Bemidji State University

MATH 3710: Mathematical Modeling

A. COURSE DESCRIPTION
   Credits: 3
   Lecture Hours/Week: 0
   Lab Hours/Week: 0
   OJT Hours/Week: *
   Prerequisites: None
   Corequisites: None
   MnTC Goals: None
   Mathematical modeling of applications that involve difference equations, matrices, probability, differentiation, and integration. Applications may be chosen from among the biological and physical sciences, economics, the social sciences, or other areas of interest. A graphing calculator is required. Prerequisite: MATH 2472. (Might not be offered every year.)

B. COURSE EFFECTIVE DATES: 12/31/2003 - Present

C. OUTLINE OF MAJOR CONTENT AREAS
   1. Modeling change with difference equations and systems of difference equations
   2. The modeling process, proportionality, and geometric similarity
   3. Analytic methods of model fitting including least-squares criterion and Chebyshev criterion
   4. Experimental modeling using one term models, higher-order polynomial models and smoothing with low-order polynomial models
   5. Optimization discrete modeling.

D. LEARNING OUTCOMES (General)
   1. learn techniques of modeling specific to applications involving the natural, physical, or economic environment. Techniques may include difference and differential equations, probability distributions, statistics, and matrix methods.
   2. use appropriate software to implement these techniques, with an emphasis on the effects of varying the parameters of a simulation.
   3. understand general and specific strategies for mathematical modeling.
   4. analyze problems, discern structure and pattern and make conjectures in a variety of modeling contexts.
   5. apply analytic thinking to develop clear and valid arguments.
   6. communicate mathematical ideas and understanding effectively.
   7. appreciate the diversity of mathematical modeling techniques.

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies
   None

F. LEARNER OUTCOMES ASSESSMENT
   As noted on course syllabus

G. SPECIAL INFORMATION
   None noted