



UNIVERSITY
OF APPLIED SCIENCES

BASIC CONTROL SYSTEMS

COURSE INTRODUCTION

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HANSHU YU

NOV 2025



WHERE STUDENTS MATTER

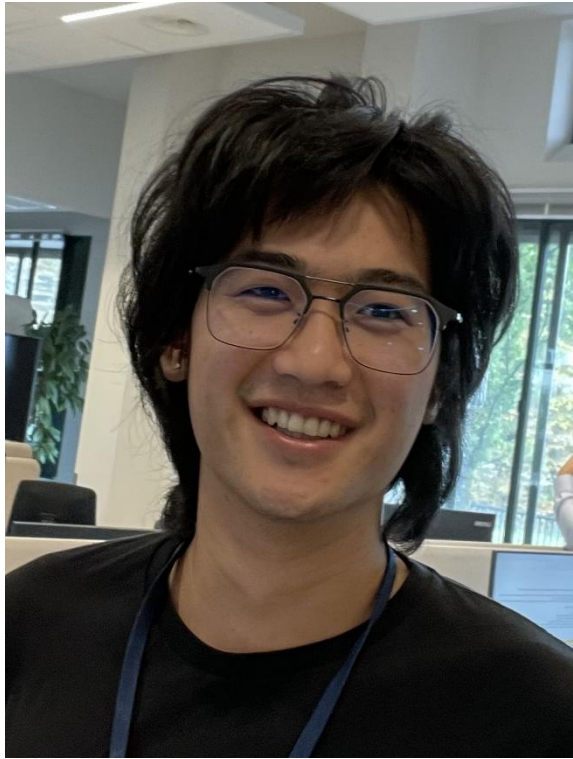
CONTENTS

- Teaching team introduction
- Learning objectives
- Course material & structure
- Preliminary knowledge
- Potential job opportunities
- Introduction Assignment (Today!)



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MEET THE TEAM:



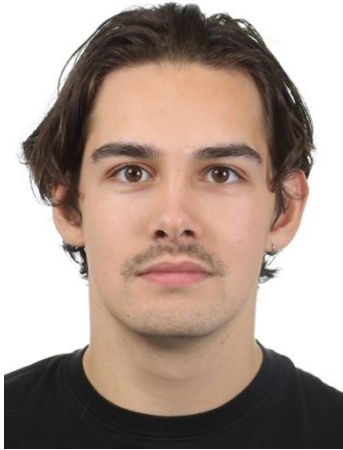
Lecturer:
Hanshu Yu





UNIVERSITY
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MEET THE TEAM:



Student assistant:
Rik



Student assistant:
Quirren



Student assistant:
Job



Student assistant:
Stefan



Student assistant:
Thijn



Student assistant:
Kyan



LEARNING OBJECTIVES - KNOWLEDGE

- **Modelling physical systems using the correct mathematical tool**
- **Have a basic understanding about simple control systems**
- **Know about how to design and tune a simple controller**
- **Understand classical analysis and design tools for stable control of simple systems.**

LEARNING OBJECTIVES - KNOWLEDGE

- Have a basic understanding of the fundamentals of classical control theory.
- Apply the theory into engineering practice.

Control theory?

A branch of applied mathematics.



LEARNING OBJECTIVES - SOFT SKILLS

Lab Skills

Report writing

Presenting

Collaboration

- We want you to learn from each other!
- Ask questions in your group, study together, help each other with assignments





COURSE MATERIAL

Notes, lecture slides, companion exercises, old exams:

<https://hanshuyu.com/material/LN-CCS.html>

Other recommended reading material:

Feedback Systems: An Introduction for Scientists and Engineers,

1st edition, Karl J. Åström and Richard M. Murray

Modern Control Engineering,
any edition, Katsuhiko Ogata



PRELIMINARY KNOWLEDGE

- Some understanding & computational skills in:
 - Calculus
 - Complex analysis
 - Integral transforms
 - High school level physics and algebra
- Some experience in:
 - Working in a team
 - Writing reports
 - Making presentations





COURSE STRUCTURE - DAILY ACTIVITIES

3

weeks

10

lectures

(~1.5h * 10)

2

presentations

(1+1) 17.5%*2

3

experiments

(2+1) 15%

1

written exam

50%



WARNING

Theoretical course

But **very practical if you understand the principles**

Higher workload

Involves a lot of self-study

Encourages a lot of group-study

Extremely useful

WARNING - STATISTICS

Historical passing rate 1st exam:

57% ~ 65%

Written exam raw score number >60%:

40% ~ 50%

WARNING -

BEHAVIOURS CORRELATED WITH (ALMOST) EXAM FAILURE

- I can just skip the lecture and self-study at home with some book I found in the library/internet.
(63, 60, 71, 54, 53, 47, 20, 32, 78, 92)
- I do not have to participate in the group work.
(66, 40, 41, 20, 48, 55, 41, 34, 54, 60, 60)
- I am afraid to ask questions.
(50, 40, 68)
- Cheating in the exam
(caught 2 last year)

HOW TO STUDY? (RECOMMENDATIONS)

Think, communicate, and interact with me in lectures.

Do the homework assignments in sync with the lecture.

Try solve a few extra problems provided.

Read the reading material if you have time.

Discuss and collaborate with your peers.

Do the experiments & simulations while you can.

HOW TO STUDY? (WARNING)

Treat online material like (video tutorials) with care.

They could be wrong.



COURSE COMPONENTS

2 assignments:

Assignment ONE consists of presenting a control system model and solving 10 problems.

Submission deadline: week 2 Tuesday morning 9 am.

Assignment TWO consists of designing filters and use those filters to modify their favorite song and present your design. While you still need to solve 10 problems.

Submission deadline: week 3 Thursday morning 9 am.

2 Lab experiments:

1. Circuit modelling
2. Water-level control using PID controller

2 Peer review assessments:

- Your teammates will assess your performance.

3-hours Exam! (*Will be arranged by SMU*)



COURSE STRUCTURE - DAILY ACTIVITIES

		Default lecture hall	<u>Discussion rooms</u>	Room 306	Room 308	Room 204
		<u>College building 124</u>		Groups 1-9	Groups 10,11,12,13,14	Groups 15,16,17,18
LAB	Nothing	Lecture	Workshop	Group work & self study	Presentation	Submission Timewindow
Lab rooms		Large lecture halls	discussion rooms	discussion rooms	Large lecture halls/ discussion rooms	Large lecture halls

→ Always bring your laptop and notebook/pens to class, changes can still be made last minute!

→ **No gaming in the classroom at anytime!** If you would like to game, do that in the dormitory or internet café.



COURSE SCHEDULE

Week 1

	Monday	Tuesday	Wednesday	Thursday	Friday
8:20 -9:55		Lecture (Logistics 124) Intro + Fundamentals	Lecture (2B103) Laplace	Lecture (Logistics 124) TF	Workshop: Presentation Group work & self study
10:15-11:50		Group work & self study	Group work & self study	Group work & self study	Group work & self study Presentation <i>in discussion rooms</i>
	Lunch Break				
13:10-13:55		Group work & self study	Group work & self study	Group work & self study	
15:05-16:40		Presentation <i>(in discussion rooms)</i>	Lecture (3D106) Block + data	Lecture (Logistics 124) PID	
		Introduce the assignments			



COURSE SCHEDULE

Week 2

	Monday	Tuesday	Wednesday		Thursday		Friday
8:20 -9:55	Lecture (Logistics 124) Root Locus 1	Submission 8:30-9:00 Presentation	Group work & self study	LAB 1 M&EE	LAB 1 EE&IC	LAB 2 M&EE	Lecture (Logistics 124) Frequency doamin 2
10:15-11:50	Group work & self study		Group work & self study				Workshop Report writing
13:10-13:55	Group work & self study		Group work & self study				
15:05-16:40	Group work & self study		Lecture (Logistics 124) Root Locus 2				Lecture (Logistics 124) Frequency doamin 1
		Assignment 1 & peer review 1					



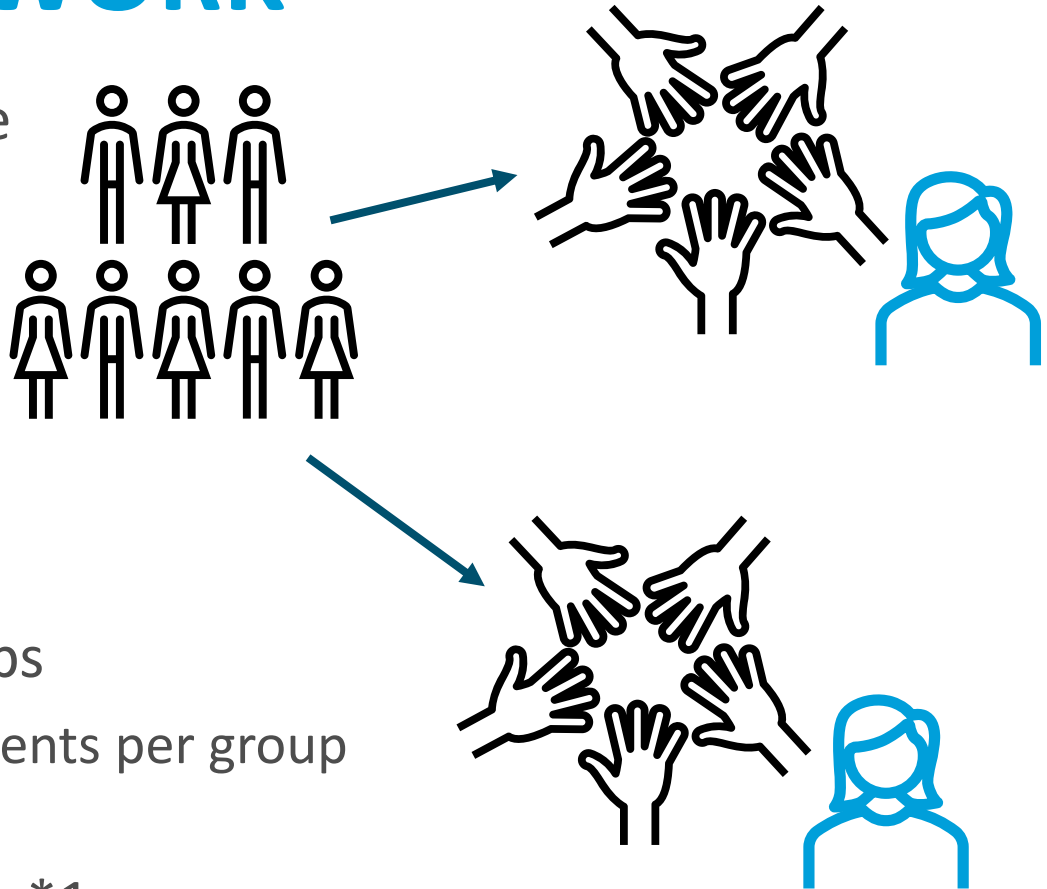
COURSE SCHEDULE

Week 3

	Monday		Tuesday	Wednesday	Thursday	Friday
8:20 -9:55	LAB 2 EE&IC	Group work & self study	Lecture (Logistics 124) Frequency doamin 4	Lecture (Logistics 124) Recap 2	Submission 8:30-9:00	Grading time
					Presentation	
10:15-11:50		Group work & self study	Group work & self study	Group work & self study		
		Lunch Break				
13:10-13:55		Group work & self study	Lecture (Logistics 124) Recap 1	Group work & self study		
15:05-16:40		Lecture (Logistics 124) Frequency doamin 3	Group work & self study	Group work & self study	Photos at the end!	

COURSE STRUCTURE - GROUP WORK

Group structure



→ Project groups

7 ~ 8 students per group

→ Group leader *1

Responsible for **homework hand-in** and
communications with the teaching staff

HANDING-IN YOUR HOMEWORK

File name format:

A1GroupX.pdf

A2GroupX.pdf

LABGroupX.pdf

PRGroupXname.pdf

You upload your pdf to the server using a local area network within a **fixed time-window!**

You can only access the server when you connect to the following wifi:

Wifi name: Course_admin

Wifi password: 37582968

Each group will receive a server ipv4 address to hand-in your pdf, this will be announced by the teaching assistant.



GRADING AND EXAMINATION

Presentation:

- **17.5%** Presentation for assignment 1 (group score)
- **17.5%** Presentation for assignment 2 (group score)

Report:

- **15%** Experiment report (group score)

Peer Assessment factor: **f**

(individual)

In-course raw score:

- sum of raw presentation and experiment scores.
- The raw scores should be the same for every student in the same group.

In-course final score for each student:

- **50%** raw score * **f** (max 50)

**3 weeks in-course
contents**

Final Exam (3 hours):

- **50%** Exam is organised by SMU after our 3-week course²⁴





GRADING AND EXAMINATION

**3 weeks in-course
contents**

Presentation:

- 17.5% Presentation for assignment 1 (group score) - **75**
- 17.5% Presentation for assignment 2 (group score) - **80**

Report:

- 15% Experiment report (group score) - **70**

Peer Assessment factor: **f**

(individual) - **1.1**

In-course raw score: **$75 * 0.175 + 80 * 0.175 + 70 * 0.15 = 37.625$**

- sum of raw presentation and experiment scores.
- The raw scores should be the same for every student in the same group.

In-course final score for each student: **$37.625 * 1.1 = 41.3875$**

- 50% raw score * **f** (max 50) **41.4**

Final Exam (**3 hours**):

$75 * 0.5 = 37.5$

- 50% Exam is organised by SMU after our 3-week course²⁵



GRADING AND EXAMINATION

**3 weeks in-course
contents**

Presentation:

- 17.5% Presentation for assignment 1 (group score) - **75**
- 17.5% Presentation for assignment 2 (group score) - **80**

Report:

- (group score) - **70**
- Peer Assessment (individual) - **1.1**

In-course

- **TOTAL**
~~78.9~~ 79
 $70 * 0.15 = 37.625$
 $\equiv 3.0$
- nt scores.
- every student in

the same group.

In-course final score for each student: **~~$37.625 * 1.1 = 41.3875$~~**

- 50% raw score * f (max 50) **41.4**

Final Exam (**3 hours**):

$75 * 0.5 = 37.5$

- 50% Exam is organised by SMU after our 3-week course²⁶



PEER REVIEW

Honestly reflect on how your peers perform.

You submit the peer review **yourself** through the ipv4 address you receive for the group.

You will evaluate and be evaluated in the follow dimensions:

1. Information gathering
2. Knowledge sharing
3. Participation in discussion
4. Picking up tasks
5. Cooperation and communication
6. Delivering result



PEER REVIEW – STEP 1

Select your group number in this drop-down list

Group Number

Group 1

Base score

Performance Levels

Scores

Above group average

13

Group average

10

Below group average

7

Almost no contribution

2

Obstacle in group work

0

Assessment items

Weights

Information gathering

0,17

Knowledge sharing

0,17

Participation in discussion

0,17

Picking up tasks

0,17

Cooperation and communication

0,17

Delivering result

0,17

Frontpage

Student forms

Groups




PEER REVIEW – STEP 2

Reviewer	Student 3						
Items -> Members v	Information gathering	Knowledge sharing	Participation in discussion	Picking up tasks	Cooperation and communication	Delivering result	
Student 1							
Student 2							
Student 3							
Student 4							
Student 5							
Student 6							
Student 7							
Student 8							
Student 9							

Select your name in this drop-down list to indicate the reviewer



PEER REVIEW – STEP 3

Reviewer	
Items -> Members v	Information gathering
Student 1	
Student 2	

In the drop down list select the level of performance of the corresponding teammate

After filling in all fields, save your file and upload to the server during the submission window.



JOB OPPORTUNITIES(INDUSTRY)

They know & use control theory:

- Aerospace Engineer
- Mechanical Engineer
- Systems Engineer
- Biotechnical Engineer
- Robotics Engineer
- Power Electronics Engineer
- Integrated Circuit Designer
-

Industries these people in:

- Robots & Vehicles
- Manufacturing factories
- Microelectronics & semiconductors
- Energy
- Chemical plants
- Smart infrastructure
- Bio-medical instruments
- Modern technology farming
- Consultancy
- Finance & banking
- High Frequency Trading
- IT & network
- Aerospace



INTRODUCTION ASSIGNMENT

Take a group photo

Put it in a presentation (ppt)

Include everyone's English & Chinese name
+ a special skill (Good at drawing, can do a
backflip, great at KTV??)

Make clear who is the group leader

Tell us a little about
yourselves in a
presentation this
afternoon!

~10 minutes

Group leader



English name
Special skill





QUESTIONS ?

If you have questions, ask them through during the lectures or work sessions.

GOOD LUCK AND HAVE FUN WITH THE BCS COURSE!