ECE 6194.01 (Proposed): Multi-Agent Control in Electric Energy Systems

Course Description

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

Prior Course Number: 694.09 and 694.11
Transcript Abbreviation: MULTI-AGENT CNTRL
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Graduate
Student Ranks: Masters, Doctoral
Course Offerings: Autumn
Flex Scheduled Course: Never
Course Frequency: Even Years
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 3.0 hr Lec
Expected out-of-class hours per week: 6.0
Graded Component: Lecture
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prerequisites and Co-requisites: Java experience strongly recommended.
Exclusions: Not open to students with credit for 694.09 (Wi12) Multi-Agent Control of Electric Energy Systems.
Cross-Listings:

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001
Subsidy Level: Doctoral Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

Course Goals

Learn the challenges of smart grid and cyber control/security.
Provide an understanding of current and future electrical energy systems utilizing intelligent agents.

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Smart Grid and Challenges	2.0							
Microeconomics theory	4.0							
Synchronous generator based distributed energy resources	3.0							
Power electronics based distributed energy resources	3.0							
Unit commitment and economic dispatch	3.0							
Participating in markets for electrical energy	4.0							
Microgrid - modeling and analysis	4.0							
Multi-agent systems	3.0							
Object-oriented programming concepts	3.0							
Java Agent DEvelopment (JADE) framework	6.0							
Review, etc.	3.0							

Grades

Aspect	Percent
Homework	25%
Quizzes	15%
Project assignments	30%
Exam	30%

Representative Textbooks and Other Course Materials

Title	Author
Class Notes	
Distributed Generation (online)	N. Jenkins, J. B. Ekanayake, G. Strbac
Power Generation Operation and Control (online)	A. J. Wood, B. F. Wollenberg
Fundamentals of Power System Economics (online)	D. Kirschen, G. Strbac

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
*	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
*	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
***	e	An ability to identify, formulate, and solve engineering problems.
*	f	An understanding of professional and ethical responsibility.
	g	An ability to communicate effectively.
**	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
**	i	A recognition of the need for, and an ability to engage in life-long learning.
**	j	A knowledge of contemporary issues.
**	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

CpE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
*	l	Students have learned a range of technical topics comprising both breadth and depth. Students have learned circuits, systems and computer hardware and software sub-disciplines plus technical elective topics.
	m	Students can apply tools and knowledge, both technical and non-technical, obtained from their undergraduate experience to a major design project.
	n	Graduates are aggressively recruited by both industry and graduate programs.

EE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
**	l	Students have learned a range of technical topics comprising both breadth across circuits, systems, electromagnetics and electronic devices and depth in at least two sub-disciplines within electrical engineering.
*	m	Students can apply tools and knowledge, both technical and non-technical, obtained from their undergraduate experience to a major design project.
*	n	Graduates are aggressively recruited by both industry and graduate programs.

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