Autumn 2018 Syllabus

EEP 547 Linear Systems Theory

Tuesdays 6:00pm - 9:50pm, EEB 003

Lecture (6:00pm - 8:00pm)
Lab (8:00pm - 9:50pm)

Instructor: Professor Linda Bushnell LB2@uw.edu
office hours: Tuesdays 4:00-5:00pm, EEB M342, or email me

TA: Sang Sagong, sagong@uw.edu
TA office hours: Tuesdays 5:00-6:00pm in EEB 026 and Saturdays 1:30-3:30pm room EEB 431

Textbooks & Software:

- P. Antsaklis and A. Michel, "A Linear Systems Primer," available at https://www.springer.com/gb/book/9780817644604 (should be free with uw email)
- Matlab, Simulink, Control Systems Toolbox, Symbolic Math Toolbox (buy student version through UW, or use remote UW version)
- Minseg robot based on Arduino (UW will provide this to each student for the quarter)

Other Reference Books:

Grading:
Homework 40% (late submission policy: -0.2points per day, 0 point will be given if the homework is submitted after the solution is uploaded)
Midterm 20% (take home)
Project 40% (project report and presentation (Dec 4th); no late reports accepted; robot kits to be returned last day of class, Tuesday, December 4th)
No final exam (class ends Dec 4th with the project presentations)

Topics Covered:

- System Representation: modeling, transfer function, state space, linearization, causality, time invariance, linearization
• System Response: LTV and LTI systems, impulse response, step response, frequency response, Bode Plots
• Stability: Lyapunov, Input-Output
• Controllability: concept of controllability, controllable subspaces, decompositions
• Observability: concept of observability, output feedback, minimal realizations
• State-variable Feedback from state space model
• State Observers from state space model
• Review of PID controller via transfer function model
• Brief introduction to LQR controllers from state space model
• Use of Matlab and Simulink to explore concepts covered above.
• Implementation of above concepts on a MinSeg robot.