

SAMPLE SYLLABUS

This syllabus is to be used as a guideline only. The information provided is a summary of topics to be covered in the class. Information contained in this document such as assignments, grading scales, due dates, office hours, required books and materials may be from a previous semester and are subject to change. Please refer to your instructor for the most recent version of the syllabus.

ABET Course Syllabus EEE463

1. **Course: EEE 463 Electrical Power Plants**
2. **Credits and Contact Hours:** 3 Credit Hours (lecture), Topics: Engineering
3. **Course Coordinator:** Dr. K.E. Holbert, Associate Professor
4. **Textbook:** M. M. El-Wakil, *Powerplant Technology*, McGraw-Hill, 1984, reprinted 2002.
Supplemental materials: <http://holbert.faculty.asu.edu/eee463/eee463.html>
5. **Specific course information**
 - a. **Catalog description:** Generation of electric power using fossil, nuclear and renewable, including solar, geothermal, wind, hydroelectric, biomass and ocean, energy sources. Power plant thermal cycle analysis. Cogeneration and combined cycles. Economics, operations, and design of electric power stations. Energy storage.
 - b. **Prerequisites or co-requisites:** CHM 114 (or 116); MAE 240 (or PHY 241); MAT 274 (or 275).
 - c. **Required/elective/selected elective:** Elective
6. **Specific goals for the course**

Provide students with a broad understanding of electricity generation

 - a. **Outcomes of instruction:**
 - Students will have a basic understanding of conversion of coal, oil, gas, nuclear, hydro, solar, geothermal, etc. energy to electrical energy
 - Students will understand the operation and major components of fossil and nuclear power plants
 - b. **Outcomes of Criterion 3 addressed by the course:**
 - (1) Students must apply both mathematics and chemistry to understand and solve problems in this course. Students utilize modern tools such as the computer to solve problems.
 - (2) Students perform design type analyses and solve engineering problems.
 - (4) There are many aspects of contemporary issues addressed in this course, especially with regard to power plant environmental and siting issues.
7. **Brief list of topics to be covered**
 1. Energy sources, utilization and conversion (1 lecture)
 2. Thermodynamics, Carnot and Rankine cycles (3 lectures)
 3. Components and operation of fossil-fired power plants (1 lecture)
 4. Fossil fuels, byproduct fuels, biomass (2 lectures)
 5. Combustion (1 lecture)
 6. Gas turbine and combined cycle plants including ICGCC (3 lectures)
 7. Nuclear fission and light water reactors (1 lecture)
 8. Environmental impact of electricity generation, global warming (1 lecture)
 9. Electricity generation economics (1 lecture)
 10. Geothermal, wind, and hydroelectric power (3 lectures)
 11. Solar energy, photovoltaics, concentrating solar power (3 lectures)
 12. Ocean energy: thermal, wave, tidal and current (2 lectures)
 13. Electric energy storage (1 lecture)
 14. Energy-water nexus, thermal cycle cooling, thermal pollution (1 lecture)

Computer Usage:

Computer use is integrated within the homework assignments. Students are allowed to use the computer tools of their choice including Excel, Matlab, Mathcad, etc. Typically, the types of homework assignments requiring computer use include solving transcendental equations, and performing numerical integration. In addition, students must use the computer tools to plot results from the analysis of reference data and from the solution of numerical problems.

Laboratory Experiments: None.

Course Contribution to Engineering Science and Design:

This course teaches engineering science through the application of scientific principles to engineering problems. For example, students use their chemistry knowledge to determine combustion products, reactant (fuel) mass flows, and energy production. This course also affords the student the opportunity to solve open-ended problems involving the selection of a suitable engineering option based upon constraints. For example, students compare and contrast various electric generation schemes for future construction based on political, environmental, regulatory and engineering constraints.

Person preparing this description and date of preparation: K. Holbert, K. Tsakalis, June, 2021.