EEL 4220 Electrical Machines

1. **Credits:** 3

   a. **Supplemental materials:** Handouts and notes

3. **Specific course information**
   a. **Brief description of the content of the course:** Transformers, 3-phase distribution systems, 3-phase motors and generators, dc motors and generators, motor speed control, single phase ac motors.
   b. **Prerequisites:** EEL 3111 Circuits 1 Co-requisites: EEL 3112 Circuits 2
   c. **Required, elective, or selected elective:** Elective

4. **Specific goals for the course**
   **Specific outcomes of instruction:**
   - The student will understand how Ampere’s law and Faraday’s law applied to an analysis of magnetic circuits.
   - The student will understand the hysteresis and loss mechanisms in magnetic circuits.
   - The student will learn a transformer connection, dot convention, and simple technique to improve power factor on power line system.
   - The student will understand the concepts of 3Φ synchronous machines, induction machines.
   - The student will understand the behavior of DC motors and Generators.
   - The student will calculate real and reactive power and perform power factor correction in ac circuits.
   - The student will be able to effectively communicate in writing answers to qualitative questions on tests.

5. **Brief list of topics to be covered**
   - Review network analysis, three–phase balanced systems, three–phase power
   - Magnetic Circuits, Hysteresis, Faraday’s and Ampere’s Laws
   - Ideal Transformers, Practical Transformers and Models
   - Three-phase transformers and the autotransformer
   - AC Machine Fundamentals, AC Machine Torque, Power and Losses, Synchronous Machine
   - Basic Induction Motor Concepts, Speed Control and Induction Motor
   - DC Machine Fundamentals, DC Motor Types
   - Single Phase
   - Stepper motors