

Cleveland State University
Department of Electrical and Computer Engineering
Spring 2007

EEC 471 Power Electronics and Machines Laboratory

Catalog Description: EEC 471 (2-0-2). Prerequisite: EEC 470. Steady state performance of electric machines: dc, induction, and synchronous in combination with power electronics converters.

Textbook:

Electric Machinery Fundamentals,
Stephen Chapman, McGraw-Hill, 4rd
ed., 2004.

N. Mohan, T. M. Undeland and W. P.
Robbins, *Power Electronics: Converters,*
Applications and Design, Second
Edition, McGraw-Hill, 1995

Laboratory Manual

Lab Volt Manual

Coordinator

Dr. A. V. Stankovic, Associate Professor
Office Hours: Wednesday 12-1 p.m

Course Objectives:

To give a student “ hands on experience”
with equipment and instrumentation used
in the electric machines and power
electronics laboratory. To give a student
opportunity to compare theoretical results
with those attainable in practice.

Expected Outcomes:

Upon completion of this course students
should be able to:

1. Work on industrial projects related to power electronics and electric machines and drives.

Fulfills The Following Electrical Engineering Program Objectives and Outcomes:

Objectives:

- 1) practice electrical engineering in power electronics.
- 2) define and diagnose problems, and provide and implement electrical engineering solutions in industry, business, and government.

Outcomes:

- (a) ability to apply knowledge of mathematics, science, and engineering to power electronics.
- (b) ability to design and conduct electrical engineering experiments, as well as to analyze and interpret data.
- (c) ability to design a system, component or process.
- (d) ability to identify, formulate, and solve electrical engineering problems.
- (e) ability to communicate effectively.
- (f) ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.

Contribution of Course to Meeting the Professional Component:

Math & Basic Science: 0 credits; Engineering Topics: 4credits; General Education: 0 credits

Prerequisite by Topic:

- 1 Polyphase systems.
2. Magnetic circuit concepts.
3. Principles of electromechanical energy conversion.
4. Transformers.
5. Steady-State performance of AC Machines.

6. Steady-State Performance of DC Machines.
7. AC/DC Converters.
8. DC/DC Converters
9. DC/AC Converters.

Experiments:

1. Transformers	3
2. AC/DC Converters – Diode Bridge Rectifiers	3
3. AC/DC Converters – Thyristor Bridge Rectifiers	3
4. DC/AC Converters	3
5 DC/DC Converters-Buck	3
6 DC/DC Converters-Boost & Buck-Boost	3
7. Midterm Bench Exam	3
8. Introduction to DSPACE	3
Mechanical System Modeling	3
9. DC Machine - DSPACE	3
10. Synchronous Motors	3
11. Synchronous Generators	3
13. Induction Machine	3
14. Induction Motor-V/F Control - DSPACE	
15. Bench Exam	<u>3</u>
	45

Laboratory Projects:

One project per experiment.

Computer Usage:

Software-Matlab and Pspice

Grading:

Midterm-30%, Final-40%
 Laboratory Reports – 20%
 Quizzes – 10%

Prepared by:

Dr. A. V. Stankovic Date: 01 15 07