694_09 Multi-Agent Control of Electric Energy Systems

ABET Classification

EE Program of Study
- This course IS NOT an EE core course.
- This course CAN be used as an EE technical elective.

CpE Program of Study
- This course IS NOT a CpE core course.
- 12 hours of CpE technical electives must be on a prescribed list.
- This course IS on that list.

Catalog Description

Fundamental concepts and approaches in multi-agent systems for next generation power systems, with focus on the operation and control of microgrids.

Quarters of Offering
Wi Qtr.

Course Prerequisites
Prereq: 341 and 551; or graduate standing in engineering.

Credits
3

Level
UG

Class Meeting Pattern
3, 48-min. cl.

General Info, Cross-listings, Exclusions, etc.

Cross-listed with:

General Info:

Exclusion:

Courses that require this as a direct prerequisite: none

Prereq by topic: Basic understanding of electric energy conversion and feedback control theory

Learning Outcomes (with ABET Criterion 3 Student Outcomes for Undergraduate Courses)

1. Apply the knowledge gained to derive mathematical models of multi-agent systems to be controlled in a power system (Criterion 3(a)).
2. Analyze and design a multi-agent system for operation and control of an application in electric energy systems (Criterion 3(c)).
3. Learn how to identify, formulate and solve multi-agent control problems by computer simulation (Criteria 3(d),(e),(k)).
4. Gain experience in writing project report and improve communication skills (Criterion 3(g)).
5. Increase understanding and awareness of the smart grid goals and technical challenges in the control of microgrids (Criterion 3(j)).

Text(s) and Other Course Materials

No text

References (supplemental reading)

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Topics and (# of Lectures)
Smart Grid and its Challenges (1)
Microgrids and Distributed Energy Resources (3)
Control Hierarchies in Microgrids (2)
Dynamic Behavior of Microgrids (3)
Comparison of Decentralized Vs Centralized Controls (2)
Multi-Agent Systems (MAS) in Power Systems: Introduction (1), MAS for Modeling and Distributed Control, and MAS for Monitoring (2), Diagnostics and Protection (2)
MAS Implementation for Microgrids: Microgrid Market Operation (2), Microgrid Control (3), Design of MAS for Microgrid (3)
Project Discussions (5)

Representative Lab Assignments
n/a

Grading Plan
Homework 25%
Literature Review 15%
Final Exam 25%
Project Assignments 35%

Relationship to ABET Criterion 3 Student Outcomes (a-k)
See Learning Objective listed above.

Relationship to Additional ABET Student Outcomes

Course Supervisor: Illindala
Date of Approval of Standard Syllabus by Area: 05/11
Most Recent Course Evaluation:
Most Recent Area Review: