

## Mathematics 4345 – Topics in Applied Mathematics

### Introduction to Mathematical Modeling

#### Student Learning Outcomes

- 1. Students will demonstrate factual knowledge.** Students will be able to demonstrate an understanding of the basic terminology and concepts that are associated with mathematical modeling including but not limited to equilibrium values, qualitative modeling, quantitative modeling, interpolation, difference equations, differential equations, model fitting, geometric similarity.
- 2. Students will be able to describe the fundamental principles involved in mathematical modeling.** Students will be able to apply definitions and basic principles to derive quantitative and qualitative models.
- 3. Students will apply course material to solve problems.** Students will be able to create and analyze discrete and continuous models for real-world phenomena.
- 4. Students will develop specific skills, competencies, and thought processes sufficient to support further work in this or related fields.** Students will be able to produce high-quality technical documents incorporating text, MATLAB results, spreadsheet results, and graphics, for solutions of problems related to various physical, biological, and social science fields.

#### Textbook

*A First Course in Mathematical Modeling*, 4<sup>th</sup> ed., by Frank R. Giordano, William P. Fox, Steven B. Horton, Maurice D. Weir, Brooks/Cole, 2009, ISBN 13 - 9780495011590.

#### Course Content

1. discrete modeling with difference equations
2. proportionality and geometric similarity
3. model fitting
4. experimental modeling
5. continuous modeling with differential equations