STAT-STATISTICS

STAT 3110. Statistics for Engineers and Scientists
3 Credits (3)
Modern probability and statistics with applications to the engineering sciences.
Prerequisite(s): C - or better in MATH 1521G or MATH 1521H.

STAT 4210. Probability: Theory and Applications
3 Credits (3)
Basic probability distributions including binomial, normal; random variables, expectation; laws of large numbers; central limit theorem.
Prerequisite(s): C- or better in MATH 2530G and C- or better in at least one-3000 level MATH or STAT course.
Learning Outcomes
1. Be able to compute discrete probabilities using combinatorial methods.
2. Understand and use conditional probability, independence and Bayes' Formula to compute probabilities.
3. Demonstrate understanding and use of discrete and continuous random variables including Bernoulli, Binomial, Poisson, Geometric, Normal, Exponential and Gamma.
4. Understand joint and conditional probability distributions and use them to compute probabilities.
5. Learn about basic limit theorems such as the Central Limit Theorem and the Laws of Large Numbers.

STAT 4220. Statistics: Theory and Applications
3 Credits (3)
Point and interval estimation; sufficiency; hypothesis testing; regression; analysis of variance; chi-square tests. May be repeated up to 3 credits.
Prerequisite: C- or better in STAT 4210.

STAT 5210. Probability: Theory and Applications
3 Credits (3)
Same as STAT 4210 with additional work for graduate students.

STAT 5220. Statistics: Theory and Applications
3 Credits (3)
Same as STAT 4220 with additional work for graduate students. May be repeated up to 3 credits.

STAT 5230. Elementary Stochastic Processes
3 Credits (3)
Markov chains, Poisson processes, Brownian motion, branching processes, and queuing processes, with applications to the physical, biological, and social sciences. May be repeated up to 3 credits.
Prerequisite: STAT 5210 or consent of instructor.

STAT 5310. Foundations of Probability
3 Credits (3)
Probability spaces, expectation and conditional expectation, limit theorems and laws of large numbers. May be repeated up to 3 credits.
Prerequisite: MATH 5460.

STAT 5320. Advanced Topics in Stochastic Processes
3 Credits (3)
Markov processes, martingales, Brownian motion, the Ito calculus, stochastic differential equations.
Prerequisite: STAT 5310.
Learning Outcomes
1. Understand the notion of a stochastic process.
2. Learn the basic properties of special stochastic processes: Markov processes and martingales.
3. Study and assimilate the fine properties of a particular instance of the stochastic process known as Brownian motion that is both a Markov process and a martingale.
4. Understand the application of Brownian motion known the Ito calculus and become fluent in its use.
5. Apply the Ito calculus to study stochastic differential equations.

STAT 5335. Linear Models
3 Credits (3)
Core topics include distribution of quadratic forms, theory of regression, analysis of variance and covariance in linear models. Advanced topics chosen from random and mixed linear models, generalized linear, growth curve, and nonlinear models, quartile and copula regression. May be repeated up to 6 credits.
Prerequisite(s): STAT 5330.

STAT 5340. Advanced Theory of Statistics I
3 Credits (3)
Testing hypotheses, probability and sufficiency, uniformly most powerful tests, unbiasedness, invariance, and minimax principle.
Prerequisite: STAT 5220 or consent of instructor.

STAT 5330. Continuous Multivariate Analysis
3 Credits (3)
Theory and applications of the multivariate normal distribution. May be repeated up to 3 credits.
Prerequisite: STAT 5220, or consent of instructor.

STAT 5345. Advanced Theory of Statistics II
3 Credits (3)
Estimation of parameters; unbiased estimators; equivariance; Bayes properties; large sample theory and optimality. May be repeated up to 3 credits.
Prerequisite: STAT 5340 or consent of instructor.

STAT 5348. Topics in Probability and Statistics
3 Credits
Topics in modern probability and statistics. The material covered will reflect current research topics in the field and may vary each time the course is offered. To be taken up to 3 times. May be repeated up to 9 credits.
Learning Outcomes
1. Gain knowledge of advanced methods in the areas of probability and statistics.
2. Develop potential to explore literature in the areas of of probability and statistics.
3. Develop potential to conduct supervised research in the areas of of probability and statistics.