MATH 7321 - Modeling & Computation
Fall 2016

Instructor: Jim Nutaro
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Prerequisites: MATH 4120/6120; familiarity with probability distributions and random
                 variables; some experience with a functional programming language.
Textbook: System Dynamics: A unified approach, 2nd Ed., by Dean C. Karnopp, Donald L.
                 Margolis, and Ronald C. Rosenberg.
                 A first course in numerical analysis, 2nd Ed., by Anthony Ralston and Philip
                 Rabinowitz.
Notes: Additional lecture notes will be distributed via the web.
Grades: Grades will be based on homework assignments (~50%) and two take-home
                 exams (~50%)

This course will teach methods for modeling and simulation a wide variety of engineered
systems. Specific topics will include

- Bond graphs with applications to modeling
    - Electrical systems
    - Mechanical systems
    - Hydraulics
    - Integrated electro-mechanical-hydraulic machines
- Construction of discrete event models with applications to
    - Queueing networks
    - Agent based systems
    - Manufacturing processes
- Cyberphysical (hybrid dynamic, mechatronic) systems
- Simulation methods
    - Discrete event simulation
    - Numerical methods for ordinary differential equations
    - Root finding
    - Mixed continuous/discrete event simulation