SU DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
SYLLABUS *(Tentative)*
MATH 465/515 *Mathematical Models and Applications*

Objectives: 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.

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

Prerequisite: MATH 306 - Linear Algebra (may be taken concurrently).

Required Texts: * "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.)

** "Math Modeling: Getting Started and Getting Solutions," by Bliss, Fowler, and Galuzzo; SIAM, 2014. This book is available on the course MyClasses site.

Topics	Number of Classes
*Chapter 1 *Modeling Change* Overview of Modeling, difference equations	3
*Chapter 2 *Modeling Process/Construction* Development of models using proportion and geometric similarity	6
*Chapter 3 *Model Fitting* Graphical and least squares analysis	3
*Chapter 4 *Experimental Modeling* Building models from observed data using exponential/logarithmic and polynomial models. Smoothing and cubic splines	6
**Chapters 3, 6, 7 *Making Assumptions, Analysis & Assessment, Putting the Model Together* Used in 5th week to prep for Presentations	3
*Chapter 5 *Simulation Modeling* Simulating probabilistic models. Inventory and queuing models	6
*Chapter 6 *Discrete Probabilistic Modeling* Reliability in series and parallel systems	3
*Chapter 7 *Discrete Methods for Optimization* Linear Programming (Simplex Algorithm and Sensitivity Analysis), Numerical Methods, Excel	10
* Chapter 8 *Modeling Using Graph Theory* Graphs as models fitting piecewise linear functions. Using graphs to solve problems.	3
*Chapter 11 *Modeling with a Differential Equation* Logistic Model	3
*Chapter 12 *Modeling with a System of Differential/Difference Equations* Predator/Prey Model	3
Team Presentations Presentations of team developed models	6
Midterm Exam	<u>1</u>
	56

Evaluation

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

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.

Graduate students will be assigned special homework/test problems or projects.