APM 570   Applied Linear Operators   SS 2020

Horst R. Thieme   WXLR 437   96-5-4772   hthieme@asu.edu

time 3:05-4:20 pm   room PSH 433 (may be changed)   LINE # 32725

This is a basic course linear operators on infinite dimensional vector spaces (notably Hilbert spaces). It is fundamental for courses on infinite dimensional dynamical systems, their application in mathematical biology, and for mathematical physics. It builds well on APM 503/MAT 570 (Applied/Real Analysis) and nicely complements APM 502 (Differential Equations II). It can easily be combined with another course for a written Ph.D. comprehensive exam.

Topics include

- Hilbert spaces, projection theorem, Gram-Schmidt orthogonalization.

- Linear functionals and their representation in Hilbert space.

- Bounded, closed operators, and closable operators; adjoint operators.

- Spectrum of an operator, classification of spectral values.

- Resolvent of an operator, resolvent identity.

- Compact and resolvent-compact operators, their spectral properties, Fredholm alternative.

- Partial differential equations with regular Sturm-Liouville operators via resolvent compact operators

Prerequisites: APM 503 or MAT 570 or MAT 372 or MAT 472
Complete notes will be posted on Canvas.

Course requirements: weekly homework.

The **course grade** will be based on the percentage of possible points you have earned in the homework. Two homework scores will be dropped to allow for missing homework.

A: 80 – 100 %   B: 70 – 79 %   C: 60 – 69 %   D: 50 – 59 %   E: 0 – 49 %