- **Course Number and Title:** ME 228. Engineering Analysis I
- **Catalog Description:** Introduction to engineering analysis with emphasis on engineering applications. Topics include ordinary differential equations, linear algebra, and vector calculus with focus on analytical methods.
- **Credit Hours:** 3 Credits (3)
- **Prerequisite(s) / Corequisite(s)** Prerequisite(s): MATH 2530G
  Corequisite(s): None
- **Required:** Required for BSME and BSAE Degrees
- **Course Availability:** Fall and Spring Semesters (+ Summer)
- **Instructor (Usual):** Dr. Seyedhamidreza Alaie (See https://mae.nmsu.edu/people/faculty.html)
- **Textbook:** Kreyszig, E., *Advanced Engineering Mathematics,* 10th Ed., John Wiley & Sons, Inc., 2011 (https://www.vitalsource.com/referral?term=9780470913611)
- **Course Learning Objectives:**

  After completing this course, a student should be able to:

  1) Derive differential equation models of phenomena relevant to mechanical and aerospace engineering.
  2) Use basic methods for solution of these ordinary and partial differential equations.
  3) Apply the solutions to simple analysis and design situations.

- **Topics Covered:**

  Ordinary Differential Equations (ODEs)

  1st-Order ODE: Separable ODEs, integrating factor and exact ODEs, general linear ODE, Bernoulli equation.

  2nd-Order ODE: Homogeneous linear ODEs with constant coefficients, homogeneous Euler-Cauchy equations, nonhomogeneous solution by method of undetermined coefficients and that of variation of parameters.

  Higher-order Linear ODEs

  Series Solution Method: Frobenius method, Legendre equation and its solution, Bessel equation and its solution

  Linear Algebra

  Matrix algebra, Gauss and Gauss-Jordan elimination, determinant and inverse of a square matrix, Cramer's rule, eigenvalue problem associated with a square matrix, solutions for a system of linear ODEs.

  Vector Differential and Integral Calculus

Review of vector algebra, gradient / divergence / curl of vectors, line / surface / triple integrals, Green's theorem in the plane, divergence theorem, Stokes' theorem