

# Course Syllabus

**Course No. & Title:** EEL4936/6936 – Power Plant Engineering

**Term & Meeting Info:** Spring 2009, Mondays, 6:20pm – 9:05pm, ENC1002

**Instructor Info:** Thomas Howard Blair, P.E., [tom\\_blair@ieee.org](mailto:tom_blair@ieee.org)

**Phone:** (813) 228-1111, ext 48179, cell (813) 323-4049

**Office Hours:** by appointment

**Website:** [thomasblairpe.com/ppe.html](http://thomasblairpe.com/ppe.html)

## Catalogue Description

EEL4936/6936– Power Plant Engineering. 3 cr (D). Design and performance of power plants for the generation of electric power; fossil and nuclear fuels, cycle analysis, component design and performance, plant operation, control, economics and environmental impact. Course will include thermodynamic and power plant cycle analysis; power plant engineering economics; fuel combustion calculations; pump & fan application engineering calculations; emission control and water chemistry; electrical system and control system design; nuclear power technology and emerging energy source technologies.

## Prerequisite

EEN 3375 (Electromechanical Systems) and {EEL 5250 (power System Analysis 1) or EEL 4936/6936 (Industrial Power Distribution 1)} or instructor permission.

**Co-requisites:** None

**Courses that require this course as a direct prerequisite:** None

**Level:** UG/Grad

**Credits:** 3

**Class Duration:** 165 minutes per week

## Textbook And/Or Other Required Material

*Standard Handbook of Powerplant Engineering*, 2<sup>nd</sup> Edition by Thomas C. Elliott, Kao Chen, Robert Swanekamp, McGraw Hill 1997

**Reference (supplemental reading):** see references cited in required text.

## Course Outcomes:

1. Students will become familiar with power plant systems, terms and definitions and basic power plant engineering design calculations. Crit. 3(a)(e)(k)(m)
2. Students will become familiar with the proper design and application of power plant related equipment. Crit. 3(a)(c)(e)(k)(m)
3. Students will become familiar with methods of diagnosing and correcting equipment mis-operation or mis-application. Crit. 3(a)(e)(k)(m)
4. Students will become familiar with recognized standards utilized in the design and operation of power plant equipment. Crit. 3(a)(c)(f)(k)(m)
5. Students will prepare and present topical issues relevant to power plant design and operations. Crit. 3(a)(c)(e)(g) (k)(m)

*Note: For a definition of the components of ABET Criterion 3, please refer to the "Relation of Course to EE Dept. Program Outcomes" section later in this syllabus.*

**Test & Grading Info:** Grading – plus/minus grading will be used.

|           |     |                        |
|-----------|-----|------------------------|
| Homework: | 25% |                        |
| Midterm:  | 25% | (open book/open notes) |
| Project:  | 25% |                        |
| Final:    | 25% | (open book/open notes) |

*Test Conflicts due to illness, religious observances, or travel may be rescheduled by contacting the instructor as soon as possible.*

## Course Syllabus

### Topics Covered

|              |  |
|--------------|--|
| M 01/05/2009 | Introduction to Power Plant Engineering, Electrical Safety   |
| M 01/12/2009 | Steam Power Plants, Steam Fundamentals, Plant Design, Boilers & Steam Generators, Boiler Auxiliaries   |
| M 01/19/2009 | Official Holiday, No Session   |
| M 01/26/2009 | Nuclear Plant Systems, Fission Theory, Steam Supply, Operation and Maintenance, Reactor Safety, Cooling Towers, Water Treatment                  |
| M 02/02/2009 | Prime Movers, Steam Turbines, Gas Turbines, Hydraulic Turbines, Reciprocating Engines  |
| M 02/09/2009 | Plant Electric Systems, AC Generator and Protection, In Plant Distribution System  |
| M 02/16/2009 | Plant Electric Systems, Transformers and Protection,   |
| M 02/23/2009 | Review for Mid-term Exam & Project Summary Due   |
| M 03/02/2009 | Midterm Exam (6:20PM – 8:30PM)   |
| M 03/09/2009 | Field Trip – (6PM – 8PM)Tour of Bayside Combined Cycle Power Plant   |
| M 03/16/2009 | Spring Break   |
| M 03/23/2009 | Plant Electric Systems, In Plant Distribution System,  |
| M 03/30/2009 | Plant Electric Systems, AC Motors and Applications, Cable & Busway Applications  |
| S 04/04/2009 | Field Trip - Tour of Nuclear Plant Simulator and Pulverized Coal Plant – Crystal River   |
| M 04/06/2009 | Instrumentation & Control, Plant Instruments, Combustion Control, Burner Management  |
| M 04/13/2009 | Instrumentation & Control, Turbine and Engine Governors, Systems and Components, HMI interface, Review for Final Exam & Final Project Report Due |
| M 04/20/2009 | Final Exam (6:20PM – 8:30PM)   |

**Specialization:** This course is useful for the engineer involved with the planning, design, engineering and/or operation of power plants.

**Professional Component:** Engineering Science – 50% Engineering Design – 50% (Eng Science = math/science required for creative applications; Eng Design = decision making process of devising a system, component or process to meet a desired need)

This course is useful for the engineer involved with the planning, design, engineering and/or operation of power plants.

**Additional Course Features:** This course will include a power plant engineering topic project and will require the student to provide a technical report on the engineering topic chosen. Additionally, this course will include a tour of an operating power plant.

Although attendance will not be taken (other than the first day of class, per university policy), attendance and participation is strongly suggested to enhance the learning experience for all students

Academic dishonesty of any kind will not be tolerated. If caught cheating, the guilty parties will be subject to AT LEAST failure of the course, up to and possibly including expulsion from the university. DO NOT CHEAT!!!

### Relation of Course to the EE Dept. Program Outcomes:

Program Outcome "a": An ability to apply knowledge of basic math, science and engineering.

Program Outcome "c": An ability to design systems, components, or processes to meet desired needs.

Program Outcome "e": An ability to identify, formulate and solve engineering problems.

## Course Syllabus

Program Outcome "f": An understanding of professional and ethical responsibility.

Program Outcome "g": An ability to communicate effectively.

Program Outcome "i": A recognition of the need for, and an ability to engage in lifelong learning.

Program Outcome "k": An ability to use techniques, skills and modern engineering tools necessary for engineering practice.

Program Outcome "m": Knowledge of basic and engineering science necessary to analyze and design complex electrical/electronic hardware/software devices and systems.

**Final Exam Info:** 04/20/2009, 6:20PM to 8:30PM

**Additional Course Info:** When E-mailing Prof. Blair about this course, please either (1) include "PPE" as the first characters in the subject line, or (2) send the e-mail from Blackboard™ and keep its default subject line "[EELxxx.xxxS09]" at the beginning of your subject line. Thank you! All course materials will be posted on the course web page - [thomasblairpe.com/ppe.html](http://thomasblairpe.com/ppe.html)

Taping lectures requires the permission of the instructor. APEX students are responsible for designating a proctor for tests, and must inform the APEX office of their designation. Notifying the instructor of an inability to attend a class or class related activity is appreciated.

This course will include a power plant engineering topic project and will require the student to provide a technical report on the engineering topic chosen. Additionally, this course will include a tour of an operating power plant.

**Syllabus Prepared by:** Thomas H. Blair, P.E.

**Date of Approval of Syllabus by Area Subcommittee:**