1. **Course number and name**
   
   **ENGR 458: Industrial and Commercial Power Systems**

2. **Credits and contact hours**
   
   3 credit hours

3. **Instructor's or course coordinator's name**
   
   Instructor: Shy-Shenq Liou, Assistant Professor
   
   Course coordinator: Hao Jiang, Assistant Professor

4. **Text book, title, author, and year**
   
   2. Class handouts
      
      a. other supplemental materials
      
      • IEEE Recommended Practices for Protection and Coordination of Industrial and Commercial Power Systems
      • National Electric Code, 2002

5. **Specific course information**
   
   a. **brief description of the content of the course (catalog description)**
      

   b. **prerequisites or co-requisites**
      
      Grades of C or better in ENGR 306

   c. **indicate whether a required, elective, or selected elective course in the program**
      
      Elective

6. **Specific goals for the course**
   
   a. **Specific outcomes of instruction.**
      
      • The student will demonstrate an ability to analyze three phase AC electrical circuits.
      • The student will demonstrate a basic understanding of electrical distribution systems, protective devices, and coordination principles.
      • The student will demonstrate an ability to calculate balanced three-phase fault current for a given distribution system.
      • The student will demonstrate an ability to calculate unbalanced fault current for a given distribution system.
• The student will demonstrate an ability to obtain all relevant information for a given distribution power system.
• The student will acquire the ability to use commercial programs to analyze the performances of distribution power systems.
• The student will acquire the ability to use commercial programs to design protection and coordination schemes for distribution power systems.
• The student will acquire the knowledge about the characteristics, performances, and constraints of different protective devices: Fuses, Circuit Breakers, and Relays.
• The student will demonstrate an understanding of the most current issues of power industry.
• The student will demonstrate an understanding of the causes of power quality problems.
• The student will demonstrate an understanding of the effects of poor power quality.
• The student will demonstrate a basic skill of how to mitigate the power quality problems.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.
• Course addresses ABET Student Outcome(s): [c, e, k].

7. Brief list of topics to be covered
• Introduction of AC electrical power systems
• Distributed generation for commercial and industrial systems
• Power quality problems: Causes, effects, and mitigation techniques
• Rotating machines and transformers models
• Short circuit current calculation for balanced 3-phase fault
• Short circuit current calculation for unbalanced 3-phase fault
• Introduction of protective devices: Fuses, circuit breakers, and relays
• Basic design principles of industrial and commercial power systems
• Analysis of industrial and commercial power systems using commercial software such as PowerTools from SKM
• Coordination for industrial and commercial power systems