Rutgers University, Department of Electrical and Computer Engineering
ABET COURSE SYLLABUS

Course number and name: 14:332:442 Smart Grid
Credits and contact hours: 3 credits; 1 hour and 20-minute session two times a week, every week
Name(s) of instructor(s) or course coordinator(s): Prof. Michael Caggiano

Instructional materials:
Textbook, title, author, and year: J. D. Glover, T. Overbye, M. S. Sarma, Power System Analysis and Design, 6th Edition, 2017.

Specific course information:
Course catalog description: The course offers an introduction to the basic concepts of power systems along with the inherent elements of computational intelligence, communication technology and decision support system. Power flow analysis and optimization schemes needed for the generation, transmission, distribution, demand response, and reconfiguration is explained in detail and simulation tools such as Matlab, PowerWorld or others are used.

- **Pre-Requisite courses:** : Principles of Electrical Engineering 1
- **Co-Requisite courses:** N/A

Educational objectives for the course: A student who successfully fulfills the course requirements will have demonstrated:

- Understand the technical basics of each of the major elements that make up the Smart Grid
- Understand the extent of the system operation and control of power network measurements in the Smart Grid.
- Be able to Model transmission and distribution lines
- Be able to Model generation power plant Power System Analysis
- Understand the Method for power-flow analysis
- Be able to apply this knowledge in determining different options for specific scenarios

How course outcomes are assessed: Lab problems, In-class Quizzes and final exams, Projects

S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(1,3,6,7)	H	Homeworks
(1,6)	H	Exam
(2,3,4,5,6,7)	H	Projects

List of topics to be covered:

- Introduction to the Smart grid, Issues with Present Energy Use.
- Introduction to Power Systems
- Power System Operation and Modeling:

- Single-phase and three-phase circuit analysis
- Basic of Transformers
- Per-unit analysis
- Modeling transmission and distribution lines
- Modeling generation power plant Power System Analysis
- Method for power-flow analysis
- Introduction to power system control elements
- System operation and power network measurements in the Smart Grid:
- Phasor measurement units (PMU)
- Smart Grid System Analysis and Control
- Power Flow Symulation
- Smart Grid Network Mesurements
- DC Transmission Line