

## EE 306: ELECTROMECHANICAL DEVICES

Instructor	Office	Phone	E-mail
Dr. Mohammad Abido	59-1076	4379	mabido@

**Textbook:** Electromechanical Energy Devices and Power System, by Z. Yamayee & J. Bala, 1994.

### **Tentative Schedule for Semester (041)**

- 1) **Three-Phase Circuits:** (4 lectures)
  - ◆ Balanced three-phase circuits
  - ◆ Phasor diagram
  - ◆ Delta and Wye connections
  - ◆ Power calculations
- 2) **Magnetic Circuits:** (3 lectures)
  - ◆ Magnetic circuit definition
  - ◆ Magnetic circuit concept and analogy
  - ◆ Magnetization curves of ferromagnetic materials
  - ◆ Magnetic circuit computations
  - ◆ Magnetic circuit losses
- 3) **Transformers:** (6 lectures)
  - ◆ Introduction and construction
  - ◆ Theory of operation
  - ◆ Equivalent circuit
  - ◆ Equivalent circuit parameter determination from tests
  - ◆ Voltage regulation and efficiency
- 4) **DC Machines:** (7 lectures)
  - ◆ Introduction and construction
  - ◆ Generation of unidirectional voltage
  - ◆ Induced EMF equation
  - ◆ DC machine classification
  - ◆ Equivalent circuit of DC generator
  - ◆ DC generator characteristics
  - ◆ Equivalent circuit of DC motor
  - ◆ DC motor characteristics
- 5) **Synchronous Machines:** (5 lectures)
  - ◆ Introduction and construction
  - ◆ Generated EMF equation
  - ◆ Equivalent circuit
  - ◆ Equivalent circuit parameter determination from tests
  - ◆ Voltage regulation and efficiency
  - ◆ Power-angle characteristics
  - ◆ Synchronous motor
- 6) **Three-Phase Induction Motor:** (5 lectures)
  - ◆ Introduction and construction
  - ◆ Equivalent circuit

- ◆ Equivalent circuit parameter determination from tests
- ◆ Power and torque equations
- ◆ Torque-speed characteristics

### **Tentative Laboratory and Problem Session Schedule**

- Experiment # 1:** Three-phase circuits (**Week # 3**)  
**Experiment # 2:** Magnetic circuits (**Week # 4**)  
**Problem Session # I: Tuesday, November 3, 2009 (Week # 5)**  
**Experiment # 3:** Equivalent circuit of transformers (**Week # 7**)  
**Experiment # 4:** Regulation and efficiency of transformers (**Week # 8**)  
**Experiment # 5:** Characteristics for DC generators (**Week # 9**)  
**Problem Session # II: Tuesday, December 22, 2009 (Week # 10)**  
**Experiment # 6:** Characteristics for DC motors (**Week # 12**)  
**Experiment # 7:** Equivalent circuit of synchronous generators (**Week # 13**)  
**Experiment # 8:** Characteristics for induction motors (**Week # 14**)  
**Final Lab Exam (Week # 15)**

### **Major Exam Schedule**

- Major I:** Wednesday, November 4, 2009, Time 7:00-9:00 PM  
**Major II:** Wednesday, December 23, 2009, Time 7:00-9:00 PM

### **Grading Distribution**

Two Major Exams	30%
Final Exam	30%
Attendance, HWs and Quizzes	15%
Lab	20%
Design Project	5%

### **Important Points to Remember**

1. **Lab Grading:** the lab grade will be distributed as 12% for attendance, performance and reports and 8% for experimental final lab exam.
2. **Lab. Makeup:** No lab. makeup will be allowed without an official excuse.
3. **Homework:** The homework out of the textbook will be given. However, homework solution will not be collected. Instead, a quiz related to the homework problems is expected. In addition, external assignments will be given and collected for grading.
4. **Attendance:** According to the university regulations, any student who exceeds 20% of the scheduled class meeting without an official excuse will receive a grade of DN in the course.
5. **Official excuses:** All official excuses must be submitted to the instructor no later than one week of the date of the official excuse. The instructor may not accept the late excuses.