❖ ECE_1673 (Linear Control Systems)

Instructor : Jeungphill Hanne

❖ Agenda for today

1. SCUPI 2025 Spring Academic Calendar

- Academic Calendar : Midterms & Final etc.
- My Schedule : Office hours etc.

2. Course Introduction

- Course information
  - Subject, Text book, Lecture Hour, Office hour, Course website, etc.
- Course Objective & Scope, Course Learning Key Points
- Course Grading & Tentative Course Schedule

& After the break

3. Review on

"Laplace Transformation, Transfer Function, Control system "

1. SCUPI 2025 Spring Academic Calendar

- **Academic Calendar : Midterms & Final etc.**

SCUPI Academic Calendar for 2024-2025 Spring

	Feb.	Mar.				Apr.				May					Jun.				Jul.					Aug.			
Monday	24	3	10	17	24	31	7	15	22	28	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18	25
Tuesday	25	4	11	18	25	1	8	16	23	29	6	13	20	27	3	10	17	24	1	8	15	22	29	5	12	19	26
Wednesday	26	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	19	26	2	9	16	23	30	6	13	20	27
Thursday	27	6	13	20	27	3	10	17	24	1	8	15	22	29	5	12	20	27	3	10	17	24	31	7	14	21	28
Friday	28	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	21	28	4	11	18	25	1	8	15	22	29
Saturday	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16	23	30
Sunday	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	31
SCU Week	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
SCU Term	2025 Spring Teaching Weeks																		Final Week		Summer Recess						

1st Midterm

2nd Midterm

Final

This schedule is preliminary!!

1. SCUPI 2025 Spring Academic Calendar

- **My Schedule : Office hours etc.**

2024-2025 Spring Semester Course Schedule					
Class time	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
08:15-09:00	Physics 1 01 S-104		Physics 1 01 S-104		
09:10-09:55	Physics 1 01 S-104		Physics`1 01 S-104		
10:15-11:00	Office Hour Physics 1 N-412	Linear Control System S-507	Office Hour Power Engineering N-412	Linear Control System S-507	
11:10-11:55		Linear Control System S-507	Office Hour Linear Control N-412	Linear Control System S-507	
Lunch Break					
13:50-14:35	Funamentals of Electric Power Engineering S-104			Office Hour Physics 1 N-412	
14:45-15:30	Funamentals of Electric Power EngineeringS-104			Office Hour Power Engineering N-412	
15:40-16:25	Funamentals of Electric Power Engineering S-104			Office Hour Linear Control N-412	
16:45-17:30					
17:40-18:25					

*But, you can come to my office anytime when I am in my office ^^*

2. Course Introduction

• Linear Control Systems

- Linear Control Systems Analysis nd Design

• **Text Book**

- Feedback Control Systems, 5th Edition
  Charles L. Phillips and John M. Parr
  ISBN 9780131866140, Prentice Hall, 2011

• Reference

- Feedback Control Systems, J.V. De Vegte
- Signals and Systems using MATLAB,
  L.F. Chaparro ISBN 978-0-12-344716-7, **ELSEVIER**
- Introduction of Electrical Circuits, 9th Ed.
  J.A Svoboda and R.C. Dorf, 2014 (国际学生版
  ISBN 978-1-119-54657-3, WILEY
- The Analysis and Design of Linear Circuits,8th Ed.
  R. E. Thomas, A. J. Rosa, and G. J. Toussaint,
  ISBN: 978-1-119-23538-5, 2016 John Wiley & Sons

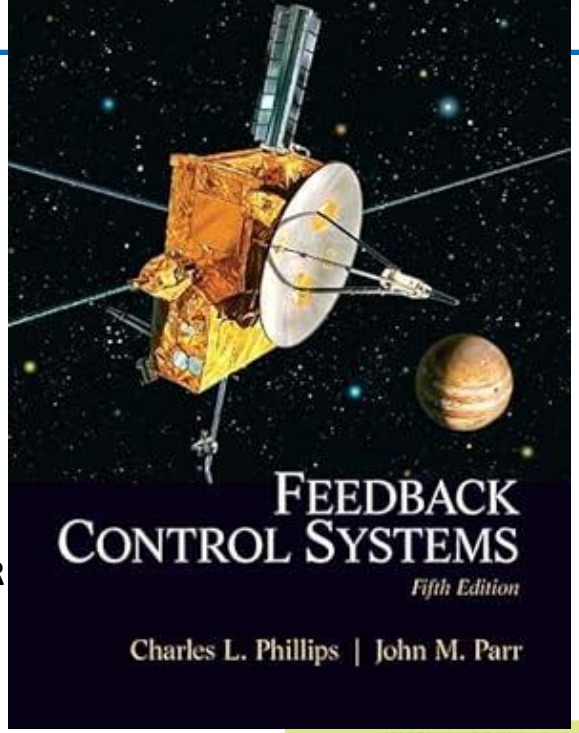
• **Lecture**

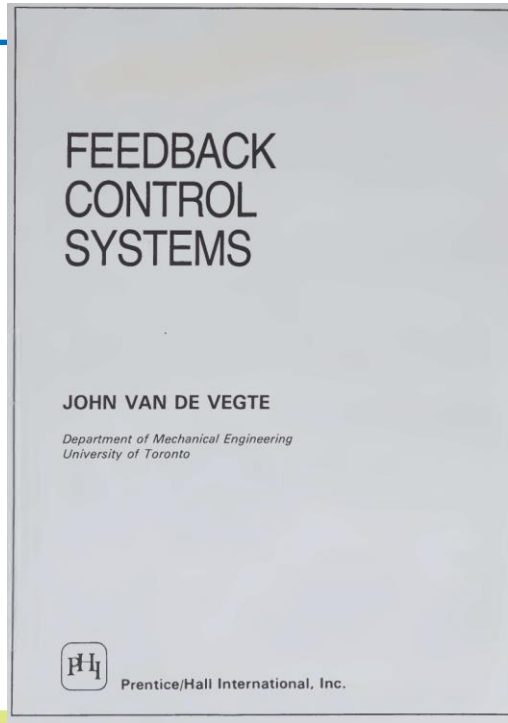
- Instructor : Jeungphill Hanne, PhD
  jeungphill.hanne@scupi.cn
- Time : Tues./Thur. (10:15-11:00)
  @ S104,SCUPI Bldg.
- Office Hour: Wed.(11:10-11:55)
  / Thr.(15:40-16:25) @ N412,SCUPI Building

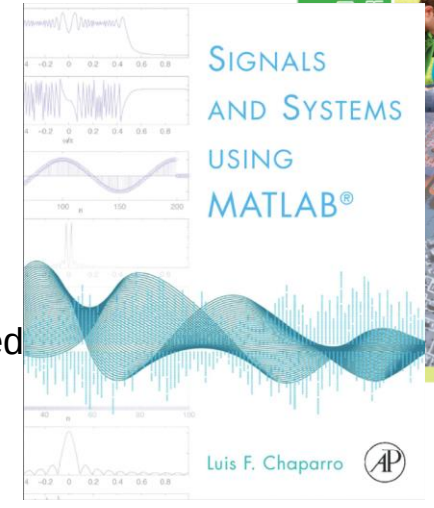
• **TA :** Hanven Liu / - Office Hrs : To be announced

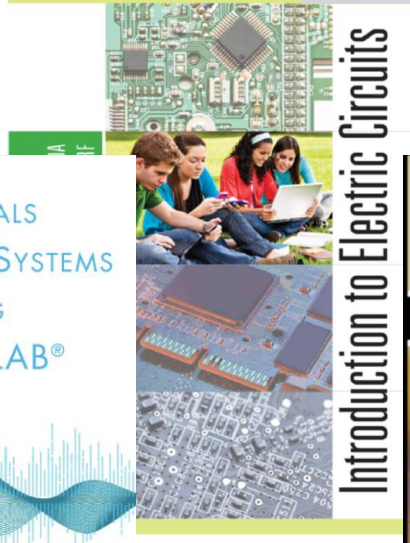
• **Course Format :** Lecture & Computer Lab

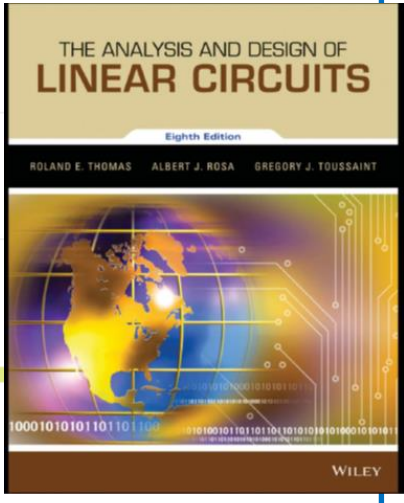
• **Course Grading:** HW+Lab+Quiz, 2 Midterm,
  1 Final and Attitude etc.











2. Course Introduction

• Course Scope & Objective

- Scope & Objective

: Introduction to feedback control systems, mathematical models, dynamical systems response and identification, system types, steady-state errors, root locus analysis and design, Bode plots, Nyquist theory and frequency domain compensation techniques, and introduction to modern control design. Includes Matlab/Simulink labs.

- Topics (selected):

- Introduction to Control Systems / System modeling
- System responses of first-order, or second order systems
- System Types/ Analysis of System Stability
- Root locus method
- Phase-lead compensator and phase-lag compensator;
- PID (Proportional Integral Derivative) control
- Frequency response analysis
- Frequency response design
- Introduction to Analysis and Design Of Digital Control Systems

• Course Grading :

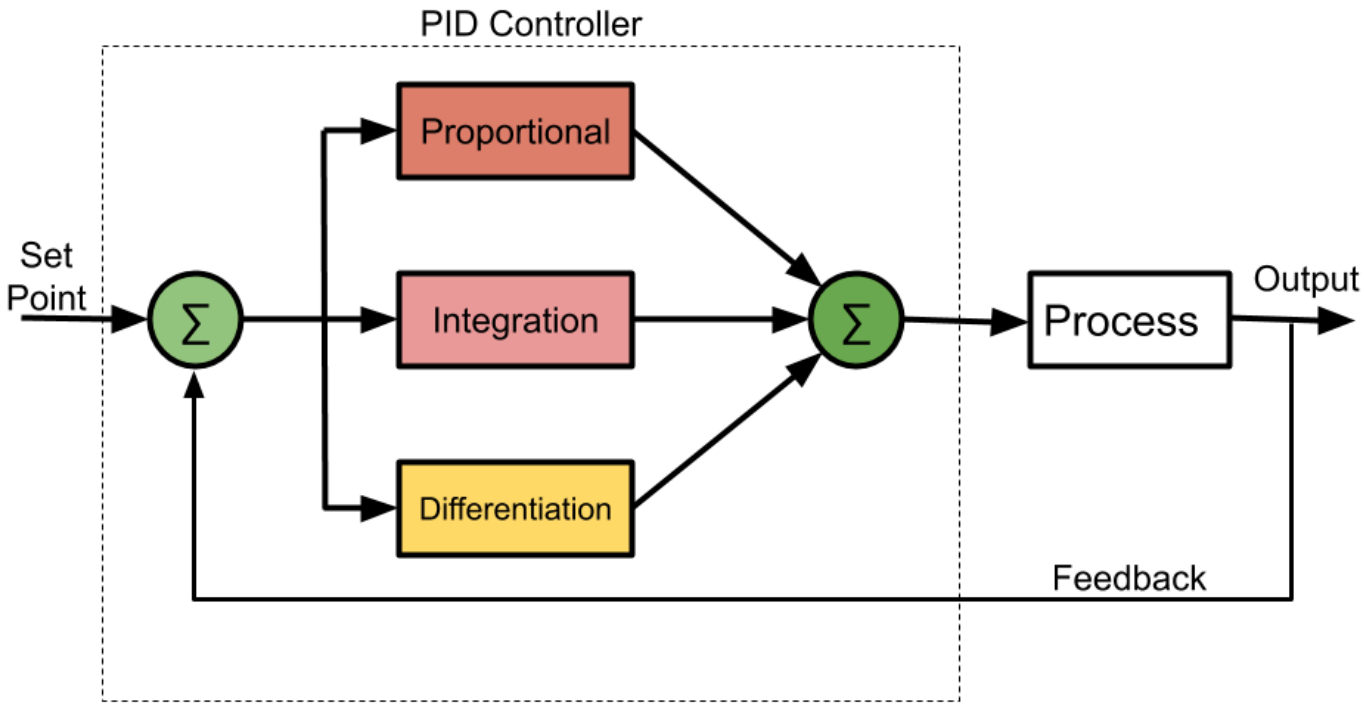
- Grading : HW + Lab Report + Quiz (20%), Midterm I (25%), Midterm II (25%), Final (25%) and Attitude(5% : Attendance, Focus, Engagement, Punctuality for HW, etc.)

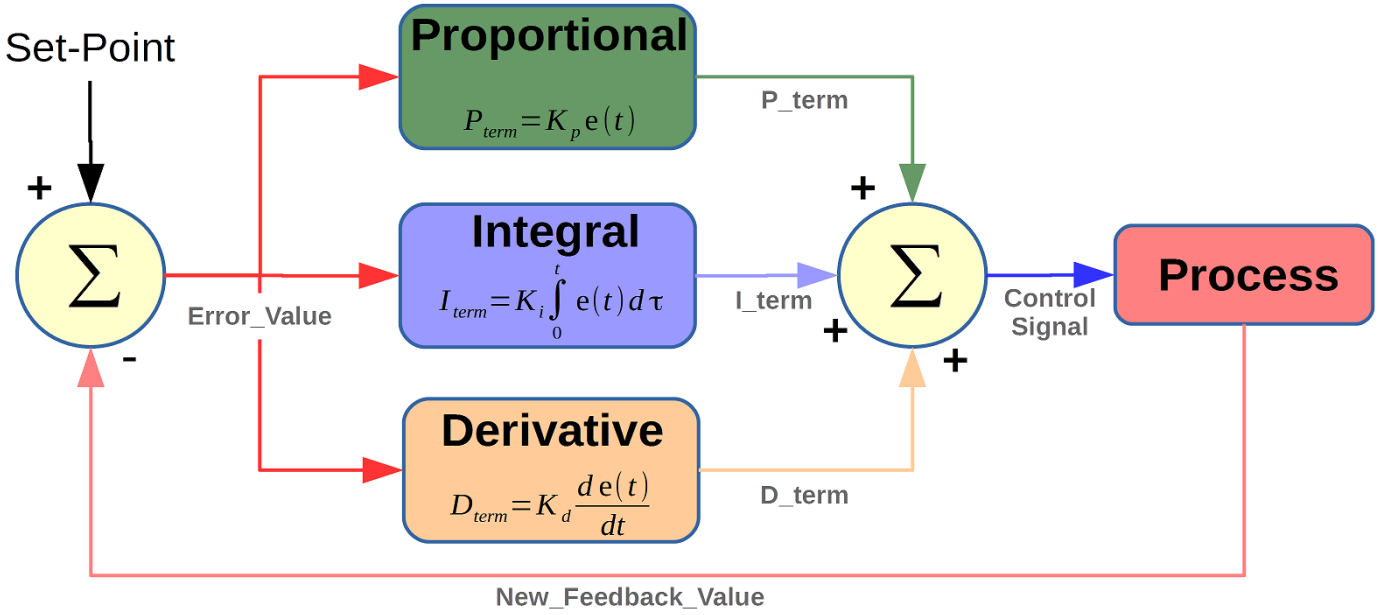
→ Less than 60% attendance might be failed for the course!

Can be flexible!

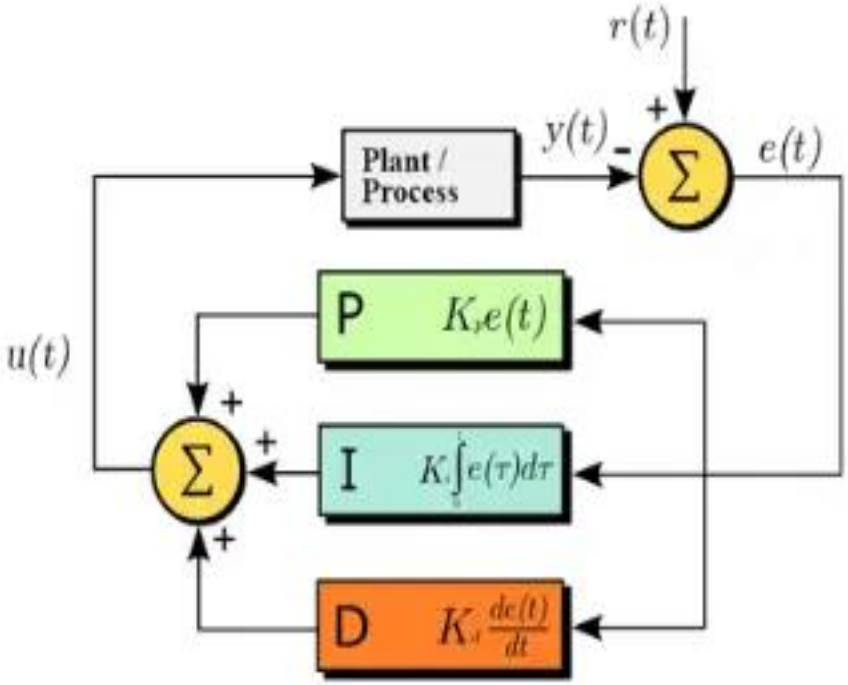
• Tentative Course Schedule

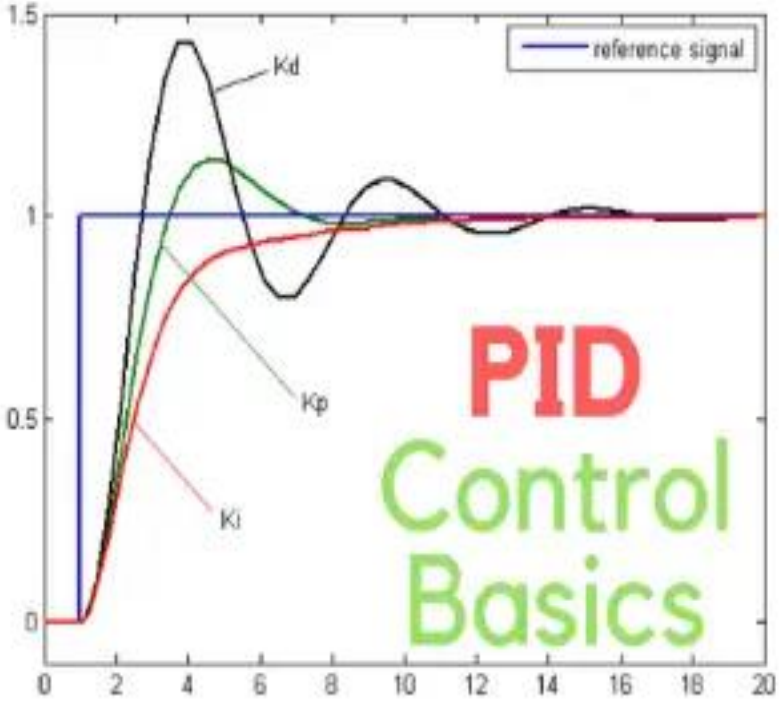
Week	Linear Control Systems	Topics	Assignment
Week 1 (2/24-3/2)	Introduction & Review on Transfer Function	**Syllabus & Review on Transfer Function**	
Week 2 (3/3-3/9)	Chap 1 (Phillips) & Chap 1 (De Vegte)	**Review on Control System**	
Week 3 (3/10-3/16)	Chap 2 (Phillips) & Chap 2 (De Vegte)	**Transfer Function/ Dynamic Model of Physical system**	HW1
Week 4 (3/17-3/23)	Chap 4 (Phillips)	**System Responses**	HW2
Week 5 (3/24-3/30)	Chap 5 (Phillips) & Lab	**Control System Characteristics / Lab**	
Week 6 (3/31-4/6)	Chap 5 (Phillips) & Chap 6 (Phillips)	**Control System Characteristics and Stability Analysis**	HW3
Week 7 (4/7-4/13)	Chap 6 (Phillips) & **Mid Term 1**	**Stability Analysis**	HW4
Week 8 (4/14-4/20)	Chap 7 (Phillips)	**Root-Locus Analysis and Design**	
Week 9 (4/21-4/27)	Chap 7 (Phillips)	**Root-Locus Analysis and Design**	HW5
Week 10 (4/28-5/4)	Chap 8 (Phillips) & Lab	**Frequency-Response Analysis / Lab**	
Week 11 (5/5-5/11)	Chap 8 (Phillips) & Chap 9 (Phillips)	**Frequency-Response Analysis and Design**	HW6
Week 12 (5/12-5/18)	Chap 9 (Phillips)	**Frequency-Response Design**	
Week 13 (5/19-5/25)	Chap 9 (Phillips) & **Mid Term 2**	**Frequency-Response Design**	HW7
Week 14 (5/26-6/1)	Lab & Chap 10 (Phillips)	**Lab / Review on Z-transform**	
Week 15 (6/2-6/8)	Chap 10 (Phillips)	**Review on Discrete-Time Systems**	HW8
Week 16 (6/9-6/15)	Chap 11 (Phillips)	**Analysis of Digital Control Systems**	HW9
Week 17 (6/16-6/22)	Chap 11 (Phillips)	**Design Of Digital Control Systems**	HW10
Week 18 (6/23-6/29)	Lab & **Review**	**Lab & Review**	
Week 19 (6/30-7/6)	**Final**		


PID Controller
Proportional
Integration
Differentiation
Set
Point
Σ
Σ
Process
Output
Feedback


Set-Point
Proportional
$P_{term} = K_p e(t)$
P_term
Integral
$I_{term} = K_i \int_0^t e(t) d\tau$
I_term
Derivative
$D_{term} = K_d \frac{de(t)}{dt}$
D_term
Σ
Σ
+
-
+
+
+
Error_Value
Control
Signal
Process
New_Feedback_Value

What is PID Control?





Any question so far?

And let's move on Reviewing
"Laplace Transformation
,Transfer Function, Control system"