1. SM212 Differential Equations

2. 4 credit hours, 4 recitation hours

3. Course coordinator: Professor Deborah A. Konkowski

4. Textbook: Differential Equations with Boundary Value Problems (8th edition) – Zill and Wright

   a. Other supplemental materials: None.

5. Specific course information

   a. Linear and simultaneous differential equations; solution by Laplace transform; partial differential equations and Fourier series.

   b. Prerequisite: SM221

   c. Required course

6. Specific goals for the course

   a. At the conclusion of the course, students will be able to:

   - Classify and identify different types of differential equations.
   - Explicitly solve two important classes of ordinary differential equations: first order separable and first or higher order linear with constant coefficients.
   - Apply knowledge from linear algebra in order to solve systems of differential equations.
   - Use Laplace transforms to solve differential equations and systems of differential equations with initial conditions.
   - Use numerical methods to solve differential equations and systems of differential equations.
   - Use the method of separation of variables in order to solve some basic partial differential equations via Fourier series.
   - Model certain physical phenomena using differential equations and interpret their solutions.

   b. This course introduces the following Student Outcome

      (a) an ability to apply knowledge of mathematics, science, and engineering

7. Topics covered:

- differential equations
- initial value problems
- separable differential equation,
- direction fields and Euler's method
- Applications of differential equations
- linear differential equations
- spring-mass systems
- undetermined coefficient,
- electrical circuits
- Laplace and inverse Laplace transforms
- matrices
- Cramer's rule
- eigenvalues and eigenvectors
- solving systems of differential equations using the Laplace transform
- electrical networks
- linear systems of differential equations
- Fourier series,
- first and second order separable partial differential equations
- the heat equation