PKU Globex Julmester

Fundamentals of Control Theory (3 Credits)

控制理论基础(00333108)

Instructor	HUANG Xun (huangxun@pku.edu.cn) College of Engineering, Peking University	
Synopsis	Introduce the fundamentals of classical and modern control theories to undergraduates in Engineering. The graduate students in dynamics and control are also welcomed if their undergraduate trainings were not in control. The pre-requisite course is calculus and linear algebra. Knowledge in electronic circuits and signal and processing will be helpful too, but will be summarized in this tutorial when it is necessary. In addition, the emerging machine learning-based control methods will be introduced, mainly through the successful completion of the designed software tasks. Hence, students are expected to have experience with Python or other similar programming language.	
Audience	Year 2 to 4 Undergraduate and Graduate Students	
Classroom	TBA	
Schedule	Class: 9-12 AM, M-F, June 30- July 18, 2025	Total Contact Hours: 45
Objective	Students learn how to model and analyze real-life problems from the perspective of control and the fundamental modeling and control methods. The knowledge can be demonstrated by completing an inverted pendulum example and, later, could be further extended to more practical design examples.	
Topics	1. Introduction 2. Mathematical model of system 3. Time domain analysis 4. Frequency domain analysis 5. Loop shaping 6. Fundamentals of nonlinear system control 7. State space representation 8. Observability and Controllability 9. Regulator 10. Examples	
Reference	Dorf R.C., Bishop R.H. Modern Control Systems, 12th edition. Lecture notes will be provided.	
Grading	Homework problems 0% (Only for self evaluation) Mid exam 30% Experiential learning report 30% Final exam 40% Total 100%	