MA (BMA) 573

Time: 11:45-12:35 MWF

Place: Riddick 339

Instructor: Ralph Smith

Office: SAS 4140, Tel: 515-7552

Email: rsmith@ncsu.edu

Web: `http://www4.ncsu.edu/~rsmith/`

Text (Optional): *Mathematical and Experimental Modeling of Physical and Biological Processes* by H.T. Banks and H.T. Tran, CRC Press, 2009.

Computing: We will use MATLAB.

Grades: The gradescale is: 90-100 A-,A; 80-89 B-,B,B+; 70-79 C-,C,C+; 60-69 D-,D,D+; below 60: F. The grades are based on the following coursework:

Homework and Projects:	60 %
Midterm Exam:	15 %
Final Exam (8-11 am, December 11, 2017):	25 %

Course Topics:
- Motivating Examples and Modeling Concepts
- Numerical Methods for Initial Value Problems and Boundary Value Problems
- Deterministic and Frequentist Model Calibration
    - Deterministic parameter estimation
    - Fundamentals of probability and statistics
    - Frequentist statistical parameter estimation
- Compartmental Analysis and Conservation Laws
    - Advection, convection and diffusion processes
    - Conservation of mass and the material derivative
    - Numerical solution techniques
    - Traffic flow models and analysis
- Energy Conservation and the Heat Equation
    - Heat conduction and the heat equation
    - Application Module: Modeling a catalytic converter
- Population Models
    - Logistic, predator-prey and size-structured models
- Epidemic Models: SIR models
- Neutron Transport Models – Boltzmann equation

Academic Integrity and Disabilities Information: This is provided at the websites:
> `http://www.ncsu.edu/provost/academic_regulations/integrity/reg.htm`
> `http://www2.ncsu.edu/ncsu/stud_affairs/counseling_center/dss/`