# **Electromechanical Engineering Systems**

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# **Author Information**

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# **Course Details**

# **Original Course Documents**

Source file URL

# **Course Contents**

### Week 1

- **Digitization**
- Engineering System Investigation Process
- Electromechanical Engineering Systems Introduction
- Studio Exercise 01 Pre-Studio Reading
- FG and Oscilloscope Introduction

## Week 2

- Electrical Systems Part 1
- Engineering Systems
- System Inputs Modeling Time and Frequency Domains
- <u>Class Quiz 01</u>
- Studio Quiz 01
- Problem Set 01
- Week 2 Studio Exercise

## Week 3

- Electrical Systems Part 2
- <u>Class Quiz 02</u>
- <u>Studio Quiz 02</u>
- Problem Set 02
- <u>Week 3 Studio Exercise</u>

# Week 4

- Electrical Systems Part 3
- Intro to MATLAB

- Intro to Simulink
- Problem Sets 03 and 04
- Week 4 Studio Exercise

#### Week 5

- Introduction to Control Systems
- Studio Exercise Week 5 Part 1
- <u>Studio Exercise Week 5 Part 2</u>
- Problem Set 05
- Class Quizzes 03 and 04
- Feedback Control Systems Part 1

#### Week 6

- Class Quiz 05
- Electrical Filter Design Problem
- <u>Second-Order Dynamic Systems</u>

#### Week 7

- <u>Pulse Width Modulation</u>
- <u>PI Control Design First-Order System</u>
- <u>Analog vs. PWM Control</u>
- <u>Class Quiz 06</u>

#### Week 8 Mid-Semester Review

- Electromechanical Engineering Systems Mid-Semester Case Study
- <u>Electromechanical Engineering Systems Slide Presentation</u>
- <u>Key Concepts Class Midterm Exam</u>
- <u>Key Concepts Studio Midterm Exam</u>

#### Week 9

- <u>Physical Modeling of Mechanical Systems</u>
- <u>Mechanical System Modeling Problems 1 DOF</u>
- <u>Studio Exercise 01: Pulse Width Modulation</u>
- <u>Studio Exercise 02: Discrete Modeling</u>
- Analogies: Electrical Mechanical
- Linearization
- <u>Simple Physical System Supplementary Notes</u>
- <u>Rigid Body Plane Motion Kinetics Summary</u>

#### Week 10

- <u>Mechanical System Modeling Problems 1 DOF Solutions</u>
- Discrete Control
- Arduino Control
- <u>Class Quiz 06</u>

- Class Quiz 07
- Discrete Control One-Page Summary
- <u>Mechanical System Design Problem</u>
- Problem Set 06
- <u>Studio Quiz 06</u>
- <u>Studio Quiz 07</u>

#### Week 11

- Electrical Systems Part 3
- Electrical Systems Part 4
- Electrical Systems Part 5
- <u>Mag Lev Sensor Exercise</u>
- <u>Mag Lev Power Stage Exercise</u>

### Week 12

- **Basic Electrodynamics**
- <u>Magnetic Levitation System Slides</u>
- <u>Magnetic System Fundamentals</u>

#### Week 13

- Brushed DC Motor Modeling
- Brushed DC Motors Abridged
- <u>Pittman Servo Motors Application Note</u>



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