**Power System Protection**

**Instructor:** Prof. Sakis Meliopoulos

**Description:** This course provides a comprehensive treatment of the theory and practice of modern power system protection techniques.

**Additional Texts**: W. A. Elmore, Editor, *Protective Relaying: Theory and Applications*, Marcel Dekker/ABB, 1994

J. Lewis Blackburn, *Protective Relaying: Principles and Applications*, Marcel Dekker, Second Edition 1998.

**Grading Policy**

Homework 20 %

Quiz 25 %

Term Project 25 %

Final 30 %

**Topics:**

1. Introduction

The Power System

Protection Philosophy

Zones of Protection

Protective Equipment

2. Review of Background Material

Power System Modeling

Symmetrical Components

Three Phase/Asymmetric Faults

Fault Transients

Transformer In-Rush Currents

Motor Starting Transients

Effects of Grounding

High Impedance Faults

Grounding Potential Rise - Safety

3. Relaying Instrumentation

Instrument Transformers VTs, and CTs

Characteristic of VTs, and CTs

4. Protection Fundamentals

Overcurrent Protection

Overvoltage / Undervoltage Protection

Underfrequency / Overfrequency Protection

Zone Distance Protection

Differential Protection

Pilot Relaying

Computer Relaying

5. Protective Relaying Applications

Generator Protection

Motor Protection

Transformer Protection

Bus Protection

Line Protection - Network, Radial

Reactor and Shunt Capacitor Protection

6. Stability, Reclosing, and Load Shedding

Out-of-Step Relaying

Synchroclosers (Dynamic, Static)

Load Conservation

7. Fundamentals of Automation

Objectives

Communication Standards, Interoperability

Applications, Integration of Substation Functions