



# Energy Production Systems

EIN 4933, EIN 6936 – Spring 2012

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This is probably the best time ever to enter the power industry in the U.S. Of course there are no guarantees, but the outlook for a technically and financially rewarding career is fantastic. **Energy Production Systems** provides an excellent overview of the electric

power generation process and the role the engineer plays in the power generation process. This course will provide information into the various equipment types, plant process systems and technologies needed for electric power generation. This course will also present some of the engineering tasks performed by the power plant engineer. Two field trips are included to a power plant to acquaint students with power plant systems and equipment. This Semester we are planning one field trip to view a nuclear power simulator and the second tour will be of a pulverized coal power plant or an integrated coal gasification combined cycle (IGCC) power plant.

## Introduction

- Review of methods of Electric Power Generation
- Present and Future Trends
- Electrical Safety Design
- Electrical Safe Work Practices

## Power Plant Engineering

- Engineering Economics
- Thermodynamics
- Heat Rate Calculations
- Fluid Statics and Dynamics
- Power Plant Cycle Analysis
- Protective Relaying including Arc Flash Calculation & Device
- Selective Coordination
- Ground Grid Design
- Standards Utilization in Design Process

## Power Plant Systems

- Coal and Limestone Handling
- Fossil Fuels and Combustion Process
- Boilers & Steam Generators
- Circulating Water Systems
- Emission Control
- Water Treatment
- Plant Auxiliary Electrical System
- Cycle Performance Impacts
- Plant Instrumentation and Control Systems

## Power Plant Technologies

- Pulverized Coal
- Nuclear Power Generation
- Integrated Gasification & Combined Cycle
- Hydro Power & Tidal Power
- Wind Power
- Solar Photo voltaic Power
- Solar Thermal Power
- Geo-Thermal Power.
- Gas Turbines
- Fluidized Bed Combustion
- Waste to Energy Conversion

## Power Plant Equipment

- Steam Turbines
- Steam Cycle Heat Exchangers
- Fan Applications
- Pump Applications
- Conveyor Applications
- Generator & Support Systems
- Emerging Technologies
- Electrical Switchgear and Motor Control Centers
- Transformers
- DC & AC Drive Systems
- Excitation Control Systems
- Synchronous and Induction Motors
- Feedwater Heaters

The American power industry is experiencing a talent drain of immense proportions. Over 50% of U.S. power engineers will be eligible to retire in the next 7 years, and the number of engineers entering the profession will make up only a small fraction of the experienced engineers leaving. In addition to this startling statistic, the U.S. infrastructure, including the power system, is deteriorated and antiquated. It is in desperate need of modernization. It takes qualified engineers to do this – and lots of them.



**Energy Production Systems** will be offered Spring semester 2012 on Wednesdays from 6:00pm to 9:00pm at USF Polytechnic in Lakeland and also via webcast. Contact the instructor Tom Blair ([tom\\_blair@ieee.org](mailto:tom_blair@ieee.org)) or Dr. Ralph Fehr ([fehr@poly.usf.edu](mailto:fehr@poly.usf.edu)) for info.

