Course Syllabus

VM564

Linear Systems

2018 Fall

Course Description:

Master the fundamental knowledge and the analytic methods of linear system. theory, be able to describe the system by the state space Representation and establish the state space Representation according to the differential equation of the system. Master the methods to obtain the characteristic Roots of the system, the solution to the inhomogeneous equation in linear time-invariant and linear time-variant system, and two methods to solve the state equation in the DISCRETE time system. Master the definition of controllability and observability and its respective criteria is Master the methods to analyze the stability of a system by the Lyapunov first method and the Lyapunov second method. Master the Basic design methods of the state feedback and state observers. Master the fundamentals of the frequency the domain theory. Have a general understanding of the new development in the linear system theory.

Instructor:

Name: Jun Zhang
Email: zhangjun12@sjtu.edu.cn
Phone: 34206765-418
Office Room: 418
Office hour: TBD

Textbook (Author, Book Title, Publisher, Publication Year, ISBN):

Course slides will be available online.
Systems:
• Frank M. Callier and Charles A. Desoer, Linear Systems, Springer-Verlag, 1991.

• Joao P. Hespanha, Linear Systems Theory, Princeton University Press, 2009.
• Chi-Tsong Chen, Linear Systems Theory and Design, Oxford University Press, 1998.
• Thomas Kailath, Linear Systems Theory, Prentice-Hall, 1980.
Algebra:
• Gilbert Strang, Linear Algebra and its Applications, 4th edition, Brooks Cole, 2005.
• David C. Lay, Linear Algebra and its Applications, 4th edition, Pearson, 2011.
Analysis:
• Halsey Royden, Real Analysis, 3rd edition, Pearson, 1988.

Grading Policy (Assignments %, Project, Exams, etc.)**:**

Your work in this course includes: attending lecture, reading assigned material, completing homework assignments and two exams. Final grades will be based on the total points earned on the homework and exams. The weight assigned to each category is as follows:
Homework: 30 %
Midterm: 30 %
Final: 35 %
Participancy: 5%
Those students who miss 1/3 of the lectures will be failed automatically.

Teaching Schedule:

Week	NO.	Date	lectures and Exams	Comments
1	1	2018.9.10	Basic Algebra	
	2	2018.9.13	Basic Algebra	
2	3	2018.9.17	Basic Algebra	
	4	2018.9.20	Basic Algebra	
3	5	2018.9.24	Basic Algebra	
	6	2018.9.27	Basic Algebra	
4	7	2018.10.1	National holiday	
	8	2018.10.7	National holiday	
5	9	2018.10.8	Basic Algebra	
	10	2018.10.11	Basic Algebra	
6	11	2018.10.15	Differential Equation	
	12	2018.10.18	Differential Equation	
7	13	2018.10.22	Differential Equation	
	14	2018.10.25	Matrices and their eigenspaces	

8	15	2018.10.29	Matrices and their eigenspaces	
	16	2018.11.1	Numerical Considerations	
9	17	2018.11.5	Numerical Considerations	
	18	2018.11.8	Controllability and Observability	
10	19	2018.11.12	Controllability and Observability	
	20	2018.11.15	Controllability and Observability	
11	21	2018.11.19	Controllability and Observability	
	22	2018.11.22	State Feedback and State Estimation	
12	23	2018.11.26	State Feedback and State Estimation	
	24	2018.11.29	Linear Quadratic Optimal Control	
13	25	2018.12.3	Linear Quadratic Optimal Control	
	26	2018.12.6	Stability	
14	27	2018.12.10	Final Exam	
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