



Louisiana Tech University
Department of Electrical Engineering
ELEN 483/ ELEN 557 – Motor Control



Course Information

Spring 2003

- Description:** Motor position and speed control. Reduced voltage starting techniques. Classical relay ladder logic. Programmable logic control device applications. Temperature, pressure, position, and velocity sensors. Motors. Advanced control system techniques: LQR control, Pole placement, observer design.
- Instructor:** Dr. Rastko R. Selmic, Email: rselmic@latech.edu,
Web: <http://www.latech.edu/~rselmic/Courses/>
Tel: 257-4641, Office: Nethken Hall 229.
- Class Hours:** T, R, 2:00pm–3:50pm, Nethken Hall 122
- Office Hours:** MTWRF 9:00–10:00am or by appointment
- Prerequisites:** ELEN 481, or consent of instructor.
- Textbook:** K. Rexford and P. R. Giuliani, *Electrical Control for Machines*, 6th ed., Thomson Delmar Learning, Clifton Park, NY, 2004.
- Additional Reference:** T. E. Kissell, *Industrial Electronics, Applications for Programmable Controllers, Instrumentation and Process Control, and Electrical Machines and Motor Controls*, third ed., Prentice Hall 2003.
- Grading:** There will be homework, project, presentation, mid-term exam and final exam. If you have a question on grading of an assignment or an exam, please contact me about your question within one week of the time the grade is received. Here is weighting of grades:
- Homework -- 20%
 - Project and presentation – 20%
 - Mid-term Exam -- 30% (closed book and notes), Tuesday, April 15
 - Final Exam -- 30% (closed book and notes), Thursday, May 15.
- Scale used: A = 100-90%, B = 89-80%, C = 79-70%, D = 69-60%, F = below 60%.
- Projects and Presentations:** **Undergraduate Students:** design example as project, and presentation about selected topic in class.
Graduate Students: Research project, proposal due Tuesday, April 15. Students need to write a paper in IEEE format, and present it in class. Paper is due on Tuesday, May 6. The paper should be 4 pages long, double column, following strict IEEE standard including references. Example of the format:

(<http://www-sop.inria.fr/mistral/personnel/Eitan.Altman/PAPERS/cdc01e.pdf>,
or <http://www2.latech.edu/~rselmic/Publications/CCA99Hawaii.pdf>).

No late proposals or papers will be accepted. There will be -5% of project part of the grade subtracted for every day that the project or paper is late.

Tests: All tests will be closed book and closed notes. No make up exams unless approval is obtained prior to the scheduled test date.

Homework: Weekly homework will be assigned. Homework will be graded. No late homework will be accepted.

Other Policy:

- a. Class attendance is governed by university regulations published each year in the university bulletin (page 26).
- b. In the event of the appeal, student is responsible for keeping all original graded materials (exams, homework, projects).

Course Topics:

1. Transformers and Power Supplies.
2. Fuses, Switches, and Circuit Breakers.
3. Control Units for Switching and Communication
4. Relays
5. Solenoids
6. Open and Closed Loop Control
 - a. P, PD, PID Control

7. Motion Control Devices
8. Motors and Motor Starters
9. Pressure Control
10. Temperature Control
11. Time Control
12. Count Control
13. Programmable Logic Controllers
14. Feedback Control Systems
15. Advanced Feedback Design Techniques
 - a. Linear Quadratic Regulator
 - b. Pole Placement
 - c. Observer Design