NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ELECTRICAL AND ELECTRONICS ENGINEERING
ELECTRICAL ENGINEERING PROGRAM

SYLLABUS - EE316 POWER PLANT II

I. GENERAL INFORMATION

CODE	**:**	EE316
SEMESTER	**:**	10
CREDITS	**:**	4
HOURS PER WEEK	**:**	5 (Theory – Practice)
PREREQUISITES	**:**	EE315 Power Plant I
CONDITION	**:**	Compulsory
INSTRUCTOR	**:**	Ronald Antara

II. COURSE DESCRIPTION

In this course students develop the skills for designing electrical power stations taking into account technical issues, marked demand, investments, business model, as well as operation, maintenance and monitoring aspects. Depending on the energy sources and operation conditions, students decide the type of power station (hydro-electrical, thermal) an complete the design detailing all the elements and components for a proper operation and supervision of the power station. In this course, students complete the capstone project presenting the complete solution to a real-world electrical power generation problem.

III. COURSE OUTCOMES

1. Understand the components of an electric power station.
2. Estimate the demand for electric energy from industry, mining, commercial and domestic sectors.
3. Compare and select the proper type of power station (hydro-electric, gas thermal, Diesel thermal).
4. Select proper equipment and technologies according to the particular application.
5. Determine the operation costs of a power station.
6. Design hydro-electric power stations considering electrical and mechanical components as well as hydrology sources and main civil works.
7. Design thermal power stations considering electrical and mechanical components as well as main civil works.
8. Present technical reports detailing the technical and economic aspect of the project.

IV. LEARNING UNITS

1. PLANNING AND OPERATION STUDIES OF POWER GENERATION PLANTS

Operation of power systems / Demand projection / Generation dispatch / Operation and maintenance indexes / Frequency control / Load restrictions / Power systems reliability / Planning of power stations / Justification of electrical generation projects.

2. DESIGN OF HYDRO-ELECTRIC POWER PLANTS
Components of a hydro-electric power plant: specification and selection / Hydrology and civil works / Electromechanical installations / Protection systems / Benefit-Cost analysis / Analysis of Peruvian hydro-electric power plants.

3. DESIGN OF THERMAL POWER PLANTS
Components of a hydro-electric power plant: specification and selection / Schematic diagrams of thermal power plants / Evaluation of thermo-electric cycles / Steam plants / Gas plants / Diesel plants / Protection systems / Benefit-Cost analysis / Analysis of Peruvian hydro-electric power plants.

4. INSTALLATIONS AND CONTROL AND MONITORING SYSTEMS
Measurement systems / Protection systems / On-line and off-line supervising and control systems / Analysis of control systems available in Peruvian power plants.

5. CAPSTONE PROJECT
Complete the capstone project along the academic semester.

VI. METHODOLOGY

In this course the students work in teams to complete the capstone project. The instructor presents the concepts and methodologies of each design aspect including technology, market and business model issues. Along the academic semester students make partial presentation of the project and at the end of the semester each team submits and defends the design report. Best projects are selected to participate in the Student Project Contest.

VII. EVALUATION FORMULA

The average grade PF is calculated as follows:

$$PF = (PP1 + PP2 + PP3 + 5*FP) / 8$$

PP#: Partial presentation FP. Final presentation

VIII. BIBLIOGRAPHY

1. **CASTELFRANCHI**
   Electrical Power Plants, Vol. I and II.
   Pearson Editorial, 1998.

2. **ZOPPETI G.**
   Hydro-Electric Power Plants
   Pearson Editorial, 1999

3. **DESHPANDE**
   Elements of Electrical Power Stations
   McGraw Hill Editorial, 1998