MATH 756: Harmonic Analysis (Spring 2024)
MWF 10:00-10:50 Minard 212

Instructor: Maria Alfonseca, Minard 408E34
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Office Hours: MWF 9:00-9:50 am and by appointment.

Textbooks:

- Gerald B. Folland, *Real Analysis: Modern Techniques and Their Applications (Second edition)*, Wiley-Interscience, for the Chapter about L^p spaces.

- E.M. Stein and R. Shakarchi, *Fourier Analysis, an introduction*, Princeton University Press, for more in-depth study of Fourier series and transform.

- Javier Duoandikoetxea, *Fourier Analysis,*, American Mathematical Society (Graduate Studies in Mathematics, 29).

Goal: This course is an introduction to classic Harmonic Analysis. The goal is to provide in depth study of several tools in Harmonic Analysis that are widely used in other areas.

Topics:

- Theory of L^p spaces: inclusions, duality, interpolation (from Folland's book).

- Fourier series and Fourier transform: pointwise convergence, summability, and L^p convergence.

- Maximal operators and pointwise convergence: weak, strong and weighted boundedness.

- Hilbert transform: Boundedness, relation to the L^p convergence of Fourier series.

- Singular integrals: Calderón-Zygmund operators, Riesz transforms.

Attendance: Attendance is expected and required. You are responsible for all the material covered in class and all the assignments and announcements made. If you need to miss class due to sickness or other reason, please email me.

Grading: This course includes material that will be asked in future Qualifying Examinations. For this reason, there will regular homework, a midterm exam and a final exam. Evaluation will be based on the performance in the following activities:

- Homework: (20%)

- Midterm Test : (20%)

- Class Presentations : (20%)

- Colloquium/Seminar Attendance : (5%)

- Final Exam: (35%). The final exam will be comprehensive.

Final grades will be assigned according to the rule:
A: 90-100
B: 80-89
C: 70-79
D: 60-69

Special Needs: Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor and contact the Disability Services Office as soon as possible.

Veterans and student soldiers with special circumstances or who are activated are encouraged to notify the instructor in advance.

Academic Honesty: The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty.