

MATHEMATICS 425 + 522
MATHEMATICS FOR SCIENTISTS + FOURIER ANALYSIS
FALL 2008

DR. J. RAMANATHAN

Office: 504 M Pray-Harold
Office Hours: 12:00-2:30 pm TR, 5:00-5:30 pm TR
E-mail: ramanath@emunix.emich.edu
Web Page: <http://emunix.emich.edu/~ramanath>

Goals of the Course

- To learn the core facts of Fourier Analysis and to get a sense of the role of the subject in applications.
- To develop further mathematical writing and problem solving skills.

Text: *A First Course in Harmonic Analysis, (2nd ed.)*, Anton Deitmar, Springer, 2005.

Class Organization, Policies etc.

The class will be run in a lecture/discussion format. Required work will include reading assignments and problem sets (some being group assignments). There will be a midterm and a final.

Problem Sets	60%
Midterm	20%
Final	20%

Finally, the course has both graduate and undergraduate students. Problems marked with a † are optional for the undergraduates while those marked with a ‡ are optional for everybody.

Topic Outline

A tentative list of topics (very much subject to change) is given below:

- (1) Preliminary Topics
 - a. Complex sequences and series
 - b. Introduction to power series
 - c. e^x and its merry companions \cos and \sin
- (2) Fourier Series (Chapter 1 from text.)
- (3) Hilbert Spaces (Chapter 2 from text.)
- (4) The Fourier Transform (Chapter 3 from text.)

Various applied topics will be interspersed throughout, especially in the form of problem sets.

Rubric for Evaluation of Individual Problems

Most problems will be graded on a five point scale¹. The approximate meaning of the numeric score is given in the following table:

- 5 points
Tears of joy are running down my face.
- 4 points
Minor inaccuracies, but still reaching for the Kleenex.
- 3 points
Strong evidence that the problem has been understood and the basic solution idea works. However key ideas are missing and/or serious logical errors have been made.
- 1 to 2 points
Weak evidence that the problem has been understood or an *unworkable* solution strategy. Serious logical errors have been made.
- 0 points
"The sun will come out tomorrow, tomorrow ..."

¹Extended problems will be graded on a ten or fifteen point scale. In this case the scale below will be multiplied by the common sense constant.