Course Syllabus

ELCT 554 – Integration of Photovoltaics in Modern Power Systems

Course Coordinator: Dr. Andrea Benigni

Catalog Description: Analysis and design of power systems in presence of photovoltaic generation with focus on protection systems, control, power quality.

Credit Hours 3

Prerequisite(s) by course ELCT 551

Prerequisite by topics Power System Design and Analysis, techniques for sinusoidal steady-state analysis of three phase systems, power-flow and short-circuit analysis

Required Textbook Math H. Bollen, Fainan Hassan “Integration of Distributed Generation in the Power System”

Other Materials Class notes posted on Blackboard

Learning Outcomes:
Undergraduate students who successfully complete this course will be able to:

1. Analyze the impact of photovoltaics generators on power system performance including:
   • Voltage and frequency control
   • Power quality
   • Protection.
2. Describe the economic challenges and the role of policy in the integration of PV generation

Graduate students who successfully complete this course will be able to:

3. Use simulation for the design of control and protection systems for power systems in presence of photovoltaic generation

Course Topics:

• Photovoltaics plant structure and fundamental components
• Generation vs. load variability and forecasting problem
• Role of energy storage
• Power quality issues
• Voltage and frequency control
• Protection systems
• Introduction to the IEEE 1547 standard for interconnecting distributed resources with electric power systems
• Market and policies role

Course Contribution to Program Outcomes:
ELCT 554 contributes to an achievement of:

• Outcome A – an ability to apply knowledge of mathematics, science and engineering
• Outcome E – an ability to identify, formulate, and solve engineering problems
• Outcome J – knowledge of contemporary issues
• Outcome K – an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
General Course Policies

**Academic Integrity**
Unless otherwise stated, assignments and examination work are expected to be the sole effort of the student submitting the work. Students are expected to follow the University of South Carolina Honor Code and they should expect that every instance of a suspected violation will be reported. Students found responsible for violations of the Code will be subject to academic penalties under the Code in addition to whatever disciplinary sanctions are applied.

**Accommodating Disabilities**
Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, contact the Office of Student Disability Services: 777-6142, TDD 777-6744, email sasds@mailbox.sc.edu, or stop by LeConte College Room 112A. All accommodations must be approved through the Office of Student Disability Services.

**Diversity**
When scheduling exams, I have attempted to avoid conflicts with major religious holidays. If, however, I have inadvertently scheduled an exam or major deadline that creates a conflict with your religious observances, please let me know as soon as possible so that we can make other arrangements.

**Recommended Study Habits**
- Read the assigned material before class.
- Bring thoughtful questions to class for discussion.
- Prepare for the exams in study groups.
- Take notes during class discussions and while completing reading assignments.

**Deviations**
Minor deviations from the syllabus are a normal part of any adaptive teaching and learning process.