

# EE1004

## Part 2

Statistics and Probability

# Lecturer

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# Teaching Schedule

Teaching Week	Activity	Details
Week 8 (21 October)	Lecture 1 (Part 2)	Statistics and Probability
Week 9 (28 October)	Lecture 2 (Part 2)	Random Variable
Week 10 (4 November)	Lecture 3 (Part 2)	Continuous Probability Distributions
Week 11 (11 November)	Lecture 4 (Part 2)	Estimation in Statistics & Procedure for a Statistical Test
Week 12 (18 November)	Test 2	Lecture 1 to Lecture 4 (Part 3)
Week 13 (25 November)	Revision / Make-up	Lecture & Tutorial

# Syllabus

## Lecture 1: Statistics and Probability

- Introduction to statistics and probability and relationship between them
- Introduction to basic concepts of data statistics: variable, population, sample, mean, variance, standard deviation, simple random sampling, law of large numbers, statistical experiment
- Introduction to basic concepts of probability: sets, subsets, element, sample point, event, sample space, set operations (union, intersection, complement), probability of an event
- Rules of Probability: subtraction, multiplication, addition, probability of a sample point, Bayes' theorem

## Lecture 2: Random Variable

- Definition of random variable
- Discrete vs. continuous random variables
- Discrete random variable: discrete probability distribution, cumulative probability, mean, variance
- Continuous random variable: continuous probability distribution, probability density function (pdf)
- Examples for discrete probability distributions: e.g. Binomial probability distribution, Poisson probability distribution

# Syllabus

## Lecture 3: Continuous Probability Distributions

- Normal probability distribution (aka Gaussian distribution): the empirical (or 68-95-99.7) rule
- Standard normal distribution: standard score or z-score
- Student's t distribution: t statistic or t score, degrees of freedom,  $\alpha$  value, cumulative probability, T Distribution Calculator

## Lecture 4: Estimation in Statistics & Procedure for a Statistical Test

- Estimation in Statistics
  - Confidence interval: confidence level, sample statistic and margin of error.
  - Margin of error = critical value x standard deviation/error of the statistic
- Procedure for a Statistical Test
  - Statistical Hypotheses: Null hypothesis, Alternative hypothesis
  - Decision Errors: Type I error, Type II error
  - Decision Rules: P-value, significance level ( $\alpha$ )
  - One-Tailed and Two-Tailed Tests
  - Procedure of Hypothesis Testing

# Textbook

Sheldon M. Ross *Introduction to probability and statistics for engineers and scientists*  
Fifth edition. London, UK ; San Diego, CA :  
Academic Press, 2014.

Note that **free** electronic version of the  
textbook can be obtained through CityU  
library web site.

