**ELEN 4230 – Renewable and Legacy Electric Energy Systems Analysis**

**Class Schedule:** 3 Credit course, meeting the equivalent of 3-50 minute class periods per week.

**Course Coordinator**: Dr. Nathan Weise

**Course Materials:**

**Required:**  First Course in Power Systemsby Ned Mohan

**Course Description:**

Elements of electric power systems; fundamental concepts and techniques for design and analysis; per unit system; load flow; economic dispatch; symmetrical components; balanced and unbalanced fault calculations, systems instrumentation and power system protection.

**Prerequisites**: ELEN 2020, ELEN 3020

**Selected Elective** in Power and Energy Systems area.

**Contribution to Professional Component**: Engineering Science 50%

Engineering Design 50%

**Course Goals:**

To enable the student to get a good understanding of the fundamental concepts, techniques, and methods for design and analysis of power systems.

**Course Objectives:**

*By the end of this course, you should be able to....*

1. describe the elements of electric power systems;
2. apply fundamental concepts and techniques for design and analysis;
3. Apply per unit system;
4. Explain power transmission line and power transformer models
5. Apply load flow;
6. Apply economic dispatch;
7. Apply synchronous machinery models for stability studies
8. Apply balanced fault calculations;
9. Explain steady state and dynamic power system stability;

**Contribution to Program Objectives**:

Partial fulfillment of Criterion 3 objectives A, B, C, E, G, K.

**Course Topics:**

1. Fundamental concepts and techniques for design and analysis 10%
2. Elements of electric power systems 5%
3. Transformers 10%
4. Transmission Lines 15%
5. Motors and Generators 10%
6. Per unit system 5%
7. Load flow 10%
8. Economic dispatch 10%
9. Synchronous machinery models for stability studies 5%
10. Balanced fault calculations 5%
11. System steady-state and dynamic stability 10%