Department of Mathematics & Statistics, KFUPM

Math 566 Syllabus (171) (Tentative)

Khaled M. Furati

Course Title: Fractional Differential Equations

Course Description: Special functions (Gamma, Mittag-Leffler, and wright), Riemann fractional integral, Riemann-Liouville and Caputo fractional derivatives, composition rules, embeddings, equivalence with integral equations, well posedness for Cauchy type problems, successive approximation method, Laplace and Mellin transform methods

Prerequisite: Graduate level

Textbook: A. A. Kilbas, H. M. Srivastava and J. J. Trujillo, "Theory and Applications of Fractional Differential Equations", 2006

Learning Outcomes:

- Use the properties of the Gamma function and Mittag-Leffler functions
- Use the properties of fractional integrals and fractional derivatives
- State the well-posedness for some fractional differential problems
- Describe the appropriate underlying spaces
- Link FDE's to their corresponding Volterra integral equations
- Use transforms to solve linear fractional differential equations

Assignment: Homework and exams

Webpage http://faculty.kfupm.edu.sa/math/kmfurati

#	Topics
1	Journey in fractional calculus & models
2	Preliminaries: Gamma function, spaces of functions, transforms
3	Riemann-Liouville fractional calculus
4	Caputo derivative
5	Grunwald-Letnikov derivative
6	Riesz derivative and fractional Laplacian
7	Mittag-Leffler functions
8	Fractional differential equations (well-posedness)
9	Successive approximation
10	Integral transform method
11	Finite difference approximations