

## STA 4821 Stochastic Models for Computer Science

**Credits:** 3

**Text book, title, author, and year:** *A First Course in Probability*, by Sheldon Ross, Pearson, 9<sup>th</sup> Edition, 2012

- a. **Supplemental materials:** none.

### Specific course information

- a. **Catalog description:** Basic principles of probability and statistics for modeling and experimentation in computer science. Topics from probability and statistics include basic concepts, conditional probability, random variables, distribution and density functions, stochastic processes, the central limit theorem, and simulation; applications include computer system performance evaluation, fault-tolerant computing, software reliability, telecommunications traffic analysis.
- b. **Prerequisites:** MAC 2254 or MAC 2312
- c. **Required, elective, or selected elective:** required

### Specific goals for the course

- a. **Specific outcomes of instruction:** To provide certain technical skills that are important in computer science and engineering applications; to provide a feeling and appreciation of statistical concepts and reasoning in everyday life; and to show, in passing, that the subject is interesting, enlightening, and sometimes surprising. To examine the relationship between theory (mathematical model) and experiment (simulation).

### Brief list of topics to be covered:

- Events, sample space, axioms of probability
- Conditional probability, independence
- Random variables
- Distribution and density functions; mean and variance; convolution
- Uniform, binomial, exponential, normal, and other distributions
- The Poisson process
- Simulation, the inverse transform method
- Laws of large numbers, the central limit theorem
- Queues, reliability, or other applications