University of Alberta
Department of Mathematical & Statistical Sciences

MATH664: Applied Functional Analysis (Core course)
Winter 2017

Instructor:	Prof. Rouslan Krechetnikov
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Lecture Room & Time:	TBD
Course Web Page:	www.math.ualberta.ca/∼ rkrechet/files/teaching/current/

Course Description:
Linear part: structure of function spaces, Sobolev spaces, embeddings, topologies, linear operators, adjoint and inverse operators, spectra, distributions, semigroup theory, integral equations, well-posedness and the notion of a solution. Nonlinear part: inequalities, Frechet and Gateaux derivatives, fixed point theorems. Applications: mechanics, reaction-diffusion equations, the Navier-Stokes equations, nonlinear Schrödinger equation.

Course Prerequisites:
One of MATH 438 or equivalent. Also basic knowledge in real analysis is expected. It is important to prepare yourself for this course through a review of the prerequisite material. Students who do not have the required prerequisites at the time of taking this course should not expect supplementary professorial tutoring from the instructor.

Course Objectives and Expected Learning Outcomes:
This course offers a concise, but self-contained, introduction to the subject of applied functional analysis, which would combine mathematical rigor and physical insights. We will value both heuristic and rigorous considerations but at the same time maintain high mathematical standards, which is important in order to penetrate into the research world and any serious literature. The goal is to expose the functional analysis such that all the analysis techniques have a unified foundation and, on the other hand, the rigorous function-analytic ideas have a clear motivation.