

EEE 463 ELECTRICAL POWER PLANTS

Instructor: Dr. Keith E. Holbert Email: Holbert@asu.edu
Office Hours: MW, 1:15–2:30 p.m. and TTh, 1:30–2:30 p.m. in ERC 581; (480) 965-8594

Class Meeting Info: TTh, 3:00–4:15 p.m. in SCOB 250
Semester Exams: Scheduled for September 21 and October 26
Final Exam: Thursday, December 9, from 12:10–2:00 p.m.

Textbook: M. M. El-Wakil, *Powerplant Technology*, McGraw-Hill, 1984 or 2002.
(Note: if you don't have a textbook at the first of the semester, I have posted Chapter 1 and Appendix A as pdf files on Blackboard.)

Course Webpage: Lecture slides, homework and solutions posted on Blackboard. Other useful info at <http://holbert.faculty.asu.edu/eee463/eee463.html>

Other References: Culp, *Principles of Energy Conversion*, 2nd Edition, 1991.
Weisman & Eckart, *Modern Power Plant Engineering*, 1985.

Course Objective: Provide students with a broad understanding of electricity generation.
The corresponding Course Outcomes are

- 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 electric generating plants.

Course 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. Prerequisites: CHM 114 (or 116) [chemistry]; MAE 240 (or PHY 241) [thermodynamics]; and MAT 274 (or 275) [Differential Eqs.].

Topics: Covers Chapters 1-4, 7-10, 12-17; details in the semester plan on next page.

Grading: "Standard" scale (with \pm) using 90-100 "A", 80-90 "B", 70-80 "C", etc.

Homework	20%
Semester Exams (2)	50%
Final Exam	30%

Homework: The homework assignments will be posted online. Homework is expected to be turned in on time. Presentation and methods for arriving at the answer are just as important as the mathematical answer; solutions should be neat and logical. For complete credit, please: (1) show all work, and (2) box the answer and include the units. Students may work together on the homework, but copying is unacceptable: the ASU [Academic Integrity Policy](#) (AIP) is incorporated herein by reference.

EEE 463 SEMESTER TEACHING PLAN

(TTh, Fall 2010)

The textbook sections (given in parenthesis below) should be read **before** the class meeting that day.

Week	Date	Lecture Topic	Assignment Due
1	8/19	Introduction; Energy and electricity fundamentals; Terminology; Steam tables	
2	8/24	Thermodynamics; Carnot cycle (Chap 1)	
	8/26	Rankine cycle (2-1 to 2-11)	
3	8/31	Modern thermal power plants (Chap 3)	Hmwk # 1
	9/ 2	Rankine cycle efficiency; Cogeneration (2-12 to 2-15)	
4	9/ 7	Fossil fuels: coal, oil, natural gas (4-1 to 4-9)	Hmwk # 2
	9/ 9	Combustion (4-13 to 4-15)	
5	9/14	Fossil fuels: byproducts, synthetic fuels, biomass (4-10 to 4-12)	Hmwk # 3
	9/16	Exam review	
6	9/21	*** Exam # 1 ***	
	9/23	Electricity economics (webpage handout)	
7	9/28	Environmental impact (17-1 to 17-12); Global warming	
	9/30	Gas turbines; Brayton cycle (8-1 to 8-4)	
8	10/ 5	Combined cycle (8-7 to 8-8)	Hmwk # 4
	10/ 7	Nuclear fission (9-5, 9-6 and 9-14)	
9	10/12	Nuclear power plants (10-1 to 10-12)	Hmwk # 5
	10/14	Geothermal power (Chap 12)	
10	10/19	Cooling cycle; Thermal pollution (Chap 7)	Hmwk # 6
	10/21	Exam review	
11	10/26	*** Exam # 2 ***	
	10/28	Solar energy principles (13-1 to 13-5)	
12	11/ 2	Solar energy calculations (webpage handout)	
	11/ 4	Solar thermal (13-6 to 13-14)	
13	11/ 9	Solar photovoltaics (13-15 to 13-20)	Hmwk # 7
	11/11	### Veteran's Day Holiday ###	
14	11/16	Wind power (Chap 14)	
	11/18	Hydroelectric power (webpage handout); Pumped storage (16-3)	
15	11/23	Ocean power: thermal and wave (15-1 to 15-12)	Hmwk # 8
	11/25	### Thanksgiving Holiday ###	
16	11/30	Ocean power: tidal and current (15-13 to 15-16, web handout)	
	12/ 2	Energy storage (16-1 to 16-7); Other generation schemes	Hmwk # 9
17	12/ 7	Review for Final Exam	
	12/ 8	--- Reading Day ---	
	12/ 9	*** Final Exam ***	

Email: Important information may be sent to students via their ASU email account. Be sure to read your ASU email or forward it to an email account that you do read regularly.

Conduct: Thank you in advance for adhering to the ASU *Student Code of Conduct* and preventing *disruptive classroom behavior*, such as cell phone ringing and use, arriving late to class, irrelevant side conversations, and inappropriate computer usage.

Online Students: Please submit homework assignments to GOEE/CPD (see <http://cpd.asu.edu/student/>); feel free to carbon copy me. Please keep in mind that CPD prints your assignments out in black & white.