

10010EE 565000

隨機程序

(Stochastic Process)

一、課程說明(Course Description)

This course will provide a solid foundation to the theory of stochastic processes from a measure-theoretic and functional analytic point of view. Since the course will be conducted in English, preview of the course material is highly recommended.

二、指定用書(Text Books)

E. Wong and B. Hajek "Stochastic processes in engineering systems"

三、參考書籍(References)

- 1.W. Feller "An introduction to Probability theory and applications" Vols. I & II
- 2.J. Doob "Stochastic Processes" Wiley
- 3.A. Bobrowski "Functional Analysis for Probability and Stochastic Processes" 2005
Cambridge University Press
4. H. H. Kuo "Stochastic integration", 2007 Springer-Verlag

四、教學方式(Teaching Method)

Lectures

五、教學進度(Syllabus)

1.Review of probability theory.

random variables, random vectors, measures on finite dimensional spaces, convergence concepts, conditional expectations.

2. Random processes

Basic definitions; separability and measurability of processes, Brownian motion, martingales, Markov processes, and stationary processes. Examples will be taken from some important random processes (asynchronous binary signaling, Poisson counting process, random telegraph signal, digital modulation using phase-shift keying, Birth-death Markov chains, ...); Continuous-time linear systems with random inputs (White noise); Some useful classifications of random processes; Wide-sense stationary processes and LSI systems; Periodic and cyclostationary processes; Vector processes and state equations.

Mean-square (m.s) calculus; m.s. stochastic integrals, m.s. stochastic differential equations; Ergodicity; Karhunen-Loeve expansion; Representation of bandlimited and periodic processes.

3. Applications to signal processing

Estimation of random variables; Bochner-Khintchine theorem, spectral measures

and random measures, white noise and white noise integrals, sampling theorem and filtering theory

4. Stochastic integral and stochastic differential equations (if we have time)

六、成績考核(Evaluation)

Homework: 30%, Midterm Examination: 30% and Final Examination: 40%

七、可連結之網頁位址

see my webpage

