

課程名稱：機率論

開課年級：二年級

學分數：3 學分

課程內容：

- 1. Combinational Analysis:** The Basic Principle of Counting, permutations, Combinations, Multinomial Coefficients.
- 2. Axioms of Probability:** Sample Space and Events, Axioms of Probability, Some Simple Propositions.
- 3. Conditional Probability and Independence:** Conditional Probabilities, Bayes' Formula, Independent Events.
- 4. Random Variables:** Discrete Random Variables, Expected Value, Expectation and Variance of a Function of a Random Variable, The Bernoulli, Binomial, Poisson, Geometric, Negative Binomial, Hypergeometric, and Zeta Random Variables.
- 5. Continuous Random Variables:** Expectation and Variance of Continuous Random Variables, The Uniform, Normal, Exponential, Gamma, Weibull, Cauchy, Beta Distributions.
- 6. Jointly Distribution Random Variables:** Joint Distribution Functions, Independent Random Variables, Conditional Distributions.
- 7. Properties of Expectation:** Expectation of Sums of Random Variables, Covariance, Variance of Sums, and Correlations, Conditional Expectation and Prediction, Moment Generating Functions.
- 8. Limit Theorems:** Chebyshev's Inequality and the Weak Law of Large Numbers, The Central Limit Theorem, The Strong Law of Large Numbers.
- 9. Additional Topics in Probability(optional):** The Poisson Process, Markov Chains, Surprise, Uncertainty, and Entropy, Coding Theory and Entropy.
- 10. Simulation(optional):** General Techniques for Simulating Continuous Random Variables, Simulating from Discrete Distributions, Variance Reduction Techniques.