

Probability for Engineers

Schedule:

Lectures: WeFr 03:00PM - 04:20PM, Rm 4620, Lift 31-32.

Tutorial (T1): Th 11:00AM - 11:50AM, Rm 2407, Lift 17-18 (126).

Tutorial (T2): Fr 04:30PM - 05:20PM, G009B, CYT Bldg.

Instructor:

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TAs:

- XIE Jize. Email: jxiebj@connect.ust.hk
- ZHANG Kunbo. Email: kzhangce@connect.ust.hk
- ZHENG Kaixin. Email: kzhangce@connect.ust.hk

Course webpage: <http://canvas.ust.hk>

Videos, lecture notes, homework assignments, solutions, and other announcements will be posted on this site. Please check this site regularly.

Course Description: This is a systematic introduction to basic probability theory for engineering, including sample space, calculus of probability, conditional probability, expectation, moments, discrete and continuous probability distributions, limiting theorems, and various applications.

Prerequisites: AL Pure Mathematics; AL Applied Mathematics; MATH 1013 and MATH 1014.

Exclusions: LIFS 3150, ISOM 2500, MATH 2411, MATH 2421.

Course Learning Outcomes: The course will demonstrate how to apply probability theory to gain insight into real problems and situations. Carefully developed coverage of probability motivates probabilistic models of real phenomena. The objective is to gain an intuitive understanding of random phenomena, and be familiar with probability tools most often used by practicing engineers and scientists. Upon the completion of this course, you will be able to:

- Understand elements of probability
- Analyze randomness by using general probability theory
- Be familiar with a range of widely used special random variables
- Calculate the probability of random events and expectation
- Understand and be able to apply limiting theorems in probability

Textbook (optional):

- *A First Course in Probability*. Sheldon M. Ross, Global Edition, Tenth Edition, Pearson.

Comprehensive and systematic class notes, homework, and homework solutions will be posted on Canvas. The book is not required but recommended.

Tentative Course Outline:

1. Preliminaries
 - Counting, combinatorics, and classic probability
 - Basis calculus
2. Elements of Probability
 - Sample space and events
 - Axioms of probability
 - Conditional probability
 - Bayes rule
 - Independence
3. Random Variables
 - Discrete random variables
 - Continuous random variables
 - Joint distribution and covariance
4. Moment
 - Expectation
 - Variance and higher-order moments
 - Moment generating function
 - Conditional expectation
5. Limiting Theorems
 - Law of large numbers
 - Central limit theorems

Grading: midterm (30%), final (50%), homework (20%).

- Midterm is scheduled on **Oct.23(Wednesday)** at lecture time, location TBD; In addition, there will be a final exam scheduled by the university. During exams, you will not be allowed to use books or notes. However, a specified cheat sheet will be allowed. Only specified models of calculators will be allowed. (Smart devices like Iphone or calculators with memory functions are strictly prohibited.)
- Homework should be turned in at the end of tutorial, or during TA's office hours, or by hand to TA's office before the due date. Late submission will NOT be accepted for any reason. However, you are allowed to drop the lowest homework ONCE.
- You may discuss your homework with instructor, TA, fellow students, and others. However, you are expected to write up your solutions on your own.

Course Code

- It is very important and strongly recommended to attend the lecture and tutorial.
- Respect others: no cell-phone and computer noise, no talking in class. If you are late due to various reason, please enter the classroom quietly.
- Checking on grading must be done within one week after handing out the graded homework or midterm exam.
- Make-up midterm exam will only be given if you have a compelling reason, e.g. being hospitalized. Official written documents by a doctor are required to support your claim.