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**Salisbury University Department of Mathematical Sciences**
**MATH 465/515 : Mathematical Models and Applications  
Syllabus (Tentative)**

**Description:** Mathematical basis for model building; examples of simple models for uncomplicated systems in biology, psychology, business and other fields; finite Markov process; models for growth process; linear programming. 4 Hours Credit: Meets four hours per week.

**Prerequisites:** C or better or concurrent enrollment in MATH 306.

**Intended Audience:** Mathematics majors and others having a strong mathematical background.

**Objective:** To develop skill in creating, describing and analyzing the performance of mathematical models to be used for explaining and predicting phenomena arising in the real world.

**Textbooks:** *A First Course in Mathematical Modeling*, by Giordano, Fox, Horton, and Weir; Brooks/Cole Cengage Learning, 5th edition, 2014. (Available electronically and can be rented from publisher.)

**Technology:** Technology is used extensively in this course.

Topic	Weeks
<b>Modeling Change</b>	1
Chapter 1*: Overview of Modeling, difference equations.	
<b>Modeling Process/Construction</b>	1.5
Chapter 2: Development of models using proportion and geometric similarity	
<b>Model Fitting</b>	1.5
Chapter 3: Graphical and least squares analysis	
<b>Experimental Modeling</b>	1.5
Chapter 4: Building models from observed data using exponential/logarithmic and polynomial models. Smoothing and cubic splines.	
<b>Simulation Modeling</b>	1.5
Chapter 5: Simulating probabilistic models. Inventory and queuing models	
<b>Discrete Probabilistic Modeling</b>	0.5
Chapter 6: Reliability in series and parallel systems	
<b>Discrete Methods for Optimization</b>	2.5
Chapter 7: Linear Programming (Simplex Algorithm and Sensitivity Analysis), Numerical Methods, Excel	
<b>Modeling Using Graph Theory</b>	0.5
Chapter 8: Graphs as models fitting piecewise linear functions. Using graphs to solve problems.	
<b>Modeling with a Differential Equation</b>	1
Chapter 11: Logistic Model	
<b>Team Presentations</b>	1.5
Presentations of team developed models	
<b>Exams</b>	1
<b>Total</b>	<b>14</b>

**Evaluation**

Homework Assignments	25%
Midterm Exam	25%
Group Project presentations	25%
Final Exam	25%

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- Graduate students will be assigned special homework/test problems or projects.
- Clear descriptions of thought processes, evidence of critical thinking, and effective communication must be demonstrated in written work.
- **Writing Across the Curriculum:** Students will be expected to communicate mathematics and mathematical ideas effectively in speech and writing. At the University Writing Center, trained consultants are ready to help you at any stage of the writing process. In addition to the important writing instruction that occurs in the classroom and during professors' office hours, the Center offers another site for learning about writing. **All students are encouraged to make use of these important services.**
- **NOTE:** Once a student has received credit, including transfer credit, for a course, credit may not be received for any course with material that is equivalent to it or is a prerequisite for it.