

Course Syllabi: UEE850: Smart Grid (L : T : P :: 3 : 1 : 0)

1. **Course number and name:** UEE850: Smart Grid

2. **Credits and contact hours:** 3.5 and 4

3. **Text book, title, author, and year**

Text Books / Reference Books

- *INIEWSKI, Smart Grid Infrastructure and Networking, McGraw-Hill Education India Pvt.Ltd (2012), 1st Edition.*
- *James Momoh, Smart Grid: Fundamentals of Design and Analysis, IEEE Computer Society Press (2012).*
- *Ekanayake J., Jenkins N., Liyanage K., Wu, J., Yokoyama A., Smart Grid: Technology and applications, Wiley Publications.*
- *Momoh J., Smart Grid: Fundamentals of design and analysis, John Wiley & Sons. Flick T., Morehouse J., Securing the smart grid: Next generation power grid security, paperback).*

a. Other supplemental materials

- Nil

4. **Specific course information**

a. Brief description of the content of the course (catalog description)

Communication Technologies for Power System: Fiber Optical Networks, WAN based on Fiber Optical Networks, IP based Real Time data Transmission, Substation communication network, Zigbee.

Information System for Control Centers (ICCS): ICCS Configuration, ICCS communication Network, ICCS Time Synchronization, E-Commerce of Electricity, GIS, GPS.

Integration, Control and Operation of Distributed Generation: Distributed Generation Technologies and its benefits, Distributed Generation Utilization Barriers, Distributed Generation integration to power grid.

Monitoring the smart grid: Load dispatch centers, wide-area monitoring system (WAMS), PMU; Smart sensors/telemetry, advanced metering infrastructure (AMI); smart metering; smart grid system monitoring; communication infrastructure and technologies; self-healing.

Micro grid: Integration of distributed energy sources; concept, operation, control and protection of Micro grid.

Hybrid Power Systems: Integration of conventional and non-conventional energy sources.

5. **Specific goals for the course**

After the completion of the course, the students will be able to:

- Explain various aspects of the smart grid, including, Technologies, Components, Architectures and Applications.
- Explain communication infrastructure of smart grid.
- Explain various integration aspects of conventional and non-conventional energy sources.
- Explain distributed generation coordination including monitoring of smart grid using modern communication infrastructure.
- Analyze Microgrid as a hybrid power system with advantages and challenges in future.

6. Brief list of topics to be covered

- Communication Technologies for Power System
- Information System for Control Centers (ICCS)
- Integration, Control and Operation of Distributed Generation
- Monitoring the smart grid
- Micro grid
- Hybrid Power Systems