

CAAM 540 · APPLIED FUNCTIONAL ANALYSIS

Fall 2008 · Rice University

- Lectures: Tuesdays and Thursdays, 1:00–2:20PM, Duncan Hall 1042
- Web Site: <http://www.caam.rice.edu/~caam540>
- Instructor: Mark Embree (embree@rice.edu)
Duncan Hall 2006, (713) 348-6160
- Office Hours: Monday 2–3, 4-5PM, Thursday 2:30–3:30PM, or by appointment
- Prerequisite: CAAM 401, or MATH 321, or equivalent background in analysis and linear algebra.
- Abstract: This course provides an introduction to Banach and Hilbert spaces, with a particular emphasis on operator theory in the latter. Applications will motivate us, including partial differential equations, mathematical physics, numerical analysis, and signal processing.
- Grading: Standard problem sets: 50%
Pledged problem sets: 50%
- Participation: Please contribute to the classroom environment by asking questions and participating in discussions. Your interaction will be considered when assigning borderline grades, as will improving performance throughout the course of the semester.
- Standard problem sets: A problem set will be assigned each week, usually due by 5PM the following Tuesday. These exercises will require proofs of general results and analysis of illustrative examples. Mathematically rigorous solutions are expected; strive for clarity and elegance. Some problems might require a modest amount of MATLAB programming.
- You are encouraged to collaborate on the standard problem sets, *but your write-up must be your independent work*. Transcribed solutions are unacceptable. You may not consult solutions from previous offerings of this course.
- Late policy: You may submit two standard problem sets one class period late with no penalty. Subsequent late assignments will be penalized 25%. No work will be accepted more than one class period late without prior arrangement or a written excuse.
- Pledged problem sets: Three assignments will be designated as *pledged problem sets*. These must be completed with only the aid of your text book and lecture notes. You may not use outside resources: other students, other books, etc.
- Pledged problem sets may not be turned in late without prior arrangement or written excuse.
- Text: Nicholas Young, *An Introduction to Hilbert Space*, Cambridge, 1988
We will use this text for the first part of the course; later material will be drawn from a variety of sources that will be referenced on the class web site.
- Supplemental Resources: Haïm Brezis, *Analyse Fonctionnelle*, Dunod, 1983 [elementary]
Erwin Kreyszig, *Introductory Functional Analysis with Applications*, Wiley, 1978 [elementary]
Peter D. Lax, *Functional Analysis*, Wiley, 2002 [intermediate]
Michael Reed & Barry Simon, *Methods of Modern Mathematical Physics I: Functional Analysis*, Academic Press, 1980 [intermediate]
Walter Rudin, *Functional Analysis*, 2nd edition, McGraw Hill, 1991 [advanced]
Kôsaku Yosida, *Functional Analysis*, Springer-Verlag, 1980 [advanced]

Any student with a disability requiring accommodation in this course is encouraged to contact the instructor during the first week of class, and also to contact Disability Support Services in the Ley Student Center.