INEL 4505 INTRODUCTION TO CONTROL SYSTEMS
Fall Semester 2019

Professor: Shawn Hunt
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Text: Control Systems Engineering, Sixth Edition, Norman Nise

Exams:
There will be 3 partial exams and 1 final exam.
Exam dates: sep 13, oct 23, and nov 22.
MAKE UP EXAMS WILL BE GIVEN ONLY FOR MEDICAL EXCUSES.
If there is a medical reason for missing an exam, you must certify this in order to request a make up. The document from the physician must be submitted the first day the student is able to return to study.

Homework:
Computer work: There will be computer work to be done in matlab. Instructions on how to do the matlab homework are on the web page. This work is to be done in groups of two students. Select the students for your group and inform me in writing before the end of the third week of class. Choose your partner carefully, there will be no changing of group members without first consulting with me. Due dates will be given with the homework. Late homework will not be accepted. Do not copy the homework. Homework from two or more groups that are the same will mean a negative grade.
Homework problems: Homework problems will be given in class. They are not to be handed in, but for you to practice.

Grading:
Your Final Grade will be computed as a percentage of 520 total points: 300 points for the partial exams (100 pts for each partial exam), 20 points for computer problems, and 200 points for the final.
A - 90-100
B - 80-89
C - 70-79
D - 60-69
F - below 60
Your grade may improve due to attendance and class participation. I will not lower your grade if you do not participate in class, but will consider attendance and participation if you only need a few points to reach the next letter grade.

Topics to Cover:

1. Introduction to Automatic Control Systems
    a. Closed loop and Open loop Control
2. Mathematical models
    a. Relation between physical systems and mathematical models
    a. Differential equations
    a. LaPlace and Transfer functions
    a. Block diagrams
3. Feedback control system characteristics
    a. Open and closed loop systems
    b. Control of transient response
    c. Disturbance signals
    d. Steady state error
4. Performance
    a. Test signals
    b. 1st and 2nd order systems
    c. Relation between root location and transient response
    d. Steady State error
5. Stability
    a. Routh-Hurwitz
6. Root locus Method
    a. Concept and Procedure
    b. Sensitivity
7. Frequency Response Methods
    a. Bode diagram
    b. Performance in frequency domain
8. Stability in frequency domain
    a. Nyquist
    b. Bandwidth
9. System Design
    a. Compensation networks
    b. Proportional Control, (P)
    c. Phase-Lag compensators, (PI)
    d. Phase-Lead compensators, (PID)