

**Georgia Institute of Technology**  
**School of Electrical and Computer Engineering**

<b>ECE4321</b>	<b>Power System Engineering</b>	<b>Spring 2009</b>
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Time and Place: VanLeer-C-240, TTh 3:05 - 4:25 pm

Instructor: A. P. Sakis Meliopoulos

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Email: [sakis.m@gatech.edu](mailto:sakis.m@gatech.edu), or: [sakis@comcast.net](mailto:sakis@comcast.net)  
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Office hours: MW 2:00 - 4:00

**Course objectives:** To introduce basic concepts of electric power system design, encompassing protection, stability and control.

**Prerequisites:** Power System Analysis and Control or Equivalent

Text: Selected Chapters: A. P. Meliopoulos, *Power System Relaying: Theory and Applications*, ( to be published). The selected chapters are: Power System Modeling, Power System Fault Analysis, Power System Stability, and Power System Relaying.

Optional: Glover & Sarma, *Power System Analysis and Design*, PWS Publishing Co., 1987  
Bergen and Vittal, *Power System Analysis*, Prentice Hall, (1986), Second Edition 2000.

Grading policy:

Homework	15 %
Quizzes (2)	20 % (each)
Project	15 %
Final	30 %

**TOPICAL OUTLINE:**

## Background

- Power system design issues
- Power system stability
- Power system protection
- Power system control

## Power System Models

- Line Sequence Impedances
- Generator Sequence Impedances
- Transformer Impedances
- Per Unit Parameters
- Power System Grounding

## Power System Electrical Transients

- Transients Characterization
- Balanced Fault Analysis
- Unbalanced Fault Analysis
- Three Phase Faults
- Asymmetric Faults
- Fault Transients
- Effects of Grounding
- Grounding Potential Rise – Safety
- Interactive A&V of Electrical Transients

## Electromechanical Transients / Stability

- Classification of Electromechanical Transients
- Transient Stability
- System Stabilization

## Protection Fundamentals

- Protection Philosophy
- Zones of Protection
- Protective Equipment
- Overcurrent Protection
- Overvoltage / Undervoltage Protection
- Underfrequency / Overfrequency Protection
- Zone Distance Protection
- Differential Protection
- Pilot Relaying
- Computer Relaying
- Interactive A&V of Protective Relaying

## Fault Monitoring and Recording