



**Louisiana Tech University**  
**Department of Electrical Engineering**  
**ELEN 572 – Digital Control Systems I**



Course Information

Spring 2005

- Description: Sampling theory, data reconstruction, z-transforms, stability analysis, time-domain analysis, frequency domain analysis, introduction to digital control systems.
- Instructor: Dr. Rastko R. Selmic, Email: [rselmic@latech.edu](mailto:rselmic@latech.edu),  
Web: <http://www.latech.edu/~rselmic/Courses/>  
Tel: 318-257-4641, Office: Nethken Hall 229.
- Class Hours: TR, 2:00 pm – 3:50 pm, NH 120
- Office Hours: MTWRF 9:00am – 11:00am or by appointment
- Prerequisites: ELEN 471 – Automatic Control Systems
- Textbook: *Discrete-Time Control Systems*, 2<sup>nd</sup> Edition, K. Ogata, Prentice Hall, Upper Saddle River, New Jersey, 1995.
- Additional Reference: *Computer-Controlled Systems*, 3<sup>rd</sup> Edition, K. J. Astrom, and B. Wittenmark, Prentice Hall, Upper Saddle River, New Jersey, 1997.
- Recommended Software: MATLAB
- 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: 15%; Plagiarizing the project will result in minus 15% (-15%).**
  - Mid-term Exam: 30% (closed book and notes), Tuesday, April 12
  - Final Exam: 35% (closed book and notes), Thursday, May 12.
- Scale used: A = 100-90%, B = 89-80%, C = 79-70%, D = 69-60%, F = below 60%.
- Projects and Presentations: Research project, proposal due Thursday, April 7. Students need to write a paper in IEEE format, and present it in class. Paper is due on Thursday, May 5. The paper should be 4 pages long, double column, following strict IEEE standard including references. Example of the format:  
(<http://www2.latech.edu/~rselmic/Courses/ELEN572/SelmicPhohaLewisCDC2003.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. You will be allowed to bring one sheet of notes (8.5" x 11") one side for the final exam, and a calculator. Students will be required to clear the memory of the calculator prior to beginning the test. 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. Some homework may require computer simulation using MATLAB.
- 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, and projects).

**Course Topics:**

1. Introduction to Discrete-Time Control Systems
2. z Transform
3. Reconstructing Original Signals
4. The Pulse Transfer Function
5. Stability Analysis
6. Root Locus Method
7. State-Space Analysis
8. Advanced Topics:
  - a. Pole Placement and Observer Design
  - b. Quadratic Optimal Control Systems
  - c. Intelligent Control Systems
  - d. Neural Networks
  - e. Polynomial Equations Approach