ECE-331 Energy Conversion

1. **Course number and name**: ECE-331 Energy Conversion
2. **Credits**: 4, **Contact hours**: 3 per week (lecture) plus 2 per week (lab).
3. **Instructor:** Rajesh G. Kavasseri
4. **Textbook:** Fitzgerald, Kingsley and Umans, Electric Machinery, 6 Edition (2003).
5. **Specific course information**:
a. **Catalog description: Magnetic circuits, transformers, DC and AC rotating machines.**
b. **Co-requisite**: ECE 311

6. **Specific goals**:
a. The broad objective is to teach electrical and computer engineering students fundamental principles of magnetic circuits, ac and dc rotating machines.
b. Specific objectives include the following:
- perform steady state calculations on magnetic circuits using concepts of magnetomotive force (MMF), reluctance, magnetic flux and flux density and characterize magnetic materials;
- model and analyze steady state performance of single and three phase transformers;
- model and analyze steady state behavior of three phase synchronous machines;
- model and analyze steady state behavior of three phase induction machines;
- model and analyze steady state behavior of DC machines;
- model and analyze simple power electronic devices and circuits used in motor control applications;
- analyze basic speed and torque control schemes for electric machines;
- Conduct laboratory experiments and document results to corroborate the analysis of machine characteristics done in the class

7. **Brief list of topics to be covered**

Rough course outline and schedule (NOTE: This is subject to change during the term.)

Week	Material Covered	Notes
1	Ch-1: Broad overview of electric machines	
1-2	Ch-2: Magnetic circuits and magnetic materials	Hw-1, Exam 1
3-4	Ch-3: Transformers	Hw-2
5-6	Ch-5: Synchronous machines	Hw-3,4, Exam 2
7-8	Ch-6: Polyphase induction machines	Hw-5,6
9-10	Ch-7: DC machines	Hw-7, Exam 3
11-12	Ch-10:Intro to power electronics	Hw-8,
12-13	Ch-10 Speed and torque control	Hw-9/papers, Final exam
13 +	Concurrent topics, revision and summary	Handouts/references