

#### **BASIC CONTROL SYSTEMS**

#### HZ + SMU EXCHANGE

HANSHU YU

NOV 2025



WHERE STUDENTS MATTER



## **THIS PRESENTATION**

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





### 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 -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,
1<sup>st</sup> 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**







#### 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 1<sup>st</sup> exam:

**57% ~ 65%** 

Written exam raw score number <a>>60%:</a>

**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 STRUCTURE -DAILY ACTIVITIES

No teaching activities

Lecture

**Guided Instructions** 

Lab Experiments

Presentation

Workshops

→ 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 STRUCTURE -GROUP WORK

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Group structure

 $\rightarrow$  Project groups

7 ~ 8 students per group



 $\rightarrow$  Group leader \*1

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



#### HANDING-IN YOUR HOMEWORK

File name format:

GroupX\_assignment1.pdf GroupX\_assignment2.pdf GroupX\_report.pdf

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

Wifi name: Course\_admin Wifi password: 37582968



Each group will get an 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 Peer Assessment factor: **f**

(group score) (individual)

contents

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.
   3 weeks in-course

In-course final score for each student:

• **50%** raw score \* **f** (max 50)

Final Exam (3 hours):

• **50%** Exam is organised by SMU after our 3-week course<sup>1</sup>









## 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

**English name** 

Special skill

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

~8 minutes





## **QUESTIONS ?**

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

#### **GOOD LUCK AND HAVE FUN** WITH THE BCS COURSE!

