large and varied subject. Our aim here will be to develop good knowledge and skills with the classical Harmonic Analysis on Euclidean spaces.

Course schedule

The course will closely follow the book by E. Stein and G. Weiss "Introduction to Fourier Analysis on Euclidean spaces". The actual depth and extend of the course will depend on the background and progress of the participants. At the very minimum, the course will cover Chapter I "The Fourier Transform"; Chapter II "Boundary Values of Harmonic Functions" is an optional extra.

Assessment

http://www.maths.unsw.edu.au/currentstudents/assessment-policies

You are required to complete four assessment tasks in this course:

In-class Activity	24%
Class Test 1 (week 6)	18%
Class Test 2 (week 11)	18%
Final Examination	40%

In-class Activity: In-class activity is split across 12 weeks of teaching. For each week, 2% mark is awarded if student attended the Thursday lecture and made a short presentation of a problem/result discussed in earlier lectures. For the weeks when the class tests are held, 2% marks are awarded for attending the test (on the top of the test mark).

Class Tests: Class Tests will give an opportunity for students to try their skills and knowledge in exam type environment. The tests are fully based on the preceding class presentations and discussions. The tests will be held during Thursday lecture.

Exam: The final two hour examination will assess student mastery of the material covered in the lectures. The exam will be worth 50% of your final mark. Further details about the final examination will be available in class closer to the time.

In case you are entitled for the Supplementary Examination, please note that the Supplementary Exam will be scheduled Saturday 8th December to Saturday 15 December 2018.

Textbooks

The course will closely follow the book by E. Stein and G. Weiss "Introduction to Fourier Analysis on Euclidean spaces".

Course Evaluation and Development

The School of Mathematics and Statistics evaluates each course each time it is run. We carefully consider the student responses and their implications for course development. It is common practice to discuss informally with students how the course and their mastery of it are progressing.

Student Learning Outcomes

Students taking this course will develop a working knowledge of Fourier Transform on Euclidean Spaces. Depending on students' progress, the basic knowledge of the boundary value of a harmonic functions is also likely to be introduced to students.

Relation to graduate attributes:

The above outcomes are related to the development of the Science Faculty Graduate Attributes, in particular: 1. **Research, inquiry and analytical thinking abilities**, 4. **Communication**, 6. **Information literacy**

Teaching strategies underpinning the course

New ideas and methods are introduced and demonstrated in lectures, then students become confident with these ideas and methods skills by making their own in-class presentations. Class Tests are test students' mastery of the subject and ability to successfully perform in the time-stressed environment.

Rationale for learning and teaching strategies

We believe that effective learning is best supported by a climate of inquiry, in which students are actively engaged in the learning process. Hence this course is structured with a strong emphasis on student independent presentations both oral and written.

Rationale for in-class presentations: In-class presentations will be a non-stressed environment where students will be given (i) an opportunity to test their understanding of the ideas and methods discussed earlier; (ii) a weekly indication whether their progress is on track; (iii) a feedback on their understanding. It also gives the lecturer a valuable weekly feedback on the students' progress with the material.

Rationale for class tests: Class tests will give students an opportunity to test their ability to perform well in the time-stressed environment.

Administrative matters

Important information on

- **Additional Assessment**
- **School Rules and Regulations**
- **Plagiarism and academic honesty**

can be found on the School's website at

`http://www.maths.unsw.edu.au/currentstudents/assessment-policies`

Please carefully read this page and the documents two which it links.