

ME304 and Supplementary Material Syllabus

ME462 Say My Name 2020 Spring

Week 1: Introduction and Basic Concepts

Class: Basic definitions

Extra: Jupyter introduction and examples

Week 2: Transfer Functions and Block Diagrams

Class: Laplace transform, inverse Laplace transform

Extra: Time-Laplace domain converter

Week 3: Transfer Functions and Block Diagrams

Class: Poles and zeros, block diagram definitions, block diagram algebra and simplification

Extra: Block diagram representations

Week 4: Modeling Physical Systems

Class: Classification of system variables, system analogues, examples, op-amps

Extra: Physical domain analogue introduction

Week 5: Modeling Physical Systems

Class: Electro-mechanical systems, transforming and transducing devices, linearization

Extra: Linearization example with mechanism

Week 6: Basic Features of Control Systems

Class: Open loop/closed loop control, common controllers, servo characteristics, regulator characteristics

Extra: Open and closed loop examples, controlling physical simulations with controller

Week 7: Stability (Midterm 1)

Class: Impulse response and stability, Hurwitz criterion, Routh criterion

Extra: Time response of a unicycle with a controller

Week 8: Time Response

Class: Time response of LTI systems

Extra: Cooking meat with impulse, step and ramp input heater

Week 9: Steady State Response and Error

Class: Steady state error analysis, type number

Extra: Car chase example, ball inside a glass without contact

Week 10: Transient Response

Class: First and second order systems, approximation for higher order systems

Extra: Load driven by motor approximated as a second order system

Week 11: Transient Response (Midterm 2)

Class: Transient response specifications

Extra: Time response characteristics of an elevator

Week 12: Frequency Response

Class: Steady state outputs of systems to sinusoidal inputs

Extra: Earthquake simulation for people in an apartment building

Week 13: Frequency Response (Final)

Class: Bode diagrams

Extra: Bode diagram representations