Tennessee Technological University
Mathematics Department

MATH 6370-6380: Probability Theory and Stochastic Processes I-II

I. COURSE DESCRIPTION FROM CATALOG:

Probability theory of sets, random variable distribution and characteristic functions, convergence, limits and law of large numbers, convolutions, compound distribution, recurrent events, random walk models, Markov chains, homogeneous, and queuing processes. Lec. 3. Cr. 3.

II. PREREQUISITE(S):

MATH 6370: C or better in MATH 4480 or MATH 5480.
MATH 6380: C or better in MATH 6370.

III. COURSE OBJECTIVE(S):

To study the Combinatorics, Theoretical Probability, Conditional Probability, Bayes Rule, Expectations Covariances, Generating Functions, Conditional Expectations, Chebysheves and other Inequalities, Limit Theorems, Stationary Stochastic Processes, Markov Chain, Random Walk, Markov Processes and Queuing Process.

IV. STUDENT LEARNING OUTCOMES:

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Upon successful completion of the course the student will be able to understand fundamental ideas of probability theory and stochastic processes involving Brownian motions; develop basic skills to apply stochastic calculus and solve stochastic differential equations in problems and applications requiring a stochastic model. Examples of stochastic model include Kalman-Bucy filtering problem and Black-Sholes model of call options.

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Upon successful completion of this course students will be able to understand fundamental ideas of Poisson processes, counting processes, and general framework of martingale, and develop basic skills to apply martingale and nonparametric approach in survival analysis of data involving time points of event. Examples of survival analysis include Kaplan-Meier estimator, logrank statistics, and Cox regression model.

V. TOPICS TO BE COVERED:

Chapter 1: Elements of Stochastic Processes
Chapter 2: Markov Chains
Chapter 3: The Basic Limit Theorem of Markov Chains and Applications
Chapter 4: Classical Examples of Continuous Time Markov Chains
Chapter 5: Renewal Processes (Through section 4)

VI. ADDITIONAL INFORMATION:

VII. POSSIBLE TEXTS AND REFERENCES:

A Introduction to Stochastic Modeling, 3rd edition by Karlin and Taylor
A First Course in Stochastic Processes, 2nd edition by Karlin and Taylor

VIII. ANY TECHNOLOGY THAT MAY BE USED:

IX. STUDENT ACADEMIC MISCONDUCT POLICY

Maintaining high standards of academic integrity in every class at Tennessee Tech is critical to the reputation of Tennessee Tech, its students, alumni, and the employers of Tennessee Tech graduates. The Student Academic Misconduct Policy describes the definitions of academic misconduct and policies and procedures for addressing Academic Misconduct at Tennessee Tech. For details, view the Tennessee Tech's Policy 217 – Student Academic Misconduct at Policy Central.

X. DISABILITY ACCOMMODATION

Students with a disability requiring accommodations should contact the Accessible Education Center (AEC). An Accommodation Request (AR) should be completed as soon as possible, preferably by the end of the first week of the course. The AEC is located in the Roaden University Center, Room 112; phone 931-372-6119. For details, view the Tennessee Tech's Policy 340 – Services for Students with Disabilities at Policy Central.