MAT 578 Functional Analysis
Course Announcement

Professor: John Quigg **Semester:** Fall 2019

Classes: Tuesday and Thursday 10:30–11:45 in WXLR 311

Description: This is the first half of a year-long sequence in functional analysis, which is the study of vector spaces equipped with a compatible topology, and continuous linear maps between them. Topics may include, but are not limited to: Banach spaces, Hilbert spaces, bounded linear maps, locally convex spaces, and duality. Some of the main theorems we will cover are: Open Mapping Theorem, Closed Graph Theorem, Uniform Boundedness Principle, Hahn-Banach Theorem, and Krein-Milman Theorem. To some extent, the syllabus will depend on the interests and abilities of the participants.

In the spring semester, the continuation will be a course on operator theory and spectral theory.

Prerequisites: The "official" prerequisites are: "graduate student (degree seeking or non-degree seeking)". But this is inadequate — it just means you've had linear algebra and advanced calculus in order to be admitted to the grad math program. Normally, the prerequisite would be the real analysis sequence MAT 570–571, or some knowledge of measure theory (and instructor approval). Much, but not all, of the course will be intelligible without a background in abstract measure theory. For someone willing to do some background reading on measure theory, the minimal prerequisite would be a course on metric space topology (such as MAT 472). And the coverage of Lebesgue integration in $\mathbb{R}^n$ given in MAT 473 would go a long way toward compensating for an absence of MAT 570-571.

However, I want to emphasize that, regardless of your background, if you are at all interested in this course, please contact me at quigg@asu.edu or WXLR 728.

Textbook: There is no required text — instead, I will post lecture notes. But suggested references include:

- J. B. Conway, "A Course in Functional Analysis", 2nd ed., Springer-Verlag, 1990.
- G.B. Folland, "Real Analysis", 2nd ed., Wiley, 1999.
- W. Rudin, "Functional Analysis", 2nd ed., McGraw-Hill, 1991.