1. Course number and name
   EML 4930 Principles of Magnet Technology
2. Credits and contact hours
   3 cr, 2.5 contact hours (2 hrs. 30 min. lecture)
3. Instructor's or course coordinator's name
   Instructor: Dr. Steven Van Sciver, Coordinator: Dr. Juan Ordonez
4. Text book, title, author, and year
   None Required
   a. References, Additional Resources:
   - Solenoid Magnet Design, Montgomery, D. B., 1969
   - Superconducting Magnets, by Wilson, M. N., 1983
5. Specific course information
   a. brief description of the content of the course (catalog description)
   This course is designed to introduce the subject of magnet technology to students interested in an overview. Topics covered include elementary electromagnetism, magnet configurations and design considerations.
   b. prerequisites or co-requisites
   Prerequisite: Senior standing
   c. indicate whether a required, elective, or selected elective course in the program
   Selected Technical Elective course
6. Specific goals for the course
   a. Course Outcomes.
      1. Be able to calculate the magnetic field in various configurations [1]
      2. Be able to design an integrated magnet system [1, 6]
      3. Be able to select appropriate materials for a magnet application [2]
      4. Be able to calculate the cooling requirements for a resistive magnet [3]
      5. Be able to analyze a superconducting magnet for a specific application. [7]
      6. Be able to design, analyze the performance of a complex magnet system [5]

      Numbers refer to Course Objectives below, e.g. for course outcome 2, [1, 6] refers to course objectives 1, 6.
   b. Course Objectives and Relation to Student Outcomes.
      1. Understanding how electromagnets produce magnetic field
      2. Developing a general knowledge of materials issues associated with magnet systems
      3. Learning how to calculate magnetic field, force and the associated structural requirements
      4. Learning how to calculate power and cooling requirements for resistive magnets
      5. Learning about the special properties of superconducting materials
      6. Learning the general requirements of superconducting magnet systems
      7. Developing an understanding of specific magnet systems through case studies
      8. Developing a detailed understanding of a magnet system through a group research project
7. Brief list of topics to be covered
   - Introduction and History of Magnetism
   - Principles of Magnet Design and Analysis
   - Resistive Magnet Design

- Pulse Magnet Design
- Magnet Materials
- Superconducting Magnet Design
- Design Case Studies presented by guest lecturers