MATH 460 Senior Project Applied Seminar

1. <u>Catalog Description</u>

   MATH 460 Senior Project Applied Seminar   **4 units**

   Prerequisite: CSC/<u>CPE 101</u> or <u>MATH 350</u>; <u>MATH 306</u>; and <u>MATH 344</u>.

   Written and oral analyses and presentations by students on topics in applied mathematics, including applications to sustainability. Construction of mathematical models for physical and biological problems, with analysis and interpretation of the solutions of these models using both analytical and numerical techniques. Not open to students with credit in <u>MATH 459</u>. 4 seminars.

2. <u>Required Background or Experience</u>

   Math 306, MATH 344, and MATH 451, or consent of instructor.
   MATH 460 is designed as a capstone course for mathematics majors in the newly proposed applied math concentration. Accordingly, the course builds on the skills and concepts learned in the upper-division courses in the concentration.

3. <u>Learning Objectives</u>

   Upon completion of MATH 460, students should be able to:

   a. Apply and integrate the accumulated skills, concepts, and knowledge from upper-division mathematics courses in the analysis of problems which arise in the applications of mathematics to other disciplines.
   b. Construct and analyze mathematical models and their solutions, including:
      creation of models, including analysis of their underlying assumptions;
      solution of these models, using analytical and numerical techniques;
      evaluation of the model results: interpretation of solutions, model validation, and model refinement.
   c. Present written and oral solutions of problems in applied mathematics.
   d. Explore and analyze of open-ended problems using skills and techniques acquired in this course.
   e. Investigate ideas and topics for the senior project.

4. <u>Text and References</u>

   The instructor may use one or more textbooks or may use mathematical models which do not necessarily come from a textbook. Suggested texts include:

   - Murray, J.D., <u>Mathematical Biology</u>
   - Kemeny, John <u>Mathematical Models in the Social Sciences</u>
   - Smith, Maynard, <u>Mathematical Ideas in Biology</u>
   - Noble, Ben <u>Applications of Undergraduate Mathematics in Engineering</u>
   - Giodano, Frank, et al, <u>A First Course in Mathematical Modeling</u>

- Burghes, D. N. and John McDonald, <u>Applying Mathematics: A Course in Mathematical Modeling</u>
- Saaty, Thomas, <u>Thinking with Models: Mathematical Models in the Physical, Biological and Social Sciences</u>

5. <u>Minimum Student Materials</u>

Paper, pencils and notebook

6. <u>Minimum University Facilities</u>

Classroom with ample chalkboard space for class use, library facilities, and computer labs

7. <u>Content and Method</u>

The course will be conducted in a seminar format with topics for presentation selected by the instructor or by the student with the instructor's approval.

8. <u>Methods of Assessment</u>

The instructor will assess student performance on the basis of:

a. The mathematical quality of the student's written and oral presentations.
b. The quality and extent of participation in the discussions as observed by the instructor.

Both of these assessment methods will be used to determine the extent to which students have achieved all of the learning objectives in section 3.