Fall 2017 Power and Energy Systems (PES) Course Schedule

1. **PES 6310 - Power Electronics Converters and Control**

Power Electronics and applications; Review of power devices including wide band gap devices. Harmonics and power factor in non-sinusoidal systems. AC- DC Phase Controlled Thyristor Converters. DC-DC converters: Buck, Boost, and Buck-Boost converters. Flyback, Cuk, and Full bridge converters. DC-AC Inverters: Square wave, Sinusoidal, Space Vector PWM, and current regulated inverters. Introduction to Active Rectifiers, Resonant Converters, and Multi- level converters.

- **Mon 5:30 PM – 8:30 PM (Face-to-Face only)**

2. **PES 6330 - Power System Analysis**

Power System Fundamentals. Transmission Line Parameters and Steady-State Operation. The Impedance Model (Zbus), Admittance Model (Ybus) and Network Calculations. Power Flow Analysis, Economic and Reliable Operation of Power Systems, Symmetrical Fault Analysis, Power Distribution Systems, Architecture and Composition of Industrial Power System

- **Section 02: (Online)**
- **Section 03: Tues 5:30 PM – 8:30 PM (Face-to-Face)**

3. **PES 6332 - Smart Grid Systems**

Basic of Smart Grid, Definition and Applications. Smart switches, Self-healing, Communication Technologies, Two-way Digital Communications Paradigm and Network Architectures, Wireless Standards (Protocols: Zigbee, WiFi, WiMax), Smart metering and Advanced Metering Infrastructure, Local Area Networks: Home network and HEN (home energy management), Wide Area Wireless

mesh networking. Cyber Security Challenges. Smart Appliances and load modeling (economic view point). Electric Vehicles and Vehicle-to-Grid Systems. Distribution network reconfiguration and other intelligent distribution control methods.

- **Section 02: (Online)**
- **Section 03: Thurs 5:30 PM – 8:30 PM (Face-to-Face)**

4. **PES 6334 Power System Protection, Monitoring and Control**

Protection Basics; Instrument Transformers; Grounding schemes, fault detection and identification; Distribution Protection, Instantaneous overcurrent protection, Time overcurrent protection, Bus protection, Differential Protection; Protection of Transformer, Generator, and Motors. Phase Distance Schemes, Ground Distance Scheme, Supervising element, and Fault Type Selection Logic; Communication Aided Distance Protection; Line Current Differential Protection; Phasor Measurement units; Synchrophasor Vector Processor; Wide area protection.

- **Wed 5:30 PM – 8:30 PM (Face-to-Face only)**