

Fall 2010
Special Topic
EE 490/890: Controls for Renewable Energy Systems

Instructor: Dr. Adel Nasiri

Office: EMS W236, **TEL:** (414) 229-4955, **EML:** nasiri@uwm.edu

Time: M 05:30 PM - 08:10 PM, **Office Hrs:** MW 03:00 PM - 04:00 PM

Course Outline:

Wind energy power conversion systems
Solar energy power conversion systems
Grid-tied PWM converters: modulation and controls (current and voltage)
Grid requirements for Distributed Generation (DG) systems
Filters and filtering requirements for grid-tied converters
Grid synchronization
Controls for multi-level converters
Islanding detection and controls for DGs
Non-linear controls for power converters
Mechanical controls for wind and solar systems

Course Purpose:

Utilization of renewable energy systems are on steady rise in the electrical power grid. This course is an advanced level course mainly for graduate students on how to control and integrate renewable energy. The purpose of this course is to provide in-depth and specific knowledge on above outlines. The main focus is on solar and wind energy integration into the utility grid. The materials for course grading include one midterm exam, final exam, homework (including simulation mini-projects) and term project.

Prerequisite:

EE 572: Power Electronics or Graduate Standing

Course Text:

There is no required text but the following texts are optional:

- N. Mohan, T. M. Undeland and W. P. Robbins, “Power Electronics: Converters, Applications, and Design”, Wiley, 2002, ISBN-10: 0471226939
- B. Bose, “Modern Power Electronics and A.C. Drives”, Prentice Hall, 2001, ISBN 013016743.
- D.G. Holmes and T. Lipo, “Pulse Width Modulation for Power Converters: Principles and Practice”, 2003, ISBN 0471208140.
- M. P. Kazmierkowski, R. Krishnan, F. Blaabjerg, “Control in Power Electronics”, Academic Press, 2002, ISBN 0-12-40277205.
- J. Machowski, J. Bialek, J. Bumby, “Power System Dynamics: Stability and Control” Wiley, 2008, ISBN-10: 0470725583.