

“*Suam habet fortuna rationem.*” (“*Chance has its reasons.*”)

Petronius

MATH 461/661: Probability Theory

TR 9:30 - 10:45 A.M.; AB 206

Instructor: U. Tuncay Alparslan (augur@unr.edu)

For phenomena arising in areas such as

- economics and management (*finance, insurance, production systems, etc.*),
- biology (*ecological systems, genetics, population dynamics, etc.*)
- computer science (*networks, artificial intelligence, algorithms, etc.*)
- physics and electronics (*particle physics, quantum theory, etc.*)
- (and many more),

it is essential to construct realistic mathematical models to better understand the underlying structure. In doing so one needs to take into account the inherent variation (randomness) that the quantities of interest exhibit. This is usually accomplished by choosing probabilistic models. This course will be an intermediate treatment of the mathematical theory needed to construct such models.

We will discuss a subset of the following topics: Axioms of probability; combinatorial probability and equally likely outcomes; random variables and random vectors (univariate and multivariate distributions); expectation, variance, and covariance; moment generating functions; Chebyshev's inequality and Weak Law of Large Numbers; important classes of discrete and continuous random variables; transformation theory; conditional distribution and mixed random variables; conditional expectation and conditional variance; Law of Large Numbers and Central Limit Theorem.

Text: Instructor's lecture notes along with a list of references to be announced.

Prerequisites: MATH 283 R with a "C-" or better or consent of the instructor.